5th International Conference

Climate Change and Its Impact (CCI-2023)

June 9-11, 2023

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Volume: 2

ISBN 978-9-35-396006-3

Souvenir Cum Abstracts/Proceedings Book

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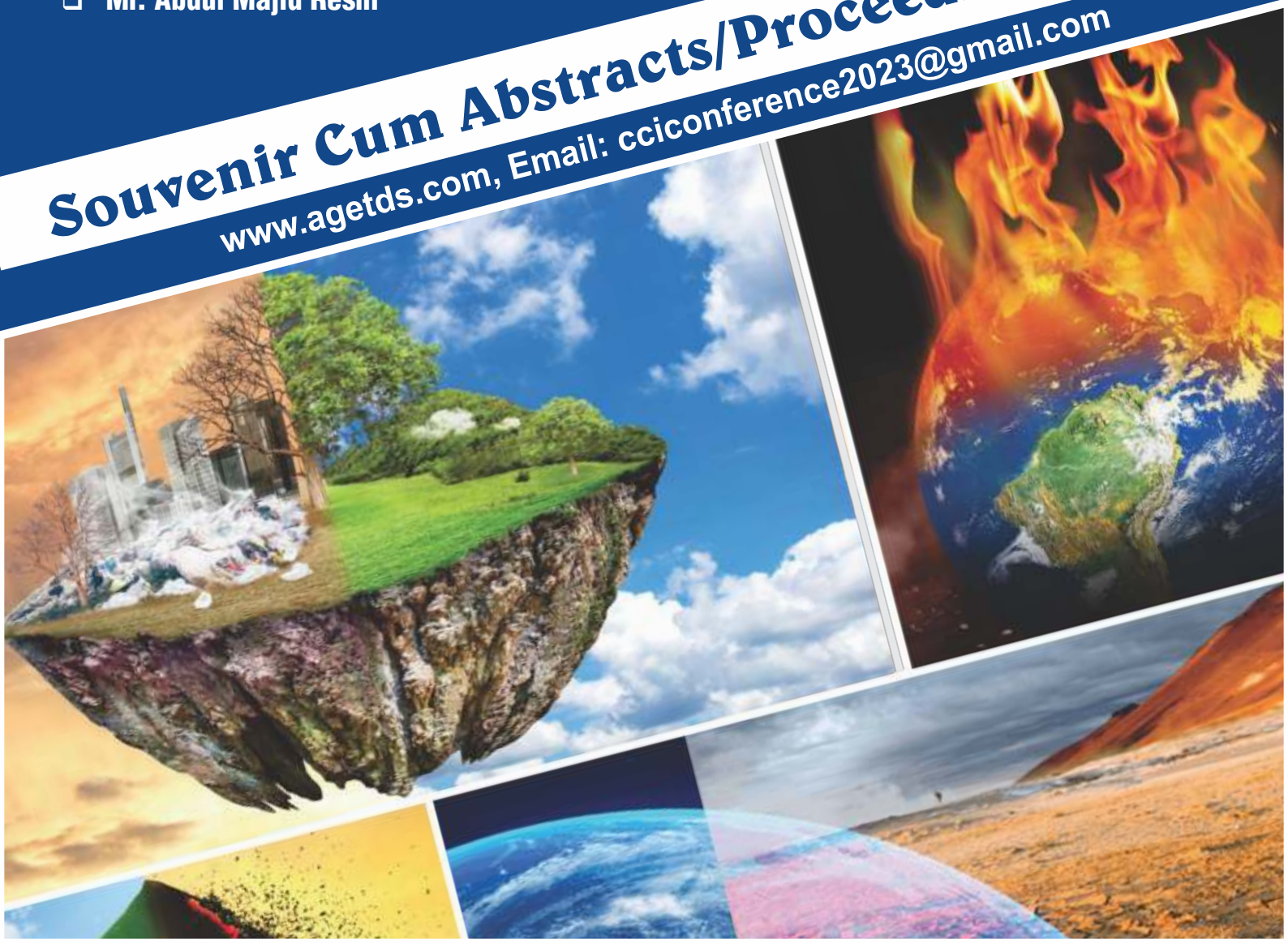

Climate Change and Its Impact

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First Edition 2023, Volume 2

ISBN: 978-93-5396-006-3

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Published by: Self Published

E-Publication

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Message from Patron

It gives me immense pleasure to know that the Agricultural & Environmental Technology Development Society (AETDS), U.S. Nagar, UK, India is going to organize the *5th International Conference on Climate Change and its Impact* (CCI-2023) in collaboration with Sher-e-Bangla Agricultural University, Dhaka-1207 along with other reputed organizations.

The demand for agricultural production will be increased to feed the fast-growing human population. However, climate change adversely affects different forms of agriculture and causes disorders in ecosystem functioning. However, some adaptive strategies showed beneficial outcomes for some crops under moderate climatic conditions. Therefore, developing different crop varieties with climate resilience can provide better food sources to alleviate poverty, especially in Asia and Africa. Moreover, the release of greenhouse gases has significantly raised and predicted an average rise of 0.8 °C in annual temperature, causing global warming. It is estimated that the world population will be around 9 billion by 2030. At the same time, it would be difficult to deal with changing climate for the provision of food resources. Therefore, it is necessary to develop resilient crops against environmental conditions. In addition, the integrationof molecular plant breeding and genome editing, as well as engineering approaches, could assist in developing climate-resilient crops.

I am delighted to see that this conference has been designed to focus on various scientific tracks covering major areas of research on Climate Change: Challenges and Mitigation. This Conference anticipates bringing together the global scientific community, policymakers, administrators, industry representatives, and other stakeholders for real brainstorming on these glaring issues related to the current crisis of global agriculture.

I am thankful to the organizers for including Sher-e-Bangla Agricultural University as one of the co-organizers. I would like to thank the organizing institutes of this conference and thank the people whose dedicated efforts and creative plans will make the conference successful. Finally, I wish the grand success of the 5th International Conference on Climate Change and its Impact (CCI-2023).

Dated: 09-06-2023 **(Md. Shahidur Rashid Bhuiyan)**

Sher-e-Kashmir
University of Agricultural Sciences & Technology of Kashmir
www.skuastkashmir.ac.in

Prof. Nazir A. Ganai
Vice-Chancellor

Message

Climate change is more than obvious now and we are increasingly recognising the potential implications in the form of extreme weather events, declining crop productivity and shifting of regional crop suitabilities. The worst-case scenario predictions of climate models are expected to significantly dent our efforts for ensuring sustainable food supplies for about 9 billion people by 2050 and achieve broader targets of UN SDG's. There is a global appreciation of the fact that climate change will be the greatest challenge that we have to offset in contemporary times and a holistic approach for sustaining food systems and ecosystem services will be needed. The anthropogenic driven changes in climate will result in rise in global surface temperatures, changes precipitation patterns, increased CO_2 in atmosphere as well as overall changes in earths broader climate patterns.

Agriculture is a major contributor to climate change and a major sufferer of its impacts also. Significant amounts of nitrous oxide and methane are emitted by agricultural soils. Animals, rice soils and garbage dumps emit significant amounts of methane. The COP27 estimates predict about 3.4 million deaths per year by the end of this century by climate change, with India alone accounting for an estimated 1 million related deaths. National Innovations in Climate Resilient Agriculture (NICRA) has projected that the yield of rainfed rice, irrigated rice, wheat and maize are projected to reduce by 2.5%, 7%, 6-25% and 18-23%, between 2050-2080, respectively. The impacts assessment studies of fragile areas like Kashmir Himalayas are highly alarming with limiting adaptive capacities and climate investment.

Any deliberation on climate change, its impacts and strategies for its mitigation and adaptation is timely and worth the investment of time and effort. There is a need to polarise public opinion and generate awareness and resolve to address various policy and research issues of climate change and to evolve a tangible set of climate action strategies that incorporates technology, policy and political support for creating a sustainable planet habitat. In this context the international conference on Climate Change and Its Impact (CCI) is a timely effort by organisers to converge global expertise and opinion for a fruitful outcome. I congratulate the organisers for organising this important and timely conference and believe that the deliberations of the conference shall be fruitful in furthering our appreciation of climate change and sustainability and evolve a science-based road map and policy recommendation for a sustainable future.

(Nazir Ahmad Ganai)

Place: Shalimar, Srinagar
Dated: 25.05.2023

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Mid-West University
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Ref.No.:

Date: 24 May 2023

Message from the Vice-Chancellor

It is my great pleasure to issue a message that Agricultural & Environmental Technology Development Society(AETDS), U.S., Nagar, UK, India is organizing the 5th International Conference on "**Climate Change and its Impact (CCI-2023)**" in collaboration with Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-K), Srinagar, J & K, India; University of Agricultural Sciences, Raichur Karnataka, India; Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani M.S, India; Mid-West University, Surkhet, Nepal and Sher-e-Bangla Agricultural University, Dhaka, Bangladesh at Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-K), Srinagar, J & K, India during 9-11 June, 2023.

The conference topic "Climate Change and its Impact" is one of the urgent and serious concerns for topic of discussion globally. Climate change has become the biggest challenge to the mankind creating huge impact on socio-economic development of any country. The international conference is the best platform where researchers, professionals and students from different institutions and Universities nationally and internationally come together to discuss such issues and related research outcomes for effective solutions to the issues. This platform will also help to establish a good collaboration between universities and industrial firms to address the current world issues. I believe the sharing of the outcomes of researches, articles, ideas, innovations and experiences, of different expertise and researchers under different sub-themes will be a milestone for the solutions to ongoing challenging issues of climate change.

I congratulate the organizing committee of the conference for organizing the conference addressing the current world issues. I would like to thank distinguished keynote speakers, academicians, researchers and participants for their valuable knowledge sharing and submitting constructive papers and abstracts for this conference.

I wish the conference a grand success !

Prof. Dr. Nanda Bahadur Singh
Vice-Chancellor
Vice-Chancellor

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UNIVERSITY OF AGRICULTURAL SCIENCES, RAICHUR
[ICAR, NAAC accredited and UG u/s 12(B) & 2(f) approved]

Dr. M. HANUMANTHAPPA
M.Sc.(Agri.), Ph.D., PGDAEM
Vice-Chancellor

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FOREWORD

Major adverse impacts of climate change on agriculture are owing to increase in temperature, change in rainfall pattern, weather hazards, decline in soil and water quality, shifting dynamics of insects, diseases, soil flora and fauna, intrusion of sea water on land and biotic and abiotic stresses arising due to climatic extremes. There could be a few positive impacts of climate change on agriculture in some locations because of change in temperature and moisture regimes.

Greenhouse gas emissions that result from the extraction and burning of fossil fuels are major contributors to both climate change and air pollution. Many policies and individual measures, such as transport, food and energy use choices, have the potential to reduce greenhouse gas emissions and produce major health co-benefits, particularly by abating air pollution.

To address the long-term negative impacts of climate change and short and medium term impacts of climatic variability on agriculture, there is a need for sustained research on increased adaptation and mitigation, capacity building, development activities, and bringing necessary changes in policies. These actions have to be accompanied by long-term sustained actions towards generation and strengthening of strategic knowledge system in key impact sectors like water, agriculture, energy, health, etc. by building human and institutional capacity.

Climate adaptation actions need to be implemented more intensely in synergistic way involving various programmes of central as well as state governments. The challenges in climate change will call for a paradigm shift in our research approach to harness the potential of the modern science, innovations in technology generations and diversity and enabling policy and investment support.

I wish all the delegates a wonderful time, fruitful stay and great scientific sessions for three days. I am sure deliberations of the international conference Climate Change and its Impact (CCI-2023) will have far reaching effect for developing the futuristic strategy to the farming community on climate change management.

I wish for commendable success of the conference.

Date: 29-05-2023
Place: Raichur

[M. Hanumanthappa]
Vice chancellor

VASANTRAO NAIK MARATHWADA KRISHI VIDYAPEETH

Parbhani - 431 402 (Maharashtra State) INDIA

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MESSAGE

I extend my warmest greeting to all participants and attendees of 5th International Conference on "Climate Change and It's Impact (CCI 2023)" organised at Srinagar (J&K), India during 9th to 11th June 2023 by Agricultural & Environmental Technology Development Society (AETDS), Uttarakhand (India) in collaboration with our University Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S.). The other collaborators of the conference are Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K) Srinagar (J&K), University of Agricultural Sciences Raichur (Karnataka), Mid-West University, Surkhet, (Nepal), and Sher-e-Bangla Agricultural University, Dhaka (Bangladesh). This momentous event brings together scholars, researchers, policymakers, and industry experts from around the world, united by a shared concern for the profound effects of climate change on our agricultural systems.

Climate change is one of the most pressing challenges of our time, and its impact on agriculture is significant. Rising temperatures, changing precipitation patterns, and extreme weather events are affecting the very foundations of our food production systems. As we strive to feed a growing global population, it is imperative that we understand, adapt to, and mitigate the consequences of climate change to ensure sustainable and resilient agricultural practices.

This conference provides a platform for multidisciplinary dialogue and collaboration, where leading minds in climate science, agricultural engineering, agronomy, ecology, economics, and policy can come together to exchange knowledge, share innovative solutions, and foster meaningful partnerships. The range of topics covered in this conference is vast, encompassing the latest research findings, technological advancements, and best practices in the field. Through this conference, we seek to not only deepen our understanding of the complex interactions between climate change and agriculture but also identify practical strategies to address the challenges. By examining the nexus between climate change and food security, we can explore sustainable farming practices, resilient crop varieties, water management systems, and policy frameworks that promote adaptation and mitigation measures.

I extend my heartiest gratitude to the organizing committee, session chairs, keynote speakers, and all the contributors for their invaluable efforts in making this conference a resounding success. Together, we have the power to shape a more sustainable future for agriculture in the face of climate change. Let us seize this opportunity to forge new partnerships, spark innovative ideas, and drive meaningful change. I am confident that the outcomes of this conference will serve as a guiding light in our collective journey toward a resilient and climate-smart agriculture.

(Indra Mani)

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From the Desk of the President AETDS, India

It's my indeed pleasure to welcome all the members to the 5th International conference on "Climate Change and its Impact (CCI, 2023)."

I am glad to convey my greetings as a president of AETDS and Chairperson of the International Conference which is going to be organized jointly by Agricultural & Environmental Technology Development Society (AETDS), U.S. Nagar, Uttarakhand, India, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K) Srinagar, J&K., India, University of Agricultural Sciences Raichur, Karnataka, India, Mid-West University, Surkhet, Nepal, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, M.H. India and Sher-e-Bangla Agricultural University, Dhaka, Bangladesh in the fort month of June i.e., (9th June, 2023-11th June, 2023).

The Earth is rendering us all the resources to meet our daily needs, however the vigorous and indiscriminate usage of these resources is posing serious threat in the form of pollution and climate change respectively. Climate change consequences threaten the availability of our food and food production. Farmers are the firsthand to experience and impacts of climate change. It is high time for us to take necessary measures to mitigate these consequences which otherwise may risk the existence of our future generations.

The plenary sessions, interactive discussions on Climate Change are forth to derail the concrete outputs that can mitigate the disastrous consequences of climate change. The conference will also provide a platform for brighter minds to get together and ponder on many global issues and suggest innovative actions to meet the challenges. It is indeed a laudable endeavor on the part of AETDS, to organize the conference on such a large scale and provide a gathering of more than 1100 participants all around the globe. I hope all the participants will enjoy this academic fest. I wish the conference a grand success.

We're looking forward to an excellent meeting with renowned scientists, academicians, research scholars and youth from different countries around the world and sharing new and exciting results during the conference.

(Prof. C. P. Singh)
Conference Chairperson
President, AETDS, Society, U.S. Nagar, Uttarakhand, India
Former Prof. GBPUAT, Pantnagar, India

Professor Dr. Mirza Hasanuzzaman, Department of Agronomy, Sher-e-Bangla Agricultural University, Dhaka-1207
&
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Message from Director

I would like to take the opportunity to express my profound joy at the event of the *5th International Conference on Climate Change and its Impact* (CCI-2023) jointly organized by theAgricultural & Environmental Technology Development Society (AETDS), U.S. Nagar, UK, India with Sher-e-Bangla Agricultural University, Dhaka-1207 along with other widely known organizations at Shri Guru Ram Rai University, Dehradun, U.K., India during 8-11 June 2023.

Climate change has been perceived as one of the biggest threats to socioeconomic development, the impact being more pronounced in the developing nations. The world's most climate change susceptible area is Southeast Asia. Agriculture is undoubtedly the backbone of this region. Thus, in brief, the fact is that the development of agriculture is the hard core of economic growth. This area has a relatively high population density, and a sizeable section of the population depends on agriculture for a living. In the future the trend of global warming will depend on human anthropogenic activities such as fossil fuel burning, deforestation, intensive farming and others that emit carbon dioxide and other greenhouse gases. Global crop production has been noticeably hampered in recent times and might be carried out for the next few decades as a consequence of climatic abnormalities such as irregularities in rainfall, increasing CO_2 concentration, and temperature. Integration of these factors affects normal growth duration, physiological responses of crops, brings pest outbreaks and unpredictable phenomena, and squeezes the available resources for agriculture, which increases the price of raw products for agro-industries. While thedeveloped nations have trained their system to implement climate smart agricultural practices,the resource challenged farmers of the developing countries may not be able to implement many of the climate-resilient technologies at the cost of immediate profit. Environmental safety and sustainability are put as the last option by the resource-poor farmers. Thus, the small andmarginal landholders continue to remain vulnerable to climate change and related disasters. Therefore, *5th International Conference on Climate Change and its Impact* for this year is of global preference today.

I hope the deliberations and sharing of the core ideas, experiences, creative imaginations, innovations, and formulas of different expertise under different sub-themes will be a milestone for the solutions to ongoing challenging issues regarding climate change and related actions in agriculture. Indeed, I believe that such kind of scholarly gatherings could play a vital role in making the world a better place and also making ready to tackle any difficult situations in the near future.

As a Director of the Conference, I am grateful to the researchers and academicians of national and international level and others who have offered their collaboration by submitting constructive papers and abstracts for this conference.

Finally, I wish the conference an eminent accomplishment in achieving its goal towards climate change adaptation thus enlightening global innovative in agricultural, forestry and applied sciences.

UNIVERSITY OF AGRICULTURAL SCIENCES, RAICHUR

[ICAR, NAAC accredited and UGC u/s 12(B) & 2(f) approved]

Dr. M.G. Patil

M.Sc. (Horti.), Ph.D

Director of Education

MESSAGE

Widespread improvements in the quality of life of many of the world's populations have gone hand-in-hand with increased demands on natural resources. The planet is struggling to keep up, with increases in the average global temperature and the frequency of extreme weather events transforming ecosystems around the world and threatening entire species of plants and animals. Forests are drying up, there is less rainfall and more fires, and the glaciers of both the North and South Poles are shrinking. The consequences of climate change affect all of us, but in order to react and adapt to it, we must first understand it.

The threat of climate change, manifested in the increase of extreme weather conditions such as, droughts, storms or floods, has been recognized as a global priority issue. Climate change is a sustainable development challenge, with broad impacts not only on the environment but also on economic and social development. The effects of climate change will vary among regions, and between different generations, income groups and occupations as well as between women and men. Due, in part, to their lower adaptive capacities, developing countries and people living in poverty are likely to experience significant impacts.

With a global and regional focus, the conference will cultivate powerful discussions amongst the academics, journalists, students, and social movements that are framing the future narrative of this issue in the context of climate justice. The discussions in the conference should make localbodies environment-friendly, saving water, saving energy, reducing waste, and e-wastes, adopting healthy lifestyles, adoption of natural farming, promotion of millets.

I appreciate this multi-disciplinary team for documenting overall status of climate change, impacts, programmes and policies related to agriculture in India. I am sure the conference on **Climate Change and its Impact (CCI-2023)** and its technical document will be useful for various stakeholders associated with the process of climate change adaptation in agriculture sector.In this regard, I wish the organizers, collaborators, delegates, scientific faculty, farmers and student community for the great success of the conference.

I wish the conference a great success.

Date: 29-05-2023
Place: Raichur

(M.G. Patil)
Director of Education

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date : 22-5-2023

Massage

I am glad to know that 5th International Conference on "Climate Change and Its Impact (CCI 2023)" will be jointly organized by Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-K) Srinagar, J&K., India, Agricultural & Environmental Technology Development Society (AETDS), U.S. Nagar, Uttarakhand, India, University of Agricultural Sciences, Raichur, Karnataka, India, Vasantrao Naik Marathwada Krishi Vidyapeeth Parbhani, M.H., India; Sher-e-Bangla Agricultural University, Dhaka, Bangladesh and Mid-West University, Surkhet, Nepal at Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-K) Srinagar, J&K., India on June 9-11, 2023. Agriculture is severally affected in all the parts of word by changes in climatic . Climate variability and extreme weather conditions increase multiple stresses not only for crop plants but also for animals by endangering the habitats and the organisms themselves, the animals may not genetically evolve fast enough with the rate at which the climate is changing. So a effective strategy to meet the challenge is essential.

As the ecological relationship between environment, land, food, forestry and agriculture are highly diversified and complex, the interactive discussions by the scientists, researchers, academicians of national and international repute, professionals, research scholars, NGOs, social and extension workers, students, corporate, entrepreneurs, farmers, and others who are actively involved in Research and Development practices related to agricultural and applied sciences, on the issues such as Climate Change; Innovative Approach in Forestry, Agricultural and Allied Sciences; Agroforestry, Natural resource management, Food and Environmental Security ; Life Sciences, Biomedical Sciences, and Biotechnological aspects and AGRI and Animal Husbandry Start ups are the need of the day for the sustainable global growth as well as solution for global warming due to climatic change. Thus, the interactive sessions among the global scientists would definitely come to the conclusion to formulate some useful recommendations for the upliftment and growth of end users worldwide.

The creation of conference souvenir books is one of the key elements of scientific events. In regard to this, I am very happy to see that the Fifth International Conference's Abstract and Souvenir Book will be published. This collection will be very helpful to all of the attendees. I am confidant that this Proceeding will be a true reflection of the organising committee's, workshop secretary's, and all other interested stakeholders' hard work and I would like to congratulate the entire team on this accomplishment.

I hope the conference will be a grand success and wish you all the best.

Dr. Dhirajkumar R. Kadam
Registrar,
VNMKV, Parbhani

Prof. T.H. Masoodi
Director Research

Sher-e-Kashmir University of
Agricultural Sciences and Technology of Kashmir

MESSAGE

I am delighted that the Division of Basic Sciences and Humanities, Faculty of Horticulture, SKUAST-Kashmir in association with Agricultural & Environmental Technology Development Society (AETDS), U.K., India is organizing an International Conference on Climates change and Its Impact (CCI 2023) w.e.f. June 09 – 11, 2023 at SKUAST-K, Srinagar. It is a matter of pride that this conference is attracting academic and industrial participation both nationally and internationally. We at SKUAST-Kashmir aspire strongly to expand our research and innovation horizon, especially in the niche areas of agriculture, horticulture, animal husbandry and veterinary science, forestry, fisheries and sericulture. With such diverse and relatively large participation, I am sure that this conference will achieve its intent – to serve as an effective platform for the research community to learn, share and supplement each other's research, while keeping abreast of the latest trends in this arena. I also hope that this conference (ICED2008) will facilitate the establishment of international joint research programmes and become a forum for the exchange of research ideas. We invite you to use this conference to create new, or to strengthen existing, partnerships between the scientific community, publishers, policy makers and society.

I would also like to stress that in this era of rapid technological advancement, we as researchers will not survive without working in coordination, supplementing and supporting each other's work. I believe that this conference would serve as an effective platform for academic staff, researchers and engineers to learn, network, share and to create an environment for intellectual exchanges which would benefit all parties. Lastly, may I plead that we should work hand-in-hand in our efforts to further enhance our research and development (R&D).

I hope that you will find the conference informative and enjoyable and take this opportunity to make new friends to expand your social contacts.

Have a great and enjoyable stay in Kashmir!

(T.H. Masoodi)
23/5/23

May 23 , 2023
Srinagar

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Ref. No.:

Date: 25/05/2023

Message from the Conference Associate Director

It is an honour to welcome you to 5th International Conference on "Climate Change and its Impact (CCI-2023)" jointly organised by Agricultural & Environmental Technology Development Society (AETDS), U.S. Nagar, UK, India; Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-K), Srinagar, J & K, India; University of Agricultural Sciences, Raichur Karnataka, India; Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani M.S, India; Mid-West University, Surkhet, Nepal and Sher-e-Bangla Agricultural University, Dhaka, Bangladesh at Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-K), Srinagar, J & K, India during 9-11 June, 2023.

I strongly believe that this conference will be a good platform for the researchers, professionals and students from different institutions and Universities to discuss about their ideas, results and research findings related to ongoing challenging issue of climate change. This gathering will surely come up with fruitful solutions for this global issue thus making the world a better place in near future.

I would like to thank distinguished keynote speakers, reviewers, sponsors and participants for their interest and valuable knowledge sharing during the conference.

Wishing for the grand success of the conference.

Associate Prof. Dr. Karan Singh Dhami

COORDINATOR
Graduate School of Agriculture & Forestry
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Prof. Dil Mohamad Makhdoomi
Director Extension

MESSAGE

The planet today is threatened by rising temperature and the biggest challenge confronting the humanity in the present era is the climate change induced by the rising temperature. According to the latest, the second part of sixth assessment report of Intergovernmental Panel on Climate Change (IPCC)- 'Climate Change 2023: Impacts, Adaptation and Vulnerability' released on February 28, 2022, there are observed impacts on climate change that are human-induced, which have accelerated recently with the advent of new extreme events in nature. This has led to widespread losses to both; nature and human society. The report had also found that there is a more than 50% chance that global temperature rise will reach or surpass 1.5 degrees Celsius between 2021 and 2040 across studied scenarios and if emissions continue to remain high, the world may hit this threshold even sooner between 2018 and 2037. Back home, the report also came with a warning for India of dire consequences, if immediate and adequate mitigation or adoption efforts are not put in place.

Agriculture is a sector which contributes to the climate change as well as is affected by it. It contributes to climate change mainly through emission of Green House Gases (GHGs) like Methane (CH4), Carbon dioxide (CO2) and Nitrous Oxide (NO). Methane gets produced during the microbial decomposition of organic matter under anaerobic conditions as in the case of Rice fields when kept submerged in water, the process of enteric fermentation in the ruminants also liberates methane in the atmosphere and the burning of crop residues is also a source of methane emission besides a source of pollution of the atmosphere. Fossil fuel use is the primary source of CO2, another potent greenhouse gas. CO2 also gets emitted from direct human induced impacts through deforestation, land clearing for agriculture and degradation of soils. The Nitrous Oxide gets released in the atmosphere by the use of nitrogenous fertilizers. Since 1970, the GHG emission from agriculture in India has increased by about 80 per cent and this is attributed to the increased use of chemical fertilizers and other inputs in agriculture.

Agriculture provides us the various adoption and mitigation strategies too. The adoption of various climate resilient technologies can help us to mitigate the adverse effects of rising temperature. Simple Resource Conservation Technologies (RCTs) can go a long way in minimizing the negative effects of GHGs in the atmosphere. Minimum or No Till agriculture with crop rotations with legumes reduces water requirements by up to 30 per cent as well as fixes atmospheric Nitrogen in the soil. Sowing across the slope reduces the erosion of soil and subsequent removal of nutrients from the soil thereby maintaining the fertility of the soil. The sloping sides can be planted with grass and trees. Mulching is another simple and one beneficial practice for conserving soil moisture. Technologies like Direct Seeded Rice (DSR) and System of Rice Intensification (SRI) that makes the least use of water should be promoted and adopted. Recycling of farm and animal waste into high quality organic manures also eliminates the risk arising out of use of synthetic fertilizers. Practices like Organic farming and Natural Farming have also the potential to restore the lost vigor of soil and its microbes. Rainwater harvesting also ensures that the excess of water is used judiciously. The most effective way of tackling the climate conundrum is to integrate adoption and mitigation strategies and I do believe that the three-day deliberations in the International Conference, 'Climate Change and Its Impact (CCI-2023)' will review the vulnerabilities, come up with relevant strategies to ensure that the global temperature do not breach 1.5 degrees Celsius limit and will also show all of us a roadmap to take so that the lives, biodiversity and ecosystems can be saved and restored.

I also congratulate the organizers of this international conference for having selected a topic which is most relevant in the present times and wish them a success for this grand event.

Director Extension
SKUAST-K, Shalimar

FACULTY OF HORTICULTURE

Sher-e-Kashmir
University of Agricultural Sciences & Technology of Kashmir,
Shalimar-Sgr, J&K, India-190025

Prof. Shabir A. Wani
Dean

MESSAGE

I am delighted to extend my greetings for the upcoming international conference on "Climate Change and Its Impact (CCI-2023) being organized by the Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K) in association with Agricultural & Environmental Technology Development Society (AETDS), U.K., India w.e.f. June 09 – 11, 2023 at SKUAST-K, Shalimar, Srinagar. This event shall give an opportunity to the agriculture fraternity, especially those who are associated with various areas of crop stress mitigation in context to climate change, to share their ideas and strategize a way forward for evolving an integrated approach for ensuring increased crop productivity and quality under changing climatic scenario. The Conference is a key base and favorable destination for horticulture-oriented business and research in India. The ground situation with our farmers though improving over last four decades has still a lot left to be achieved. Farmers' incomes are still dependent on a good rainfall for irrigation and climate change remains a challenge most of the time, especially for the horticulture crops that are drastically hit by recent climate change events, be it uneven rainfall, hailstorm, floods etc. Such conference will especially help not only the scientists, policy makers, marketing personnel but also students to be sensitized about the problems faced by stakeholders but also show untapped potential of agriculture and horticulture. The exposure will encourage the students to consider horticulture as better and/or alternate career pathway. I congratulate the organizers and wish them a grand success.

S.A.Wani
Dean Faculty of Horticulture

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UNIVERSITY OF AGRICULTURAL SCIENCES, RAICHUR

[ICAR, NAAC accredited and UGC u/s 12(B) & 2(f) approved]

Dr. Gururaj Sunkad
M.Sc. (Agri.), Ph.D., P.D (USA), FIPS, FISMPP.
Dean (Postgraduate Studies)

MESSAGE

Climate change is the defining crisis of our time and it is happening even more quickly than we feared. But we are far from powerless in the face of this global threat. As Secretary-General António Guterres pointed out in September, "the climate emergency is a race we are losing, but it is a race we can win".

No corner of the globe is immune from the devastating consequences of climate change. Rising temperatures are fuelling environmental degradation, natural disasters, weather extremes, food and water insecurity, economic disruption, conflict, and terrorism. Sea levels are rising, the Arctic is melting, coral reefs are dying, oceans are acidifying, and forests are burning. It is clear that business as usual is not good enough. As the infinite cost of climate change reaches irreversible highs, now is the time for bold collective action.

Climate change is impacting human lives and health in a variety of ways. It threatens the essential ingredients of good health, clean air, safe drinking water, nutritious food supply as well as safe shelter and has the potential to undermine decades of progress in global health.

5th international conference is being jointly organized by Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar, Jammu and Kashmir, India, Agricultural and Environmental Technology Development Society (AETDS), U.S. Nagar, Uttarakhand, India, University of Agricultural Sciences, Raichur, Karnataka, India and Mid-West University, Surkhet, Nepal on the theme **Climate Change and its Impact (CCI-2023)** from June 9-11, 2023 is need of the day. I am confident that the proceedings of the conference will be of great use to the well acclaimed scientists, researchers, students, policy makers, farmers, entrepreneurs and stake holders engaged in the area of climate change impact on agriculture.

I wish the conference great success.

Date: 29-05-2023
Place: Raichur

(Gururaj Sunkad)
Dean (Postgraduate Studies)

DIRECTORATE OF EDUCATION

Main Campus Shalimar Srinagar-190025

MESSAGE

It is with great pleasure and excitement that I welcome you all to the 5th International Conference on Climate Change and its Impact, hosted by the Division of Basic Sciences and Humanities Faculty of Horticulture SKUAST K in collaboration with Agriculture & Environmental Technology Development Society, I am delighted to notice that experts, scholars, researchers, and enthusiasts have gathered to deliberate on one of the most critical challenges of our time.

This conference serves as a platform to exchange ideas, scientific findings, and best practices in tackling climate change across diverse sectors as the Climate change poses an unprecedented threat to our planet, ecosystems, and human societies.

Throughout the conference, we aim to foster interdisciplinary discussions, encouraging fruitful collaborations among participants from different backgrounds and disciplines. I am particularly excited about the presentations and panel discussions that will showcase ground breaking research, innovative technologies, and successful initiatives from around the world.

Furthermore, this conference will provide an opportunity for networking and forging meaningful connections. I encourage you to engage in fruitful conversations, build partnerships, and explore avenues for collaboration that will extend beyond the duration of this event. I extend my heartfelt gratitude to the organizing committee, the distinguished speakers, the esteemed sponsors, and all the participants who have contributed to the success of this conference Let us seize this opportunity to make a lasting impact on our planet.

I wish you all an enriching and rewarding experience at the International Conference on Climate Change and its Impact.

Prof. M. A. A SIDDIQUE
Director Education
SKUAST K

VASANTRAO NAIK MARATHWADA KRISHI VIDYAPEETH,PARBHANI
AGRICULTURE TECHNICAL SCHOOL,NANDED,MS,INDIA, 431605

Dr. Nareshkumar E. Jayewar
Ph.D.(Agril. Entomology)
Principal

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Massage

I am glad to know that 5th International Conference on "Climate Change and It's Impact (CCI 2023)" the Agricultural and Environmental Technology Development Society (AETDS), U.K., India in collaboration with Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K) Srinagar, J&K., India, University of Agricultural Sciences Raichur, Karnataka, India, Mid-West University, Surkhet, Nepal, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, M.H. India and Sher-e-Bangla Agricultural University, Dhaka, Bangladesh with focus on various scientific tracks covering major areas of research on Climate Change: Challenges and Mitigation at Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST-K) Srinagar, J&K., India on June 9-11, 2023.

Agriculture production is influenced by climatic and meteorological factors, but today's rising temperatures, precipitation, and CO2 concentrations have a direct impact on crop productivity. Groundwater recharge, the water cycle, soil moisture, livestock, and aquatic species will all be impacted by climate change. Climate change increases the prevalence of pests and diseases, which significantly reduces crop yield. Climate change should be found to be responsible for declining soil fertility, increased salinity, resistance to many insecticides and herbicides, and declining irrigation water quality. So there is a urgent need to address this issue on this context discussion by international scientific community on different prospects of climate resilient agriculture in view of climate change and how climate resilient smart agriculture will definitely help in attaining sustainable livelihood.

Thus, the interactive sessions among the global scientists would definitely come to the conclusion to formulate some useful recommendations for the upliftment and growth of end users worldwide. I am looking forward to an excellent meeting with renowned scientists, academicians, research scholars and youth from different countries around the world and sharing new and exciting results during the conference.

I wish grand success to the international conference.

Dr.Nareshkumar E.Jayewar
Principal
Agriculture Technical school, Nanded

Sher-e-Kashmir
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No: AU/BSH/2023/Est./ 259
Dated: 29- 05 - 2023

MESSAGE

On behalf of the Organizing Committee, I would like to cordially welcome you to the 5th International Conference on Climate Change and Its Impact (CCI 2023) being organized by the SKUAST-K in association with Agricultural & Environmental Technology Development Society (AETDS), U.K., India w.e.f. June 09 – 11, 2023 at SKUAST-K, Srinagar. The objective of this Conference is to provide a forum and opportunity for scientists, academia, industrialists and students to exchange their ideas and assess the latest developments under the scenario of global climate change in the fast-growing fields. In addition, it is an ideal venue for interactions and for them to establish the all-important contacts with each other.

This conference is the right platform to bring various stakeholders under one roof to discuss impact of climate change on food production system and strategies. Through this conference we will put all our effort to drive the policies on climate change and for better survival of human beings. We are planning to have best exhibition with multi domain displays and poster presentation. The thematic talks and the plenary sessions will drive you through the multi sectoral emergence in the field of agriculture and allied disciplines. This conference will provide a platform where everyone could have opportunity to showcase and present their ideas, thoughts, developments that could lead to a meaningful life. We are trying our best to ensure that your time and stay in the beautiful valley of Kashmir during the conference be one of the most memorable one and you go back with rich information and as a proud stakeholder of the field. I welcome you gain to this wonderful gathering and make the maximum out of it.

I thank each and every one of you who are contributing to the success of the conference and looking forward to seeing you all soon.

(Farooq Ahmad Khan)
Organizing Secretary
CCI 2023
Professor and Head
Division of Basic Sciences and Humanities

Agricultural & Environmental Technology Development Society
(Regd.) AETDS, U.S. Nagar, UK, India
(Registration No. UK06708052019001367, Under the Registration Act No. 21, 1860)

From the Desk of the Organizing Chairman

I am pleased to extend a warm welcome to all attendees of the International Conference on "Climate Change and Its Impact." This significant gathering brings together experts, researchers, policymakers, and stakeholders worldwide to address one of our time's most pressing global challenges.

Climate change threatens our planet and its inhabitants, and we must come together to deepen our understanding of its causes, impacts, and potential solutions. This conference is a platform for knowledge exchange, collaboration, and exploring innovative strategies to mitigate and adapt to climate change. Throughout the conference, we will engage in thought-provoking discussions, presentations of cutting-edge research, and insightful sessions that shed light on various aspects of climate change and its profound consequences. We aim to foster a multidisciplinary approach encompassing scientific, technological, economic, social, and policy perspectives.

I encourage all participants to actively contribute their expertise, share their research findings, and engage in fruitful discussions. Together, we can pave the way for effective climate action and sustainable development.

I am writing to thank the organizing committee, distinguished speakers, and sponsors for their dedication and support in making this conference a reality. Your commitment to addressing climate change is commendable, and your contributions are invaluable.

I wish you all a fruitful and inspiring conference experience. May our collective efforts drive positive change and contribute to a more sustainable and resilient future for future generations.

Best Wishes

Dr. Huma Naz
Organizing Chairman
CCI-2023

Agricultural & Environmental Technology Development Society
(Regd.) AETDS, U.S. Nagar, UK, India
(Registration No. UK06708052019001367, Under the Registration Act No. 21, 1860)

From the Desk of the Co-organizing Secretary

It's my immense pleasure and matter of pride that Agricultural & Environmental Technology Development Society (AETDS), U.K., India hosting three days International conference on "Climate Change and its Impact (CCI, 2023)." In association with Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K) Srinagar, J&K., India, University of Agricultural Sciences Raichur, Karnataka, India, Mid-West University, Surkhet, Nepal, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, M.H. India and Sher-e-Bangla Agricultural University, Dhaka, Bangladesh in the fort month of June i.e., (9^{th} June, 2023-11^{th} June, 2023).

This is a burning issue at the current world scenario. In the view of the focus on climate change and its impacts on agriculture and living world is an appropriate and relevant topic and is need of the hour to be emphasised. Scientists working on the current aspect are playing a pivotal role for developing climate smart technologies that can be employed in agriculture and other fields to combat with the changing climate. Combating climate change and ensuring food security are prime importance at this hour. So the intended three day International conference aims to bring the participants of national and international repute around the world to disseminate and discuss their findings in the proposed sessions. I believe that, such kind of scholarly gathering could play a vital role in making world a better place and also make ready to tackle any difficult satiation in the near future. I hope this conference will bring glory in bringing up the modern solutions to the modern problems.

I look forward in welcoming you all to the beautiful city of Srinagar height in feet, known for its chain of icy Himalayas.

Dr. Kota Chakrapani
Co-organizing secretary (AETDS)
College of Agriculture, Central Agricultural University, Imphal

Agricultural & Environmental Technology Development Society
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Ref: AETDS/SO/201 **Date: 09.06.2023**

From the Desk of the Chief Organizing Convener/ Secretary AETDS

I am delighted to invite you all for the upcoming 5th International conference "Climate Change and its Impact (CCI, 2023)." Organized by Agricultural & Environmental Technology Development Society (AETDS), U.S. Nagar, Uttarakhand, India, and hosted by Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K) Srinagar, J&K., India, and jointly organized by University of Agricultural Sciences Raichur, Karnataka, India, Mid-West University, Surkhet, Nepal, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, M.H. India and Sher-e-Bangla Agricultural University, Dhaka, Bangladesh in the fort month of June i.e., (9th June, 2023-11th June, 2023).

The major barricade of 21st century is climate change which is imposing serious threats to the nature, ranging from changing of weather patterns that imperil food production to rise in sea level that sinks the nations by causing catastrophic flooding. According to the research, the influence of human activities on climatic systems is unquestionable. Getting acclimatized to these repercussions in coming future will be more difficult and costly if strong actions are not taken.

The three-day conference gathers all the researchers worldwide focusing on climate change to unveil the best possible solutions and developments related to climate change. Reputed keynote talks and lead lecture series including air quality measures, use of smart techies in agriculture and sustainable food production, nature-based solutions and others will be discussed during this three-day significant gathering. The conference brings all the scientific people to join their hands that will end with challenges imposed by climate change by their novel works and suggestions.

I appreciate experts worldwide for their valuable time and willingness to share their wisdom through empirical evidence addressing different thematic areas of the conference.

I congratulate the CCI-2023 team for organizing the conference.

I wish the conference a grand success.

Wajid Hasan, Ph.D., PDF
Organizing Convener, CCI 2023
Secretary, Agricultural and Environmental Technology Development Society (AETDS), U. S. Nagar, Uttarakhand, India
Krishi Vigyan Kendra, Jahanabad, Bihar Agricultural University, Bihar, India

CONTENTS

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Strategies for Strengthening Horticulture Research and Technology Transfer System in Nepal

Dhruba Raj Bhattarai
Director, Crop and Horticulture Research, Nepal Agricultural Research Council, Kathmandu, Nepal

ABSTRACT
Commercial horticulture has immense potential to generate employment and improve livelihood of the people in Nepal. At present, the horticulture sector has been the main stay of Nepalese agriculture with a contribution of about 39 per cent to the agricultural GDP. However, the per capita availability of vegetables and fruits is still below the recommended levels and hence, the nutritional and health security can be achieved only by enhanced productivity. The rising national and global demand of horticultural commodities necessitates increased cultivation efforts for increased productivity. In this context, it is essential to evolve technologies for enhancing productivity in horticultural crops through concerted efforts in horticultural research and technology delivery system. Thestrategy is to enhance the production to meet theminimum dietary requirements and to enrich the crop varietieswith specific nutritional diversity. Other important areas to beaddressed will be to use the natural resources efficiently andproduce more with minimum use of light, energy, water andalso fertilizers with the shrinking land base. Horticulturevarieties have to be bred with marker assisted selection formultiple resistances to biotic and abiotic stresses with highyield potential and good quality employing the latest tools such as *in vitro* ploidy, non-nuclear (cytoplasmic) genomemanipulation, allele mining and quantitative trait locus (QTL) linkage mapping.Furthermore, extension strategies should include web basedinteractive digital information management in horticulturalcrops for clientele groups-farmers, entrepreneurs andinstitutions. Integrated Technology Dissemination System(blending traditional with ICT based) for horticultural cropsto be included in order to sustain quality, productivity and marketdemand. In this context, a clear strategy is needed to achieve the objectives with the limited resources. So, this strategy paper has been prepared.
Keywords: Horticulture research, integrated technology dissemination, technology packaging

The influence of soil - water relations on mangrove ecosystem dynamics: a review

Sabrina Dookie, Sirpaul Jaikishun, & Abdullah Adil Ansari
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ABSTRACT
Mangroves represent highly important and abundant coastal ecological systems on a global scale. They are known for their capacity to offer numerous goods and services while supporting the preservation of biodiversity. Despite being highly examined ecosystems, the literature reveals several knowledge gaps regarding the impact of soil-water relationships on their dynamics. This literature review integrates extant studies on the impact of soil-water relationships on the dynamics of mangroves at global, regional, and local levels, with the aim of identifying the factors that facilitate or impede their capacity to flourish productively. A comprehensive review was conducted on a multitude of scholarly articles that were peer-reviewed and published between 2013 and 2023, pertaining to the physicochemical characteristics of soil and porewater in mangroves and their collective impact on the dynamics of their ecosystems. This review demonstrated that various biogeochemical processes that take place in soil and water have an

impact on the functioning of mangrove ecosystems. These processes prompt mangroves to develop ecophysiological adaptations that enable them to mitigate the effects of harsh environmental stressors and changes. Alterations in both the physical and chemical properties of soil and water within mangrove ecosystems can have a direct impact on their distribution, density, and diversity. The aforementioned phenomenon results in a cascading impact on other types of flora and fauna, particularly those that are subject to anthropogenic disturbances. The review also underscores the necessity of establishing appropriate policies and governance mechanisms for the protection and conservation of mangroves. This is due to an alarming increase in anthropogenic activities that have a significant impact on mangrove ecosystems and affect their ability to resist and recover from disturbances in their present conditions. The interplay between soil and water has a significant bearing on the functioning of mangrove ecosystems, with potential implications for productivity and functionality as anthropogenic and natural phenomena can alter their physicochemical properties.

Keywords: dynamics, ecosystems, mangroves, nutrients, soil, water

The Effects of Climate Change on the Future of Citrus Growth in the Mediterranean Region Change

İbrahim Ortaş

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ABSTRACT

Citrus plantations and fruit production are one of the largest fruit crops in the World and the Mediterranean area. The future of citrus plantations in the sub-tropical region depends on climate change. Eight billion-world population's activity and energy demand is getting increase and as a as a result, more greenhouse gases are fluxing to the atmosphere. All the atmospheric data such as CO_2 and other gases concentration and weather patterns are increasing and the climate is changing. Agricultural productivity and climate change parameters are interrelated in many ways. Since abiotic stress such as temperature and water stress are, the main, environmental factors that reduce yield at a drastic level. Climate bases strass factors cause physiological, biochemical, and anatomical changes in plant growth and structure. Strass factors also lead to cause a reduction in crop yield. An increase in temperature rises and water deficiency is expected to result in reduced citrus tree fruit growth and yield decreases.

In the present work, the effects of greenhouses gases on climate change and citrus plantation future. Since net carbon dioxide assimilation in plant leaves and stomatal conductance is reduced by high leaf temperature plant growth is depressed. As a result of water deficiency naturally reduces the transpiration rate and stomatal conductance. As a result, the yield will be reduced. Knowing the possible effects of climate change on photosynthesis productivity and CO2 assimilation capacity in citrus plants is better. In addition, it is better to know what can be done to keep yield at optimum levels. Also, it is better to know the rhizosphere organism's role in the mitigation of greenhouse gases to reduce climate change effects on agricultural sustainability.

Keywords: Citrus plant and citrus fruits yield, Global warming, Abiotic stress factors, Climatic adaptation factors.

Isolation and Characterization of Compound From Extracts of *Cordia Africana* Using Column Chromatography

Salaudeen A.A.[1], Dangoggo, S.M. [2] and Adamu Abdulmutalib[2]
[1]*Abdu Gusau polytechnic, TalataMafara, Zamfara State, Nigeria.*
[2]*Usmanu Danfodiyo University Sokoto*

ABSTRACT
Cordia africana is used in traditional medicine for treatment of microbial infections. The column chromatography yielded 97 fractions, which were pooled to six combined sub-fractions (A-F). Isolate A appeared to be pure and was subjected to antimicrobial screening and spectroscopic studies using standard method. Strong antimicrobial activity was observed on all the microbes tested, with increase in their zones of inhibition The spectroscopic studies revealed that isolate A consist of three compounds i.e.,isobutyloctadecylester, butyl undecyl ester, methyl-12-oxo-9-dodecanoate. The research has provided the scientific basis for the use of *Cordiaafricana* by traditional healers in treatment of microbial infections and a possibility for its use in drug formulation.
Keywords: *Cordiaafricana*, Microbial Infection, Phytochemical, Column Chromatography.

Integrated Use of Bio-Inoculants and Biochar as A Strategy for Improving Crop Production on Marginal Soils: A Review

Tracy Persaud, Gomathinayagam Subramanian, Danilo López Hernández
Soil Management & Farm Mechanization Department, National Agricultural Research and Extension Institute, East Coast Demerara, Guyana

ABSTRACT
The coastal belt continues to be the most active agricultural zone in Guyana, despite climate risks and environmental vulnerability. To build the resilience of Guyana's agriculture sector to the threats of sea level rise, salinization and flooding exacerbated by climate change, it is imperative that agricultural activities be decentralized through the development of Guyana's vast hinterland region. The hinterland soils have the capacity to fulfil their potential as Guyana's next agricultural frontier. This can be achieved, through the efforts to amend its marginal soils to enhance its agricultural productive capacity. Therefore, this literature review identifies and elaborates on research done on sustainable soil management practices that improve soil quality and crop productivity of marginal soil types. A systemic literature search was conducted via appropriate journals and search engines. This review found that the combined use of biochar and plant growth-promoting microorganisms (bio-inoculants), were the most efficacious and sustainable interventions for marginal sandy soils. Biochar when applied to acidic and infertile sandy agricultural soils is a valuable amendment for improving soil fertility and productivity. Biochar application improves the physical properties of the soil, enhances its capacity for nutrient retention, and encourages microbial activity, thus, improving soil quality and plant performance. The combined use of biochar and bio-inoculant creates synergies, especially for the establishment and beneficial activities of rhizobia bacteria, which fix nitrogen, and arbuscular mycorrhizae fungi, which increases the availability of nutrients especially phosphorous for plant uptake. Nitrogen and phosphorous are two of the most limiting nutritive factors in crop production on marginal sandy soils, thus the supplementation of nitrogen and phosphorous, using the

combination of beneficial microorganisms and biochar, would help to improve soil quality and crop productivity.

Keywords: Biochar, Guyana, Marginal, Mycorrhiza, Review, Soil, Rhizobium

An Advanced Review on the Impacts of Global Warming on the Agricultural Aspects and the Importance of the Mitigation

Suresh Aluvihara[1, 2]

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ABSTRACT

Global warming has been identified as a huge environmental issue that associated with various components of the earth and particular activities linked with them. The presence of excess amounts of CO_2, CH_4, NO_X, SF_6, some hydro-chlorofluorocarbons, hydro-fluorocarbons, O_3, NF_3 and water vapor(greenhouse gases) is the significant sources for the global warming since the impact is being increased due to the industrial and automobile emissions. Global warming is defined as increasing of global temperature with the presence of some gasses (greenhouse gases) which are able to trap solar radiations, store them and release them to the surrounding environment while reducing the heat transfer towards the upper atmosphere back. The incident causes the increasing of temperature of the environment. According to the considerations of the impact of global warming on the various sections of the earth, agricultural activities are affected in different stages and different similitudes by the global warming. In the consideration of those environmental impacts, basically they can be categorized as the positive impacts and negative impacts based upon the relevant changes in the particular agricultural systems. According to the shortlisting of both positive and negative impacts on the agricultural systems, the increasing of productivity/ harvest of crops because of the increasing of CO_2 gas in the atmosphere/ environment, generations of new crop varieties with respect to the temperature rising, variation in the growth period, expansion of the area that suitable for cultivation such as the polar areas due to the reductions/melting of snowcap and the reduction of the adverse impact on the winter crops can be emphasized. In the elaboration of negative impacts on the agricultural systems, the adverse impacts on the quality of products/ harvest, increasing of the soil erosion and decreasing of soil fertility, increasing of the disasters including weeds, insects and pests, impacts of floods and droughts on agricultural lands are predominantly found adverse impacts. When considering of the mitigation methods of the greenhouse effect, the limitations/ reductions of fossil fuel burning, increasing and developments of the applications of renewable energy sources such as the wind, solar and hydro power to enhance the sustainability.

Keywords: Global warming, Green house gases, Positive impacts, Negative impacts, Mitigations

BJRI Tossa pat 9: A New High-yielding Variety of Tossa Jute Developed in Bangladesh

MM Mukul, SSU Ahmed, N Akter, MG Mostofa
Breeding Division, Bangladesh Jute Research Institute, Manik Mia Avenue, Dhaka, Bangladesh.

ABSTRACT

Jute is a common term used both for plant and the fiber obtained from the bark of the plants of *Corchorus* spp. It is a short-day plant cultivated in mid-March to April and harvested at 100-120 days after sowing in Indian subcontinents for bast fiber production. According to FAO information, Bangladesh ranks first position for both production and export of jute in the world at now. Bangladesh Jute Research Institute (BJRI) had released an improved variety of quick growing, high-yielding and quality fiber of tossa jute (*Corchorus olitorius* L.) namely 'BJRI Tossa pat 9 (Sobuj Sona)' in March 2023. It was developed by hybridization between an Indian variety (JRO-524) and an early maturing local germplasm (Acc. 1749) followed by pure line selection (PLS). The new variety is full green having narrow lanceolate leaves with dark green wavy margin and fiber is golden bright cloured. The leaves hang down like goat's ears at maturity. Maximum plant population (4.0-4.5 Lha^{-1} than regular 3.0-3.5 Lha^{-1}) can be kept per unit of area due to its narrow lanceolate leaves and cylindrical stem without hampering photosynthetic and agronomic requirements and ultimately gives higher fiber yield than other varieties. Field experiments proved that it can be sown in early (mid-March) and give higher yield even after harvesting at 110 DAS compared to BJRI Tossa pat 8 (control) and JRO-524 to fit in 3-4 cropping pattern. It is tolerant to early flowering, yellow mite infestation and root rot disease. The variety performed better in terms of yield trials at six regional research stations as compared to JRO-524 during 2017-2019 and compared to the control variety (BJRI Tossa pat 8) during 2020-2021 along with farmers' fields and in field evaluation during 2022. It was observed from yield trials that, the variety yields 3.0-3.5 t/ha fiber at farmers' fields and 3.5-3.8 t/ha fiber at research stations when harvested at 110 days of age. The new variety is able to yield 4.38% more than JRO-524 and 8-10% more than the control variety BJRI Tossa pat 8 (Robi-1). Medium high to high land with proper drainage system is suitable to cultivate BJRI Tossa pat 9 and it is able to yield more fiber than traditional varieties with proper care and favorable environment.

Effects of Seed Priming and Foliar Spray of Salicylic Acid (SA), $CaCl_2$ and Moringa Leaf Extracts (MLE) on Vegetative and Reproductive Characters of Tossa Jute

MM Mukul, K Fatema
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ABSTRACT

Jute (*Corchorus* spp.) is a traditional cash crop of Bangladesh and known as golden fiber for its significant role in the earning of foreign currency by the export. Tossa jute is a photosensitive short-day crop and easily affected by abiotic & biotic stresses resulting lower fiber yield. Different bio-stimulants and nanoparticles are widely used to improve morphological (biomass accumulation), physiological traits (stress tolerance) and finally post-harvest products in plants by seed priming as well as foliar spray. The study was conducted to know the effects of seed priming and foliar spray with salicylic acid (SA), calcium chloride ($CaCl_2$) and moringa leaf extracts (MLE) on vegetative and reproductive growth of a local accession of tossa jute (Acc. 1098). Seed sample was collected from the Gene Bank and multiplied by the Breeding Division of BJRI. Healthy seeds were treated (1.5h) with Vitavax 200WP@ 0.4% to avoid fungal infection and seeds

were treated for overnight (12h) with fourteen treatments (T_1= 0.0 control, T_2= 0.5mM SA, T_3= 1.0mM SA, T_4= 5.0mM SA, T_5=100mM $CaCl_2$, T_6= 150mM $CaCl_2$, T_7=50%MLE, T_8= 25%MLE, T_9= 50%T_1+50%T_5, T_{10}= 88%T_1+12%T_6, T_{11}= 88%T_5+12%T_6, T_{12}=46%T_2+46%T_5 +8%T_7, T_{13}= 46%T_1+46%T_4+8%T_6, T_{14}= 46%T_2+46%T_5 +8%T_7). Treated seeds were washed with D.H_2O for 3 times and seed priming was done by lowering the moisture content into 8-0% by oven drying (30°C, 24h). Two hundred seeds were sown in medium sized earthen pot keeping three replicates for each treatment. The treatments were applied again by foliar spray for 3 times with 3 days interval at 30 days after sowing. Plant height and base diameter were recorded at 100, 110 and 120 DAS, and fiber yield was taken at 120 days of vegetative growth phase. Results revealed that, no seeds were germinated for 5.0mM concentration of SA (T_4). Higher plant heights 2.84m and 3.09m were found at 100 and 110 DAS, respectively for T_9 treatment; and 3.50m for T_{10} treatment at 120 days after sowing. Plants were started to flower on 155 DAS and reproductive data were taken after physiological maturity of seeds. Higher pod length (61.78mm), number of pod plant^{-1} (57.0) and 1000 seed weight (2.79g) were found for T_5 treatment than control (60.83mm, 33.0, 2.28g). Higher records for green fiber weight plant^{-1} (80.33g), dry fiber weight plant^{-1} (25.83g) and seed yield pod^{-1} (298.78g) were found for T_3 treatment than control (56.17g, 19.33g, 220.05g). The T_6 showed higher green stick weight (193.33g) and dry stick weight (85.0g) plant^{-1} than control (141.17g, 73.33g). So, salicylic acid should be used as priming agent, but its effects should be studied more considering the lethal dose to improve tossa jute yield within short duration.

An Advanced Review on the Green Technology Approaches for the Sustainability in Agricultural Activities

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ABSTRACT

Green technology is currently being applied in various industries such as the agricultural aspects, energy generation, water treatment sector, transportations, waste management aspects and manufacturing purposes including nanotechnology. According to the consideration of the terms and limitations of green technology it is totally related with the aspects of environmental and eco-friendly concepts, materials, processes and productions. In generally, the green technology is defined as using of eco-friendly materials, methods and technological processes for various purposes with the expectations of pollution control, reduction of waste, reduction of emissions, generations of eco-friendly recycling, cost-effectiveness and reusable products and conservation of natural resources furthermore. Agriculture field is a vast section which was described as a combination of various sub sections such as the crops, harvesting, food science, soil science, waster science, animal science, mechanical technology, chemistry and biology. Therefore, the technological applications are some sort of essential aspects in the agriculture section. In the agricultural industry, especially there were found some impacts on the environment because of the waste generation, excess chemical applications, hazardous emissions and usages of non-biodegradable materials. The adaptation of existing technologies into the green technological is the key factor in the new innovations of green technology in agricultural field. In generally the power generation using solar radiation (photovoltaic), wind waves, tidal waves (ocean waves), hydropower, biogases, biofuels and geothermal energy can be emphasized as more appropriate

green technological methods. In addition that the organic farming including organic fertilizer, organic pesticides, organic weedicides, organic herbicides and organic insecticides can be used instead of using hazardous chemical products for the same task. As the advantages of applying green technology in agricultural purposes, the reduction of the emissions of greenhouse gases (global warming), reduction of water pollution due to the pathogens, heavy metals, toxic organic compounds, reduction of solid waste accumulation and improving the quality and nourishments of the agricultural products can be emphasized.

Keywords: Green technology, Agricultural activities, Sustainability, Biotechnology, Productivity

Plant Species Composition and Diversity around Baraha Lake, Surkhet, Nepal

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ABSTRACT

Wetlands are considered to be repositories for biodiversity, but anthropogenic disturbance and climate change have put them at risk of extinction. Baraha Lake is a wetland with a total area of 6.28 hectares at Baraha Rural Municipality, Surkhet. In this study, species of vascular plants were documented by random foot transect method up to 500 m away from the water bodies. Two field trips were carried out to record the vascular plant species. During the field visit, plant species were enumerated along with their families. Herbarium specimens were collected and photographed for later identification using standard literature, and experts and specimens were deposited at the Central Department of Biology, Mid-West University, Surkhet.

There were 91 plant species reported from 48 families, with the most species being found in the Poaceae, Asteraceae, Fabaceae, Euphorbiaceae, and Lamiaceae. Out of 91 species, 87 were angiosperms, 2 were gymnosperms, and 2 were pteridophytes. Similarly, 20 species were monocots, while 67 were dicots. The main objective of the study was to compile an extensive list of vascular plants in the area of Baraha Lake.

Keywords: Wetland, Vascular plants, Herbarium.

Systematic Review of Bio Chars' Production from Invasive Alien Plant Species: A Potential Tool for Sustainable Forest Management in Nepal

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ABSTRACT

Bio char production from invasive alien plant species for sustainable forest management in Nepal has utilized a variety of literature sources to provide a comprehensive analysis of the topic. The types of literature used in the review include scientific articles. Academic journal, conference proceedings, government reports, and books. The literature has been carefully selected to ensure that the review covers all aspects of bio char production from invasive species, including its potential benefits, challenges, and practical applications. Additionally, the literature has been chosen based on its relevance to Nepal's forest management goals and its potential to provide insights into sustainable forest management practices. Overall, the use of diverse literature sources has helped to ensure that the review article provides a well-rounded and evidence-based analysis

of the topic. Biochar production presents a cost-effective and sustainable method for managing invasive species while producing a valuable soil amendment. However, there are challenges and limitation to bio char production, including feedstock variability and potential soil contamination. Further research is needed to fully explore the potential of biochar production in Nepal's context and to ensure its long-term sustainability. Biochar production from invasive species can contribute to Nepal's forest management goals while providing economic and environmental benefits. The potential of biochar production as a sustainable tool for managing invasive species and promoting forest health. Biochar production offers a cost-effective method of converting invasive plant species into valuable soil amendment while also providing economic and environmental benefits. However, the review also points out the challenges and limitations of biochar production and emphasizes the need for further research to explore its practical applications and economic viability in the Nepalease context. Overall, biochar production from invasive species can contribute to Nepal's forest management goals and sustainable development while also promoting soil health and carbon sequestration.

Keywords: biochar, invasive alien plant species, sustainable forest management, carbon sequestration, soil amendment

Advances in Root Research in Common Bean for Climate Resilience: from Digging them out To Functional Characterization

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ABSTRACT

Common bean is one of the most important legume crop of the world, grown over 35 million hectares. Common bean is inherently sensitive to water stress and water is increasingly becoming a major production constraint. Despite conferring definite adaptive advantages to plants under stress, research on roots has been precluded by obvious limitations in reliable high-throughput phenotyping. In addition, greater phenotypic plasticity of root traits in response to soil resource status, and lack of high-throughput and cost-effective screening techniques for root is still a challenge. With advances in root phenotyping and a wide body of experimental evidence for potential role of root traits in common bean response to drought, root research in common bean has advanced through multiomics approaches and focus is on identifying appropriate root phenes or phene modules and developing a root ideotype for optimum resource acquisition. Root phenes are not as high in number as above ground traits, and exploring natural variation for root traits can benefit bean improvement programs for climate resilience. In this paper, we discuss basic theoretical foundations of root system architecture as a potential breeding target for developing drought-resilient bean varieties for future bean farming systems.

Keywords: Common bean, climate change, root architecture, physiology, QTL

New Record of Moth *Chiasmiafidoniata* (Guenee, 1858) (Lepidoptera :Geometridae : Enominae) from Shikohabad, Firozabad district , Uttar Pradesh (India), with Systematic Account and Distribution.

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ABSTRACT

Present communication deals with the new record of *Chiasmiafidoniata*, a dull coloured moth belonging to family Geometridae, from residential area in Shikohabad (Firozabad district, Uttar Pradesh, India) which is interesting as being the only other record from the state. Its systematic account with distribution has been provided here.

Keywords: New record, *Chiasmiafidoniata*, Shikohabad, Uttar Pradesh.

Assessment of Different Cropping Systems with Respect to Soil Physicochemical Properties and Nutrient Status of Agricultural Research Farm, IAS, BHU-Varanasi.

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ABSTRACT

The study was done in long term (2010-2019) established 4 diversified cropping systems field of Agricultural Research Farm, BHU. The established legumes and cereal cropping systems and a grassland fallow system's data were taken to assess their effects on physicochemical properties and nutrient status of soil. Out of 4 cropping systems viz, Pigeon pea-Pigeon pea (PP-PP) and Rice-Maize (R-M) systems were managed as conventional cultivation established under the breeding project however, Dryland Rice-Lentil (R-L) and Zero-till Rice-Wheat (R-W) systems were established under agronomy project. Soil samples were collected at depth of 0–10 and 10-20 cm, depending on the soil properties. The different cropping systems significantly influenced the physicochemical properties and nutrient status of soil at both the soil depths. The results indicated that the nutrient status and soil organic carbon (SOC) was greater at soil surface (0-10cm) than sub-surface (10-20 cm) depths. In contrast, the bulk density (BD) and pH increased with depth. The minimum BD & pH was observed in permanent grassland (1.34% & 1.41%, 6.62 & 6.67) followed by zero-till lowland rice-wheat (1.40% & 1.45%, 6.74 & 6.79) and maximum in dryland rice-lentil (1.54% & 1.59%, 7.60 & 7.65). Permanent grass land has significantly higher SOC than other cropping systems. The maximum availability of available N was found under zero-till lowland rice-wheat (180.18 kg N/ha) and available phosphorus & potassium in permanent grassland (46.35 kg P/ha, 202.90kg K/ha). Also, the availability of micronutrients (Fe and Zn) were significantly higher under permanent grassland systems ((33.99 mg/ha and 73.79 ppm/ha). The results indicate that the crop rotation with legumes could sustainably exploit soil resources without reducing fertility over a long period.

Keywords: Cropping system, Physicochemical properties, Nutrient, Dryland, SOC

Interaction Between Mycorrhizal and Medicinal Plants Towards Enhancement of Secondary Metabolites

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ABSTRACT
Arbuscular mycorrhizae fungi (AMF) are symbiotic relations between plants and fungi, it has a long history of more than 400 million years. AMF mycelium colonizes the plant root system forming structures like root hairs which are considered as functional site for absorbing nutrient from soil and transfer them into the plant root. AMF increase nutrients uptake from soil as well as improving disease resistance against many pathogens. Medicinal plants are used across the world as primary form of therapy in the all known traditional medical systems which considered safer, cheaper and effective compared with chemicals ones. These plants metabolites are classified as primary metabolites and secondary metabolites, these secondary metabolites are subdivided in three major classes: alkaloids, terpenoids, and phenolics. They contain numerous phytochemicals with beneficial therapeutic as well as preventive effects. AMF inoculation on medicinal plants decreased the infection of bacterial and fungal pathogens, in addition to that The AMF–medicinal plants interaction causes chemical and biological changes lead to change in the secondary metabolite concentrations. In this review, we have summarized the effect of different arbuscular mycorrhizae fungi on increasing or decreasing the secondary metabolites of some medicinal plants and it was discussed about the secondary metabolites pathways involved in AMF–medicinal plants interaction.
Keywords: Interaction, mycorrhizal, medicinal, towards, enhancement

***Drosichamangiferae* (Green in Stebbins, 1903) Mealybug Infestation on Mango Orchards in Dehra Dun, Uttarakhand, India, with Control Measures**

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ABSTRACT
Mango Mealy-bugs (*Drosichamangiferae*), belonging to family Margarodidae under order Hemiptera are very destructive pests of mango trees (*Mangifera indica*) as they suck up sap from leaves, twigs, inflorescence and fruits affecting the yield seriously. They also cause sooty moulds on leaves which effect photosynthesis and growth resulting further damage. Recently plenty of females and some males of this bug were found on mango trees in various parts of Dehra Dun, particularly during early summer months. The incidence of pest infestation and control measures are provided here for general awareness and needful to save the most precious crops.
Keywords: *Drosichamangiferae*infestation in Dehra Dun.

Expression of MaUSP1-like Gene Cloned from Mulberry Reduces Photosynthetic Limitations and Enhances Biomass in Tobacco

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ABSTRACT

Across the world, there is a push to increase crop productivity to meet the increasing demand for food. One promising approach is to improve photosynthetic efficiency, which would enable crops to produce more energy from sunlight. This could be achieved through a variety of methods, including genetic engineering, breeding, and crop management practices. The present study using tobacco transgenics expressing MaUSP1-like, a gene cloned from Indian mulberry, demonstrates that crop biomass can be improved by minimizing the photosynthetic limitations.The transgenic plants exhibited significantly higher plant height, total leaf area and root growth, resulting in a 28% increase in total biomass. The photosynthetic parameters estimated (*Vcmax, J, triose phosphate utilization*) and dark respiration (*Rd*) were significantly more in the transgenic plants indicating an improvement in overall photosynthetic kinetics, and reduced limitations associated with product utilisation. The study demonstrated that minimizing the limitations associated with product utilization can contribute to enhanced photosynthetic efficiency. Hence, any approach that can minimize photosynthetic limitations would be beneficial for increasing crop productivity, especially in the era of changing climate.

Keywords: MaUSP1-like, A/Ci Curve, Photosynthetic limitations, Biomass, Mulberry, Triose phosphate utilization

Role of Wildlife Vets in Protecting Natural Heritage of India

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ABSTRACT

Contribution of veterinarians to the present-day society is immense and very well known. Until a few years ago, veterinarians in India keep themselves confined to only treating farm livestock and pet animals. However, the present scenario talks much more about sphere of activities as well as the responsibilities of veterinarians. Veterinarians now involve in care and treatment of livestock, poultry and pet or companion animals; production of much needed protein of animal origin viz, milk, meat, eggs etc., value addition and food safety; and also, in investigation and monitoring of wildlife diseases as well as treatment of diseased wild animals. In addition, vets also participate in conservation efforts of valuable indigenous breeds of livestock as well as in research on in-situ/ex-situ conservation of wild animals. Today, veterinarians have to work together with other wildlife professionals meant for conservation of wild animals of mother earth. The age-old attitude or practice of working independently within one's domain is rapidly diminishing owing to desired goal of conservation efforts. Veterinarians in today's world have to change their earlier mindset and should make them worthy to play most effective role not only in protecting life of animals but also in saving the mankind from zoonotic diseases. As such, they need to acquire a broad understanding of biological, ecological and epidemiological issues in order to make meaningful

contribution to wildlife conservation. In that case only, biologist, ecologist, wildlife managers and other related organisation or individuals may appreciate and recognised the wildlife veterinarians and acknowledge their works and contribution in protecting 'Natural heritage' of India. The country is bestowed with many 'National parks' & 'Natural wildlife heritage' with different iconic species and scenic beauties. The wildlife vets can play here key role in protection and development of natural heritage sites working in wildlife rehabilitation centres/projects, wildlife breeding, raising orphan young ones of wild animals and finally releasing them to the wild successfully. Prevention of disease outbreak and its spreading in wild as well as in domestic animals by adopting appropriate measures are essential work to be carried out by wildlife vets with sincerity. Besides, wildlife veterinarians should be able to perform the act of capturing wild animals (individual or mass capture) applying 'physical restraint' or 'chemical restraint' i.e. tranquilization for human safety and/or to avoid the human-wild animal conflicts, rescue operation during natural calamities and translocation etc. Another important role of wildlife veterinarians is to sensitize or creating awareness among the people about consequences of protecting biodiversity and its necessity for sustainability as well as well being of mankind.

Keywords: Heritage, Vets, Wildlife, Treatment, Conservation.

Clinical Management of Lumpy Skin Disease (LSD) in Cattle

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ABSTRACT

Emerging disease like lumpy skin disease is creating havoc in livestock owners, in the year 2022 LSD outbreak in India leads to death of 97000 cattle population. Starting from Gujrat, Rajasthan, disease spreads to Haryana, Punjab U.P etc Lumpy skin disease is an infectious viral disease of cattle and buffaloes, caused by Lumpy skin disease virus (LSDV) of Capripoxvirus genus, subfamily Chordopoxvirniae, family Poxviridae. The incubation period of disease in natural condition is between 2 and 5 weeks. The clinical manifestations in mild form of infection appears as one or two lumps of nodules within 2 to 3 days of onset of fever, emaciation, ocular discharge, agalactia. Later on, nodular lesions, which are painful and hypermic may be observed on the animal body especially in the skinof the muzzle, neck, back, legs, scrotum, perineum, eyelids, lower ear, nasal and oral mucosa, tail and throughout the body. Morbidity is found to be 10% and mortality is about 1-2%. The present study was envisaged, to find out best possible line of treatment of Lumpy skin disease in field condition. 60 numbers of clinically infected cattle were randomly selected for study. Which are divided in four different groups of 15 each. All the groups were treated for seven days. In group I Enrofloxacin @5mg/Kg Body weight, Meloxicam paracitamol @ 1ml /40Kg Body weight and Multivitamin B complex @4-10 ml daily Intra muscularly was used, and Group II along with above medicine Flunixin Megludine 2000mg, Seretiopeptidase, Citrizine Hydrochloride, Magnesium Trisilicate (Rest Ultra)orally, Multivitamin with Mineral Liquid (Use) Ascorbic Acid 500mg/ml @5-10ml daily Intra muscularly(Pail C) , Cypermethrin, dichlorophen, Chlorocresol, Gentian violet wound spray (Almazol spray) tropically twice daily, In group III, along with group I medicine Turmeric *Curcuma longa* @ 30 g orally fed per day, Herbal antistress, adaptogenic, restorative, immunomodulator and performance enhancer (Restobal liquid) 50 -100ml daily orally, Herbal wound management ointment(Voxeto) applied locally on lesions and In group IV along with groupI medicine, Merigold LSD 25 kit(Homeopathic preparation) orally and spray for tropical application was used. Out of four

groups, Group II treatment was found to be more effective in clinical management of Lumpy Skin Disease in field conditions.

Keywords: Emerging, lumps, nodule, mortality, morbidity

Green India Mission and its Major Role for Mitigating Climate Change

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ABSTRACT
Climate change is one of the most critical global challenges of our times. Recent events have emphatically demonstrated our growing vulnerability to climate change. Climate change impact will range from affecting agriculture- further endangering food security – to sea level rise and the accelerated erosion of coastal zones, increasing intensity of natural disasters, species extinction and the spread of vector borne diseases. Green India Mission "Greening" in the context of climate change adaptation and mitigation. Greening is meant to enhance ecosystem services such as carbon sequestration and storage (in forests and other ecosystems) hydrological services and biodiversity as well as other provisioning services such as fuel, fodder, small timber and non-timber forest products .The mission aims at responding to climate change by a combination of adaptation and mitigation measures which would help: Enhancing carbon sinks in sustainably managed forests and other ecosystems, Adaptation of vulnerable species/ ecosystems to the changing climate, Adaptation of forest dependent communities.

Keywords: Climate change, Green India Mission, Biodiversity, Carbon sinks.

Study of Copper Sulphate Toxicity on Hematological Parameters in an Air Breathing Fish *Channa Gachua*

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ABSTRACT
Fish are an important food of human nutrition and those from contaminated sites present at potential risk to human health. Since fish occupy the top of the aquatic food chain they are suitable bio-indicators of metal contamination. Metals are well known inducers of oxidative stress and assessment of oxidative damage and antioxidant defenses in fish can reflect metal contamination of the aquatic environment. The metals especially heavy metals like copper are important contaminants of aquatic environments world-wide. The present study was to evaluate the toxicity of copper in the blood cells of fresh water air breathing fish *Channa gachua*. Ingestion of copper compounds can cause anemia and other blood cell abnormalities that may produce systemic toxic effects to the kidney and liver and central nervous system excitation followed by depression which causes respiratory tract irritation with possible burns. The prolonged and repeated contact may cause problem in the changes in red blood cell count of the blood in fish *Channa gachua* exposed to sub lethal concentration of copper exposed for 35 days. The RBC count was decreased throughout the study period when compared to the control ones showing the minimum percent decrease of -2.22 at the end of 7th day and maximum percent decrease of 18.36 at the end of 35th days. Decrease in RBC count in copper exposed for 7th, 14th, 21st, 28th, and 35th days the percent observed was -2.22, -6.52, -10.63, -14.58, -18.36 respectively. The changes in the

leucocyte count of fish *Channa gachua* exposed to sub lethal concentration of copper for 35 days were observed during the above exposure period and WBC count was decreased throughout the study period showing the percent decrease of -48.51, -53.09, -67.63, -70.43, -74.82 at the end of 7th, 14th , 21st, 28th,and 35th, days respectively. However, WBC count was declined showing minimum percent decrease of -48.51 at the end of the 7th day and maximum percent decrease -74.82 at the end of 35th days. The data shows changes in the hemoglobin content of the fish *Channa gachua* exposed to sub lethal concentration of copper. The hemoglobin content in the copper exposed fish was found to be decreased when compared to the control ones showing the percent decrease of the fish was to be -15.64, -26.59, -25.60, -23.36, -11.73 for 7, 14, 21, 28, 35 days. However, this result shows the minimum percent decrease at 35th days showing percent decrease of -11.73 and maximum percent decrease at 14th day showing the percent decrease of -26.59 in copper exposed fish.

Keywords: Copper Sulpahte, Hematological parameters, *Channa gachua.*

Impact of Sodium Cyanide on Behaviour and Oxygen Consumption in an Air Breathing Fish *Channa Gachua*

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ABSTRACT

Pollution of water bodies affects all the biotic communities including fishes. The chemical fertilizers pesticides are the main sources of water pollution. The general effects of water pollution on fish may be considered as physical effects oxidation effects and toxic chemical effects. As fish is excellent indicator of water quality and parameters such as fish population size growth rate condition factor and diversity are also indicative of the total health of water. Toxic chemicals generated through man's industrial agricultural and domestic activities eventually reach aquatic environment and cause a major threat to the inhabiting organisms. Since the aquatic environment is fragile and hence sensitive to the toxic effects of chemical pollutants including hydrophobic pollutants. Pollutants are known to alter the behavioural pattern growth and reproductive potential and resistance to disease of aquatic organisms by effect on a variety of biochemical and physiological mechanisms. The toxicity of sodium cyanide free cyanide to the fresh water fish *Channa gachua* was studied using static bio-assay method. The LC_{50} in 96 hours was found to be 33μg/L respectively. The behavioural changes when exposed to lethal concentration of sodium cyanide showed increased in the opercular movement surface behaviour and loss of equilibrium changewas observed. The body colour increased in secretion of mucus irregular swimming activity rapid jerk movement partial jerk and aggressiveness. The swimming behaviour was in a cork screw palter rotating along horizontal axis. In sub lethal treatment the schooling behaviour of the fish was slowly disrupted and the ventilation rate was increased. The fish *Channa gachua* at 21 days of exposure exhibited balanced swimming and active feeding and behaved in normal way. Hence oxygen consumption was decreased in lethal concentration of the fish (-22.64 -70.13%) but in sub lethal concentration decreased trend was improved and reached normal level at 21 days (-25.10-2.19). Alterations in oxygen consumption may be due to respiratory distress as a consequence of impairment in oxidative metabolism. Fish in sub lethal concentration were found under stress but that was not fatal.

Keywords: Sodium cyanide, Toxicity, Behaviour, Oxygen consumption, *Channa gachua.*

Effect of Different Probiotics on Floc Characteristic and Plankton Diversity of Culture Water in Biofloc System

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ABSTRACT
Biofloc system is one of the aquaculture system that can be applied in intensive culture of fish. By enhancing and adjusting the carbon/nitrogen ratio and converting these metabolites to microbial flocs, this system is an evolving technology to avoid the accumulation of hazardous nitrogen metabolites having systems with minimal water exchange. The aim of this study was to evaluate the effect of three groups of commercial probiotics (P1, P2, P3) on the floc characteristics and plankton diversity of culture water under indoor conditions. Among floc characteristic, different parameters like floc volume in probiotic 2 supplemented water is in the range of 30 to 50 ml, indicating improved microbial culture growth,which in turn boosts fish growth. In such system, a conglomerate of microbes, algae and protozoa develops in the water column, along with detritus and dead organic particles. On the other hand, plankton are the integral part of this culture ecosystem. On the basis of number of genera encountered in this study, class Bacillariophyceae (*Cyclotella*sp., *Cymbella* sp., *Diatoma* sp.) constituted the largest group among phytoplankton followed by Chlorophyceae (*Chlamydomonas* sp., *Chlorella* sp.,) and Cyanophyceae (*Nostoc* sp., *Spirulina* sp.).
Keywords: Biofloc, Probiotic, Plankton, Floc, Fish

Understanding Landslide Occurrence and Mitigation Strategies in the India-Bhutan Border Region: A Case Study"

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ABSTRACT
In the India-Bhutan border region, landslides are one of the most major geohazards. They are caused by a variety of reasons, including excessive rainfall, geological structure, terrain, and human activity. These landslides have significantly damaged infrastructure, homes, and lives in recent years. By performing a case study, this project intends to comprehend the incidence of landslides and propose appropriate mitigation techniques in the India-Bhutan border region.
In this work, we identified and mapped the landslide-prone locations along the India-Bhutan border using remote sensing and geographic information system (GIS) techniques. With the use of historical information and satellite photography, we also examined the temporal and geographical patterns of landslides. In order to learn more about the magnitude, volume, and frequency of landslides, among other physical properties, we also carried out field experiments. Based on the results of our investigation, we determined that excessive rainfall and human activity are the primary causes of landslides in the India-Bhutan border region. Also, we discovered that the bulk of landslides take place on steep slopes, where the soil is badly worn and unconsolidated. We suggested a number of actions, such as better drainage, early warning systems, and land-use planning, to lessen the effects of landslides. This research offers a thorough overview of the occurrence of landslides in the border region between India and Bhutan and makes suitable mitigation recommendations to lessen their impact. In order to create efficient landslip

management strategies, politicians, researchers, and local people in the area should utilise the study's findings as a guide.

Keywords: Landslides, Mitigation strategies, Heavy rainfall, Steep slope areas, Land-use planning, Effective landslide management plans.

Status of Organic Farming and Organic Crop Management Practices in Paddy in West Godavari District of Andhra Pradesh

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ABSTRACT

Organic rice production and farming is a holistic production management system, The organic farming system relies on crop rotation, use of crop residues, animal manures, off-farm organic wastes, green manures, bio-fertilizers, bio-pesticides to maintain soil productivity and tilth to supply plant nutrients and to control insects, pests and weeds thereby combating environmental pollution. This ultimately helps to maintain sustainable rice production and ecosystem. It is also cost effective, which helps our small and marginal farmers to sustain in rural areas of the country thereby maintaining their social, cultural and economic status. Organic farming in West Godavari district is implemented by Agriculture Department in 186 villages in 46 clusters in 46 mandals. According to the 2021-22 statistics 9754 paddy farmers were adopting organic cultivation methods in paddy in an area of 10,025 acres.KVK,venkataramanna gudem has conducted organic demonstrations in paddy crop from last five years. Rice provides 21% of global human per capita energy and 15% of per capita protein. Although rice protein ranks high in nutritional quality among cereals, protein content is modest. Farmers were adopted organic crop management practices in paddy from sowing to harvesting stage. Paddy seed is treated with bijamrutham this was helpful against the seed borne pathogens. Before paddy they grown navadanyalu and incorporated them into soils at 40-45 DAS. Last ploughing farmers add nearly 5-6 tons of ghanajeevamrutham, 50kgs and 100kgs of neem powder and caster cake to soils which are very helpful for controlling the soil borne pathogens. Application of dravajeevamrutham at every 15-20 days at an interval of 20 days after transplanting. Panchagavya, fish –amino acids and egg-lemon was used as plant growth promoting purpose and sprayed at an interval of 10 days at every 20DAT. Major pest and diseases like BPH, Leaf roller, Rice blast, Bacterial leaf blight were effectively controlled by spraying of bio-cultures, tutikadakasayam, maredupatrakasayam, inguva cow dung-cow urine and NSKE.Adoption of these practices farmers got an average yield of 18.75-21 quintals/acre in kharif 22.50 q/ac in rabi season with a gross income 61250-68800 rupees/ac and average cost of cultivation for one acre is17800-21000 rupees only.

Keywords: paddy, organic farming, yield, gross income, pest and diseases

Climate Crisis, Poverty and Alternative Livelihood Strategies of Small Tea Growers: A case Study on Ilam, Nepal

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ABSTRACT
Nepal is an agrarian country and agriculture is the main livelihood base of people. Nearly 68% of Nepal's people depend on agriculture for livelihoods. Nepalese agriculture contributes about 33% to national GDP. Tea production is labor intensive and the industry offers job opportunities in remote rural areas. Millions of livelihoods around the world depend on tea picking and processing. Tea plays a significant role in rural development, poverty reduction and food security and is one of the most important cash crops. The sustainable and socially equitable development of the Nepali tea industry is considered to be pivotal in poverty alleviation and the empowerment of rural women. It also improves the gender-disparity in employment in rural communities through provision of large-scale livelihood for women.While tea production by small growers is rising worldwide, their condition is often challenging because the values they are paid for their green tea leaves tend to be below the cost of their production. Issues constraining smallholders include low farm gate prices, poor extension services, limited market accesses, poor access to credit and low level of farmer organization along with some climatic factors are affecting the sustainable livelihoods of small-scale farmers in tea producing district of eastern Nepal. Tea cultivation is attractive to small growers because it provides work opportunity and income throughout the year, requires comparatively less investment, labour is available on a casual basis and the risk of complete crop failure is small. Furthermore, because of changes in weather patterns, such as fluctuating temperature, rainfall and frequent extreme weather conditions, the incomes of tea small growers' risk being lost as the plucking days decrease, which would impact negatively on food security. In this paper, I'm trying to document that despite all those negative impacts how small growers are coping with the situation and made it sustainable for their livelihood purpose. The study investigated the strategies applied for sustainability of tea small growers of Ilam and guided by two main objectives and a structured questionnaire and in-depth interviews were used as the principal data collection tools.

Keywords: Climate change, Poverty, Livelihood strategies, Small Tea Growers, Risk Management, food security.

At The Interface of Adaptation Strategies: The Migrant Labour, Climate, Health and Beyound

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ABSTRACT
Migrant include people like labour, refugees, asylum seekers, victims of human trafficking, and others. Among such, labour migration is the "movement of persons from their home to another state for the purpose of employment" (Library of Congress-Federal Research Division, 2007: 38) that has emerged as one of the most critical social and economic as well as environmental issues in the era of globalization, constantly strengthened by 'push' and 'pull' pressures. Adaptation is a human strategy and social practice for being capable to face the life, for which people need to adapt with their surrounding environments. Adaptation and change – an important bimodal

dimension of life practice creates in human expectations and also environmental adaptation towards the human vicissitudes. Thus, understanding of various aspects of adaptation needs to pay care – physical and beyond physical environment should be viewed as a "process and product of humans'' interaction with their new environment holistically. Migrants' need to adjust with the new climatic condition. Considering Sikkim as a case of this research study, it has rugged mountain terrain with totally different climatic conditions while the maximum migrant labourers are from the plain (West Bengal and Bihar) with just differing climatic condition. In Sikkim, migrant labourers have to reside in a relatively cold sub-tropical/ semi-temperate climate. The migrants very often face different health problems in Sikkim, especially among the newly arrived groups or individuals. This study proposes to examine the synergies between the adaptation processes in the new climatic conditions of migrant labourers and vulnerabilities of their health problems in Sikkim.

Keywords: Migrant labourers, Climate change, Adaptation, Social determinants

Climate Change and Water Use in Horticulture: A Case Study of Apple Orchard of Kashmir Valley

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ABSTRACT

There is an unprecedented impact of climate change on horticulture in the world, and so is the case for Kashmir valley. Climate change put an impact on water availability and the scarcity of water not only reduces quantity and quality of apple production but also impairs the health of apple orchards. This paper focuses on the impact of climate change on water availability in horticulture sector particularly on the apple orchards of Kashmir valley. The paper also set up the relationship between water use and apple production. This paper is based on secondary data taken from the various sources such as Meteorological Department J&K, Sheri Kashmir University of Agriculture University Kashmir, and Directorate of Horticulture J&K etc. Cobb Douglas Production function has been used to identify the impact of climate variables (such as rainfall, temp. etc) on apple productivity. This paper concludes that less apple productivity has been seen due to uneven distribution of rainfall per annum by non availability of water during the critical limits of various growth stages of apple fruit.

Keywords: climate change, water scarcity, apple orchards, production etc.

Breeding Climate Smart Pulses

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ABSTRACT

It is estimated that the planet's demand for food and feed crops will almost double by 2050. Globally, rainfed agriculture is practised in 80% of the total agricultural area and generates 62% of the world's staple food. Farmers are advised to use climate-resilient crops and crop types as a means of coping with or adapting to climate change. As the primary source of protein and

minerals for vegetarians, pulses are typically grown on marginal land with minimal inputs in a number of resource-poor nations around the world. They are subjected to a variety of abiotic and biotic challenges as a result of their growing in resource-limited circumstances, which results in severe production losses. Germplasm, genotyping and phenotyping, combined with a clear definition of product targets, are the foundation of a successful crop breeding programme on long term basis. Breeding crop genotypes with superior yield for the climatically challenging regions of the region involves integration of multiple drought-specific technologies together with all of the other technology components that comprise a successful crop breeding programme. Drought has major implications for regional crop production because of the expected effects of gradual climate change happening since last decade observed with respect to erratic rainfall distribution pattern during major part of crop life cycle. Germplasm of diverse nature serves as a base for devising any drought oriented breeding programme. Characterization of genetic diversity for drought resistance and identification of novel germplasm is the first step for conventional breeding, genomics-assisted plant breeding and functional analysis of the genes involved in various pathways associated drought stress responses. Although final yield returns under drought stress is the primary trait for measurement of drought resistance in many crops, secondary traits may be particularly suited to improving selection response to stress conditions. Desirable screening methods based on secondary traits should be established to effectively trace out target phenomes in quickest possible time. Selection for improved performance under drought based on grain yield alone has often been considered inefficient, but the use of secondary traits of adaptive value whose genetic variability increases under drought can increase selection efficiency. Root screening has proved to be effective tool in culling out poor genotypes with respect to drought. Usual trend in field trials indicating relevance of root architecture with yield performance under drought stress is always expected. In order to combat climate change and create new crop types that are better suited to the changing climate, holistic smart breeding approaches may be a feasible solution.

Keywords: Pulses, Drought, Resilience

Natural Polyphenols of Green Tea as Potential Antiviral Drug

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ABSTRACT

COVID-19 is spreading at an alarming rate and the lack of an approved treatment is causing a major load on the healthcare systems. Several antiviral drugs are under clinical trials however; owing to possible side-effects higher doses of these drugs cannot be administered. Comparing with the mechanism of action of possible drug candidates in previously known viral diseases, we can shortlist some potential viral targets and drugs that can act on these sites. Green tea contains a number of bioactive chemicals, it is particularly rich in catechins, of which epigallocatechin gallate (EGCG) is the most abundant. Catechins and their derivatives are thought to contribute to the beneficial effects ascribed to tea. Tea catechins and polyphenols are effective scavengers of reactive oxygen species in vitro and may also function indirectly as antioxidants through their effects on transcription factors and enzyme activities. EGCG is polyphenolic catechins found abundantly in green tea with a vast array of health benefits. Their antiviral activities also have been reported against various viral infections. In depth analysis of antiviral activities of EGCG and

TFs reveals that both of them are wide spectrum antiviral molecules with no definite interaction sites. They act at different stages of the viral cycle.
Keywords: Green Tea, EGCG, COVID-19 .

A Case Study on Pesticide Application on Tomato, Chillies, Cucumber, Beans, Brinjal and Cabbage Growing Vegetables Hub Of Bishnupur District, Manipur

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ABSTRACT
The investigation aimed to study the pattern of pesticide usage, management practices, and health effects on farmers in the vegetable-growing areas of Bishnupur district, Manipur. Data was collected from 100 farmers and 15 pesticide retailers using structured questionnaires, interviews, and group discussions over the period of January to March 2023.The study found that several chemical insecticides, including Cypermethrin (10%), Imidacloprid (17.8%), Chlorpyrifos (50%), Fipronil (5%), Monocrotophos (36%), Chloropyriphos (20%), Cypermethrin (4%), Dichlorvos (70%), Thiamethoxam (25%), and Profenofos (40%), were popular among the farmers. Similarly, fungicides and antibiotics such as Tebuconazole (6.7%), Captan (26.7%), Carbendazim (20%), Streptomycin (90%), and Tetracycline (10%) were also widely used. The investigation revealed concerning findings about pesticide usage and management practices among farmers in the vegetable-growing areas of Bishnupur district, Manipur. The study identified popular chemical insecticides and fungicides used by farmers, and highlighted the lack of safety measures during pesticide spraying and improper disposal of used containers. Despite some farmers practicing organic farming in their personal kitchen gardens, overall awareness and training on pesticide usage and residues were found to be insufficient. The study emphasizes the need for urgent measures to raise awareness, provide training, and promote safer and sustainable farming practices to protect farmers' health and mitigate the harmful impacts of pesticides on human health and the environment.
Keywords: Pesticide, Insecticides, Fungicides, Farmers perception, application

Siderophore Production Activity by Rhizosphere Dwelling Fungi to Alleviate Salinity Stress and Enhance Plant Growth in Finger Mille

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ABSTRACT
Soil salinity, a consequence of climate change, is one of the most devastating environmental challenges that affect sustainable agriculture and hinder global food security. The United Nations General Assembly has declared 2023 the International Year of the Millets. Finger millet is a nutraceutical crop susceptible to salinity at the germination stage. Therefore, it is necessary to enhance salinity stress tolerance in Finger millet using eco-friendly and efficient approaches like the application of siderophore-producing rhizosphere fungi, as siderophores are the iron-chelating agents essential for numerous biological activities and plant growth under stress conditions. The present work was designed to isolate and characterize the rhizosphere inhabiting fungi from wheat

(Gujarat) and Finger millet (Karnataka) to induce salinity stress tolerance in Finger millet. These isolates were screened and optimized for their siderophore production potential in different culture media, varying NaCl concentrations, incubation period and temperature using a universal CAS assay. A seed germination assay was performed using the top-of-the-paper method by priming Finger millet seeds with fungal isolates and assessed for morphological and physiological parameters. The results revealed that siderophore producing *Trichoderma*sps. 110 produced the highest siderophore units (86.76 %) than *Trichoderma*sps. 109 (84.79) under 0 mM NaCl in succinic acid media, whereas under 400 mM NaCl, they produced 57.97 and 49.08 % respectively. These fungal treatments enhanced morphological (germination percentage, shoot, root length, and vigour index) and physiological (total chlorophyll and RWC) parameters of Finger millet. These siderophore producing rhizosphere fungi can be exploited at the field level to mitigate salinity stress and enhance plant growth in Finger millet.

Keywords: Finger millet, Soil salinity, Siderophore, Total chlorophyll, *Trichoderma*

Problems Associated With Bamboo Artisans: A Challenge

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ABSTRACT

The study was conducted in 2019-2020 in North Karnataka districts. The respondents were interviewed personally to elicit the primary information by using self structured interview schedule. Exploratory research design was used. Random sampling method was applied to select a sample size of 120 bamboo artisans' family. Cent per cent of the respondents experienced non availability of bamboo as a major general problem followed by high price of bamboo and, middle man involvement while purchasing bamboo raw materials and plastic hinders their selling. More than sixty per cent of the respondents faced problems like lack of knowledge about eco friendly products among people. Whereas maximum per cent of the respondents faced the domestic problems like difficulty to balance between family and work life followed by family responsibilities come first and respondents cannot take business decision by their own. Major per cent of the respondents mentioned difficulty to move and travel alone followed by difficulty due to caste and social status as major social constraints. First rank was given to the towards the recommended suggestion- availability of bamboo at reasonable price should be provided by government followed by provisions of drudgery and time saving devices to the artisans by government (II rank), third rank was given to advertisement of the bamboo products to be made through T.V., radio, newspaper and magazine, fourth rank given for artisan's an opportunity for participating in melas and exhibition to sell their products, government should take the responsibility of not involving the middleman for selling bamboo products was ranked fifth and sixth was given for the financial assistance from the government for the construction of work station among the suggestions to overcome general problems. First rank was given for suggestion to overcome domestic problem- provision of government financial support to the artisans by the government followed by encouraging women in for decision making (II rank) and third rank was given for teaching of work life balance. First rank is given for suggestions to overcome the social constraints- transportation facilities provided by the government followed by arranging workshops for innovative marketing and communication skills while selling (II rank), third rank- was given

for initialization of adult education for the artisans by government and NGO's and fourth rank for provision of facilities for motivational classes for the artisans by the government.

Perception of The Farmers of Banaskantha District of Gujarat State Regarding Effects of Climate Change on Agriculture

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ABSTRACT
Agriculture sector is vital for the food and nutritional security of the nation.In present era, agriculture sector is affected by various reasons like fragmentation of land, fluctuations in market prices, depleting natural resources, erratic monsoon conditions, climate change etc. During succeeding era, global agriculture production is declining due to these reasons and climate change is one of the important factors. Climate is the primary determinant of agriculture production as it directly affects the crop yield and livestock productivity.Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions. The study was conducted in Banaskantha district of Gujarat state. Erratic rainfall coupled with high temperature and high wind velocity due to arid and semi-arid region creates water shortage in soil of Banaskantha district. Hence, it was selected for the study to understand the perception of farmers about effect of climate change in the district. Among 14 talukas of Banaskantha district Vav, Tharad and Suigam talukas are most affected by varying climatic conditions like lower rainfall and aberrant temperature comparing to other talukas of Banaskantha District. Therefore, these three talukas Vav, Tharad and Suigam were selected purposively. Five villages from each taluka were selected randomly. Ten respondents were randomly selected from each village. Hence final sample was constituted with 150 respondents. For calculating Perception on five aspects selected viz. scientific understanding of climate change in relation to agriculture, causes of climate change, change in climatic parameters, effects of climate change and adaptation and mitigation to climate change was measured. Total score for each statement was calculated in each aspect. On the basis of obtained score, mean score for each statement in each aspect was calculated. On the basis of mean score rank was given to each statement in each aspect. From the study it was concluded that majority (68.68 per cent) of the respondents had moderate level of perception as well as in case of aspect wise perception regarding climate change it was found that the Perception about scientific understanding of climate change in relation to agriculture; Climate change is really happening (Mean score 4.13), Perception about causes of climate change; Indiscriminate tree cutting (Mean score 3.96), Perception about change in climatic parameters; Summer is becoming more hotter (Mean score 4.15), Perception about effects of climate change on agriculture; Reduction in area of cultivable land due to water erosion (Mean score 3.89) and Perception about adaptation and mitigation to climate change; Rain water harvesting in monsoon help farmers in time of scarcity (Mean score 4.12) were ranked first in all aspect wise perception regarding climate change.
Keywords: Farmers Perception, Climate change, Global warming

Adaptation Strategies Followed by the Farmers of Banaskantha District of Gujarat State Regarding Effects of Climate Changein Agriculture

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ABSTRACT

Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions. Climate change is caused by factors such as biotic processes, variation in solar radiation received by earth, plate tectonics and volcanic eruptions. Certain human activities also have been identified as significant causes of climate change and very likely the main causes of the phenomenon known as global warming. Climate plays a dominant role in agriculture having a direct impact on the productivity and physical production factors for example the soil's moisture and fertility. Adverse climate effects can influence farming outputs at any stage from cultivation through the final harvest. Thinking the seriousness of unwanted consequence of climate change problems, everybody should aim to do something. Agricultural production activities are generally more vulnerable to climate change then other sectors. Agricultural extension and advisory services, both public and private, thus have a major role to play in providing farmers with information, technologies and education on how to cope with climate change and ways to contribute mitigation. Support from extension functionaries for farmers in dealing with climate change should focus on mitigation and adaptation. Realizing the importance of the issue it is thought to know how farmers perceive the issue of climate change. It was necessary to study strategies to adapt the changing climatic conditions for sustainable agricultural development. The study was conducted in Banaskantha district of Gujarat state. Erratic rainfall coupled with high temperature and high wind velocity due to arid and semi-arid region creates water shortage in soil of Banaskantha district. Hence, it was selected for the study to understand the adaptation strategies of farmers about effect of climate change in the district. Among 14 talukas of Banaskantha district Vav, Tharad and Suigam talukas are most affected by varying climatic conditions like lower rainfall and aberrant temperature comparing to other talukas of Banaskantha District. Therefore, these three talukas Vav, Tharad and Suigam were selected purposively. Five villages from each taluka were selected randomly. Ten respondents were randomly selected from each village. Hence final sample was constituted with 150 respondents. To assess adaptation strategies the respondents were requested to select the strategy they used by the farmers regarding climate change. Then strategies were calculated on the basis of frequency and per cent and rank were given to each strategy. It was concluded that the majority of farmers adapted the strategies *viz.* Selection of appropriate crop/varieties (94.00 per cent), Application of farm yard manure (92.00 per cent), Ploughing and sowing across the slope (89.30 per cent), Storethe product at safe place (84.00 per cent) and Weeding at initial stage of crop (80.00 per cent) were ranked first to fifth respectively while, Integrated nutrient management (74.66 per cent), Irrigation during critical stages (71.30 per cent), Interculturing (68.00 per cent), Use of intercropping (61.30 per cent), avoid tree cutting and planting more trees (58.67 per cent) were ranked sixth to tenth.

Keywords: Adaptation strategies, Climate change, Global warming

Effect of Pressing Pressure and Pressing Time on Qualities of Soypaneer

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ABSTRACT
The experimental research work was carried out at the department of Agricultural Process Engineering, CAE & T, VNMKV, Parbhani (Maharashtra) to study the effect of varying pressing pressure and pressing time on moisture content, yield, colour values (L* , a* and b *) and sensory qualities of soypaneer. Soypaneer was prepared using 0.2% citric acid as a coagulant. Four levels of pressing pressure (1, 2, 3, 4 bar) and three levels of pressing time (15, 20, 25 min) were taken and soypaneer samples were prepared. The study revealed that the values of moisture content of soypaneer were found to decrease with increase in pressing pressure and pressing time. The yield of soypaneer decreased with increase in pressing pressure and pressing time due to removal of water from the soybean curd during its preparation. The study also indicated that the colour values (L*, a* and b *) of soypaneer were not significantly influenced either by pressing pressure or by pressing time. The process variables viz. varying pressing pressure and pressing time did not show significant effect on colour and flavour of soypaneer. However, taste, body and texture and overall acceptability of soypaneer were found to be significantly affected by varying pressing pressure and pressing time. The pressing pressure of 3 bar and pressing time of 25 min were found to get desired qualities of soypaneer.
Keywords: Soypaneer, coagulant, soybean curd

Variability, Correlation and Path Analysis Studies for Yield and Yield Attributing Traits in Bitter Gourd (*Momordica charantia* L.)

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ABSTRACT
The present experimental work was conducted at Department of Biotechnology and Crop Improvement, College of Horticulture, University of Horticultural Sciences, Bagalkot to study the genetic variability, correlation and path coefficient analysis among the genotypes of bitter gourd for yield and yield contributing traits during the year 2019-2021. Twenty-one bitter gourd genotypes were collected from different regions of Karnataka and evaluated in RCBD design with three replications. Analysis of variance exhibited highly significant differences for all the traits studied. High heritability coupled with high genetic advance as per cent mean (GAM) was observed for characters viz., vine length, number of branches per vine, number of nodes per vine, inter-nodal length, tendril length, node at which first male flower appears, sex ratio, number of fruits per vine, average fruit weight, fruit length, fruit width, pulp thickness, fruit yield per vine and plot yield. This indicated the predominance of additive component of gene action for these traits. Yield/vine expressed positive and significant genotypic correlation with vine length, number of branches per vine, sex ratio, number of fruits per vine, fruit length and plot yield. The traits viz., vine length, days to first female flower appearance, sex ratio, number of fruits per vine and plot yield exhibited positive direct effects on fruit yield per vine. These seem to be primary yield contributing characters and could be relied upon for selection of genotypes to improve genetic

yield potential of bitter gourd. Hence, utmost importance should be given to these characters during selection for yield improvement.
Keywords: Bitter Gourd, Genetic Variability, Correlation and Fruit

Studies on Reciprocal Effects and Gene Actions in Sesame (*Sesamum Indicum* L.)
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ABSTRACT
A combining ability was estimated using 8 x 8 diallel mating design for ten biometrical characters in sesame. The results showed that the variance were highly significant for all the characters excluding days to 50 per cent flowering and length of capsule due to gca, days to maturity and 1000-seed weight due to sca and days to 50 per cent flowering, plant height, number of seeds per capsule and oil content due to rca, denoting the importance of both additive and non-additive gene actions for yield and attributing traits. The magnitude of the gca variance was higher than the sca variance for most of the traits. The magnitude of sca variance when compared with rca, was highly significant and higher for the characters days to 50 per cent flowering, plant height, number of branches per plant, number of seeds per capsule and seed yield per plant, whereas the magnitude of reciprocal effect was highly significant and higher than the sca variance for the traits days to maturity, number of capsules per plant, 1000-seed weight and oil content. This disclosed the presence of reciprocal effects for these characters as both additive and non-additive gene actions are involved for yield and yield attributing traits. Where GCA are more pronounced, appreciable progress could be achieved through conventional breeding methods such as pedigree, bulk method etc, while non fixable genetic variance could be improved by diallel selective mating or biparental mating in early generations.
Keywords: Diallel Analysis, Combining Ability, Reciprocal Effects and Sesame.

Identification and Selection of Drought Tolerant Rice Genotypes Using Drought Tolerant Indices in Red Laterite Zone of West Bengal
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ABSTRACT
The present investigation was carried out under a diverse set of water stress conditions at two locations Regional Research Station (Red & Laterite Zone) Bidhan Chandra Krishi Viswavidyalaya, Jhargram and Regional Research Station Sub (Red and Laterite Zone) Bidhan Chandra Krishi Viswavidyalaya, Raghunathpur, Purulia of West Bengal, India in Kharif-2015. Forty rice genotypes were assessed for 11 drought tolerant indices. The yield reduced significantly under drought stress condition during reproductive stage as compared to well irrigated condition in both the locations. Four rice genotypes Rashi, Gautam, Turant and Khandagiri possessed high level of drought tolerance as these varieties exhibited high YI, REI, DTE, STI, MPI value and low value for SSI, STI and TOL compared to the check varieties Sahabagi Dhan and Vandana in both the locations. The yield reduction percentage under water stress condition was also less for these genotypes as they performed better than other genotypes under drought stress condition in

Jhargram as well as Purulia location. Thus, these genotypes showing tolerance to drought with high yield potential under water stress condition irrespective of locations could be selected for further hybridization with elite parents for breeding of high yielding drought tolerant lines.
Keywords: Rice, Stress, Drought Tolerant Indices, Selection and Grain Yield

Changes in Growth and Yield of Onion as Influenced by Pruning and Gibberellic Acid Application Methods

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ABSTRACT
Photosynthesis supplies the carbon and respiration supplies the energy for plant growth, a group of chemicals produced by plants known as plant growth regulators control the growth and development of plant. These chemicals act on plant processes at very low concentrations. Often they are produced at one location and transported to another, where they exert their influence; however, they may also act on the same tissue in which they are produced. Field experiments were conducted for two years (2015-2017) to study the effect of pruning and Gibberellic acid and its application methods in onion .The experiment consist of Root pruning, (ii) leaf pruning, (iii) Root and leaf pruning and six Gibberellic acid and its application methods at (i) 50 ppm as root dip, (ii) 50 ppm as foliar spray, (iii) 100 ppm as root dip,(iv) 100 ppm as foliar spray, (v) 150 ppm as root dip, (vi) 150 ppm as foliar spray and one absolute control at atHorticulture Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.).The treatments were assessed based on the bulb yield, weight of bulb, plant height, number of leaves plant, bulb size and days to crop maturity. Pooled analysis of the two years data indicated significant difference. The growth of unpruned plants was never disturbed and produced maximum storage roots, whereas, the pruned ones had to recover by producing new stems and leaves. In consideration of pruning in terms yield attributing characters highest value was recorded from P2 i.e. leaf pruning treatment followed by root pruning and the minimum value was recorded from P3 i.e. root and leaf pruning treatment. In consideration of Gibberellic acid concentrations and their application methods showed highest value was recorded from G6 i.e. GA3at150 ppm as foliar spray during both years and on the basis of mean data and this trend was followed by its lower concentrations at 100 and 50 ppm which were significantly at par with each other.
Keywords: Onion, Pruning , Gibberellic acid amd Application Methods

Climate Smart Agricultural Technologies in Nepal

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ABSTRACT
Growing population and changing diets have increased the demand of food. Food production isintensified by agriculture's extreme vulnerability to climate change. Climate change's negative impacts are already being felt in different forms of weather variability, invasive species and shifting the boundaries of agro-ecosystem. It has reduced the crop yields and nutritional qualities

and lowering livestock productivity. The reverse is also true that agriculture contributes significantly to climate change. A brief review was done to illustrate the potential CSA technologies in Nepal. Nepal's weather forecasting system is being robust and reliable now. Climate resilient crop species and varieties like cold, drought and submergence tolerant rice varieties, heat stress tolerant wheat and maize varieties, disease and pest tolerant, and nutrient responsive crop varieties are being developed by Nepal Agriculture Research Council, NARC. Resource conserving technologies like no or minimum tillage practices, water use efficient technologies, integrated crop management technologies, improved cattle-sheds and composting technologies are few of them. Sloppy land agricultural technologies, agroforestry and crop diversification through intercropping/mixed cropping and crop-livestock, crop-fish farming are the potential technologies in Nepal. However, few of them are being adopted by the farmers. Therefore, a consolidated efforts is needed to cater the effects of climate change through R&D of Climate Smart Agricultural (CSA) technologies in Nepal. NARC should collaborate with the related international organizations for knowledge and resources sharing.

Keywords: Agriculture, climate change, climate smart, technologies, collaboration

Climate Change and its Impact on the Farming Community

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ABSTRACT

Climate change is a pressing issue that affects the global population in numerous ways, including its impact on agricultural communities. The agricultural sector is particularly vulnerable to climate change due to its reliance on natural resources, such as water and soil, which are affected by changes in temperature and precipitation patterns. In addition, extreme weather events, such as droughts, floods, and heatwaves, have become more frequent and severe, which can damage crops and livestock, and ultimately result in economic losses for farmers. The effects of climate change on agriculture vary by region, and depend on a range of factors, such as the type of crops grown, the availability of water, and the local climate. In some areas, rising temperatures have led to reduced crop yields and lower quality produce. In others, changes in precipitation patterns have led to soil erosion, reduced fertility, and increased susceptibility to pests and diseases. Farmers are also facing challenges related to the availability of water, as climate change is altering rainfall patterns and causing changes in the timing and volume of snowmelt, affecting both irrigation and drinking water supplies. Climate change also has social and economic implications for agricultural communities. For example, farmers may face increased financial risks due to the unpredictability of weather patterns and the potential for crop losses. The need for adaptation and mitigation strategies may also require significant investments in new technologies and infrastructure, which may not be feasible for small-scale farmers in developing countries. Overall, the effects of climate change on agricultural communities are complex and multifaceted, and require coordinated efforts to address. Adaptation strategies such as crop diversification, improved water management, and the development of climate-resilient crops and livestock can help mitigate the impacts of climate change on agriculture. Solutions of the problem There are several solutions that can help mitigate the impacts of climate change on agriculture. Here are some examples- Sustainable agriculture practices, Water management, Climate-resilient crops, Improved weather forecasting, Education and training to the farmers, Policy support, Mitigation efforts etc.

Keywords: Agricultural Communities, Farmers and Climate Change

Impact of Climate Change on Productivity of Selected Crops in Akola District

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ABSTRACT
Agriculture sector is more vulnerable to changing climate compared to other sectors. Looking to the adverse climatic situation and persistent changes in area, production and productivity of major crops in study area, it is felt necessary to analyze the impact on productivity of selected crops in Akola district. So, the present study has been conducted to study the impact of climate change on productivity of selected crops in Akola district. Time series data ranging from 2000-01 to 2020-21 on productivity of cotton, gram, tur, wheat and soybean crop has been taken from government publications, websites. The data of selected climatic factors such as rainfall, maximum temperature, minimum temperature, morning relative humidity, evening relative humidity has been collected from Department of Agronomy, Dr. PDKV, Akola.The effect of climate change on the productivity of cotton, gram, tur, wheat, and soybean has been studied using the multiple linear regression technique. According to the results of the multiple regression equation, climatic conditions are responsible for 59 per cent of the variation in cotton productivity. Soybean productivity varies by 38 per cent, and this fluctuation is caused by climatic factors. According to the findings, 74 per cent of the variation in gram productivity is observed. The climatic factorare responsible for 59 per cent of the fluctuation in tur productivity and also about 17 per cent of the variation in wheat productivity.
Keywords: Climate change, Agriculture, Productivity, Multiple Linear Regression

Effect of Organic Fertilizer on Growth and Yield Traits of Kodo Millets (*Paspalum scrobiculatum L.*)

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ABSTRACT
Kodo (*Paspalum scrobiculatum L.*) is an among the ancient grain millets grown in many parts of India, where it is consumed as nutritional values, dietary fiber along with antioxidant propertiesand vitality foods in rural areas. Millets are considered as ancient grains, domesticatedthousands of years ago at the beginning of human civilization. Some evidences point out about the cultivation of millets about 4000 years ago. There is growing realization regarding nutritional and healthbenefits of the underutilized millets grains, which have paved the way for growth of millets production that has been declining science the focus has been mainly on cereal crops like rice and wheat. It is a drought-tolerant and hardy monocot crop especially confined to semi-arid regions.it has considerable production potential in marginal and low fertility soils under diverse environmental conditions. Kodo millet is small seeded crop and it is mainly grown for its grain and fodder. Now a day's thrust to grow millets is given due to their nutritional superiority as compared to the major cereals. An experiment was conducted mainly focused on to identify the effect of organic manure on growth and yield of kodo millet. The present study was undertaken to find out the growth and yield attributes through organic manure on farm testing on Kodo crop. Theon farm testing on Kodo millet was conducted by Krishi Vigyan Kendra, Badgaon, Balaghat

in two adopted villages of Birsa Block in Balaghat district. Prevailing farmers' practices were organic treated as control for comparison with organic recommended practices. The average two year data observed that an average yield of demonstrated plot was obtained 14.04 q/ha over control (09.05 q/ha) with an additional yield of 4.99 q/ha and the increase average kodo productivity by 51.58 per cent.The average technology gap and index were found to be 5.6 and 23.00 per cent. The extension gap ranged between 4.90 q to 6.40 q/ha indicating the need to educate the farmers through various extension approaches for the adoption of improved technologies. The results revealed that among the treatments farm yard manure treatment evidenced its superiority through growth parameters like 50% flowering, internode length and days to maturity and yield parameters *viz.*, 1000 seed weight and seed yield / kg.

Keywords: Kodo millet, Organic, Growth, Yield parameters.

Impact of Climate Change on Maize Yield in Bastar District of Chhattisgarh

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ABSTRACT

Agriculture and forest product collecting are the economic foundations of the Bastar district. Paddy and maize are the most important crops in agriculture, while wheat, jowar, kodokutki, gram, tur, urad, sesame, niger, and mustard are also cultivated. In addition to agriculture, animal husbandry, poultry, and fisheries also contribute to the economy. Maize is cultivated in 10 percent of the gross cropped area in Bastar district and mostly requires less water. For simple ordinary least square (OLS) Regression analysis, two types of data was obtained viz., directorate of economics and statistics and district-wise gridded annual rainfall, maximum temperature, minimum temperature data (2000-2020) were used as a baseline climatic condition. To analyze, the impact of climate change on the maize productivity, two types of data viz., yield of maize and various climatic data set was used to find out the relationship between climatic variation and yield fluctuations. recorded data of rainfall showing that rainfall in June to September has a negative impact and decreased productivity was predicted due to an increase in every per cent of rainfall in the months of June to September. Whereas, monsoon rainfall during June to September shown significantly positive impact on maize (6.30***) which implies that increases in the productivity. Annual rainfall is significantly increase with every percent increase with productivity. minimum temperature in April, October, November and January is negatively affect the crop yield as every increase in the percent of degree Celsius will decrease the productivity by 10.82, 4.08, 3.49 , and 3.56 percent , respectively. The winter season's maximum temperature affects the crop yield. In December and January maximum temperature of one percent degree Celsius increases, the yield of maize decreases by 7.57 and 5.4 percent, respectively. Maximum temperature during April and May positively affects the yield increases by 17.81 and 7.31 percent when one percent degree increases.Coefficient of determination was calculated as 89.40 percent.Durbin-Watson test was near to 2 level stats; there was no autocorrelation. Excessive rainfall can have either negative orpositiveimpact on crop yield, andits signvariesregionally. The study suggests to develop winter resistant crop varieties by researchers.

Keywords: Maize, Climate Change, Rainfall, Temperature, Regression

Trends in Seasional and Annual Precipitation Extremes -An Indicator of Climate Change in Afzalpur Taluk, Karnataka, India.

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ABSTRACT
Attempt was made to analysis of temporal variation in seasonal and annual rainfall in the study area of Afzalur taluk, Karnataka, India. Rainfall data collected from four different rain gauge stations Afzalpur, Atanoor, Karajagi and Gobbur during the period from 2010 to 2022. The Mann-Kendal (MK) rank test and linear trend were used to determined long term changes in rainfall. The analysis found that significant decrease in southwest monsoon rainfall, while increase in post-monsoon period in the study area which is popularly known as "Gateway of summer monsoon". Rainfall during summer period showed insignificant increasing trend. Rainfall during monsoon period (June – August) showed significant decreasing trend while increasing trend in summer season. Water availability throughout the summer months is a concern in the study area due to rainfall decrease in rainiest months of June to August. At the same time, if the post-monsoon rains are consistent and extended, the majority of plantation crops will benefit.
Keywords: Afzalpur taluk, Climate change, coefficient of variations, Mann-Kendal test, rainfall trend.

Impact of Front Line Demonstrations on the productivity enhancement and dissemination of Pigeonpea in Panna district, Madhya Pradesh

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ABSTRACT
Pigeon pea (*Cajanus cajan*L.) is an important legume food crop that is predominantly cultivated in tropical and subtropical areas of the world. The crops is plays an important role in food and nutritional security for urban and rural communities in developing countries. The seed of pigeon pea is eaten as a green vegetable and dry pulse along with is an important source of protein in 20-22%, Vitamin B, carotene and ascorbic acid. It is hardy and drought tolerant crop assuring sustainable returns from marginal lands with minimum input, hence it is considered as a very suitable crop for material agriculture. The study was undertaken in Krishi Vigyan Kendra, Panna (M.P.) during the period four year conducted a total 132 front line demonstration of Pigeonpea crop at farmers fields. Cultivation practices comprised under FLD *viz.* use of improve variety TJT 501, seed treatment, seed inoculation, spacing 45x15cm, soil test based nutrient management, irrigation water management and integrated pest management show that percentage increase in the yield of pigeon pea ranged from 25.00 % to 30.00 percentage over farmer's practice. The highest seed yield 16.40 q ha-1 was recorded in the year 2015-16 in FLD, which was 28.00% more over the farmer's practice (12.80 q ha-1). The additional cost Rs. 8675 to Rs. 13482 gave additional net return, it was ranged from Rs. 6075 to Rs. 12015 per hectare .The increased Benefit: Cost ratio was also calculated, it was ranged from 2:30 to 2.70 in demonstration & 1.90 to 2.30 in farmers

practice. Effective demonstration and enhanced productivity would promote pigeon pea cultivation in district.

Keywords: Pigeonpea, Grain yield, improved technology, Gap analysis, Productivity.

Mango Leaf Hopper: A major problem in Amroha District U.P., India

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ABSTRACT

Amroha district is situated at North-West site of Uttar-Pradesh, India and famous for growing and commercializing varieties of mangoes. During the orchard survey in Amroha district it was observed that the mango is suffered from number of pests out of which Mango Leaf hopper i.e.*Amritodusatkinsoni, Idioscopusclypealis*and *Idioscopusnitidulus*are the prominent pest in this area. They may cause ~60% losses even more sometimes at each crop stage of mango from appearance of new flush to flowering cum fruit setting stages cause a very serious problem in this region. The infestation leads to weakening of the plants and reducing percentage of fruit set. Therefore, it should be managed properly and carefully to avoid economic loss of crop. During feeding they excrete honey dew on the leaves and flowers which results in the development of black sooty mould. As a result, the leaves turn black reducing photosynthesis, arresting the new growth and development of plants. Therefore, a proper organic management practices should be followed to reduce the pest incidence and also to avoid the use of synthetic chemicals in mango orchards as they may cause resurgence in this pest.

Keyword: Mango Hopper, Economic Losses, Pest management and Resurgence

Impact of frontline demonstration of raised bed planter on yield and economics of soybean in Vindhyan Plateau of Madhya Pradesh

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ABSTRACT

Climate change is putting increasing pressure on India's farmers' land and natural resources, which they rely on not just to feed the country but also to support their livelihoods. Approximately 30% of land is currently degraded and rising temperatures mean agriculture will require 30% more water. Innovative approaches are emerging across India to assist farmers in adopting to climate change challenges and mitigating the effects of their farming practises. An innovative raised bed planter pattern and its impact on soybean crop production was carried out. Krishi Vigyan Kendra, Raisen conducted frontline demonstration during two consecutive years 2015-16 and 2017-18 at farmers' field in Raisen district of Madhya Pradesh to assess the effect of raised bed planter on the growth parameter, yield and economics of soybean crop. Raised bed planter was found better in terms of growth parameter and yield of soybean in comparison to normal seed drill sowing machine. The net return is the best index of profitability of soybean crop and higher net return per ha of Rs. 23820 was recorded for soybean crop under raised bed planter, where as lower net return per ha of Rs. 13850 was recorded under normal seed drill sowing and yield was 1644 and 1245 kg/ha respectively.

Performance Evaluation of Zero Tillage in Wheat under Rice-Wheat Cropping System in Vindhyan Plateau of Madhya Pradesh

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ABSTRACT

Rice-wheat cropping system is the world's largest Agricultural production system occupying 12.3 million ha in India. Krishi Vigyan Kendra, Raisen for performance evaluation of frontline demonstration on sowing of wheat by zero tillage method of farmers' field during 2017-18, 2018-19 and 2019-20 in Sanchi and Gairatganj block of district Raisen. Zero tillage wheat has sown primarily positive impact on wheat crop management, particularly through reduced input needs combined with yield increase. The demonstration were conducted during the rabi season at 60 farmers field to assess the production potential and economic benefit of sowing of wheat under zero tillage method versus conventional method (FP). Improved technology of wheat variety GW-322, Integrated Nutrient Management (100:60:40:25 kg of N: P: K: S/ha + Azotobacter + PSB 10ml/kg of seed) and seed treatment with *Trichoderma viride* @5-10 g/kg of seed. The improved technology recorded mean yield of 44.28q/ha, which was 15.67 percent higher then that obtained under farmers practices 38.28 q/ha. The technology gap, extension gap, and technology index were 5.71 q/ha, 6.0 q/ha and 11.43 percent respectively. Zero tillage sown wheat had significantly less weed dry biomass percent area as compared to wheat sown in conventional and reduced tillage besides advancement at sowing by 10-12 days over conventional method (F.P.) Wheat was sown by zero tillage technology that helped in advancing sowing time, reduced cost of cultivation in terms of land preparation (Rs.5000/ha), saving in labours time (6-7 hrs/ha), fuel(50 ltr/ha), environmental pollution (65%) as well as water saving (40 %).

Harmful Effect of Pesticides on Human Health and Environment

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ABSTRACT

Pesticides are used to control and kill harmful pest which ruin crops and vegetables. When these pests used in huge amount it harms environment and human health. To determine risk, one must consider both the toxicity and hazard of the pesticide and the likelihood of exposure. A low level of exposure to a very toxic pesticide may be no more dangerous than a high level of exposure to a relatively low toxicity pesticide. Pesticides can cause short-term adverse health effects, called acute effects, as well as chronic adverse effects that can occur months or years after exposure acute health effects include stinging eyes, rashes, blisters, blindness, nausea, dizziness, diarrhea and death. Examples of known chronic effects like cancers, birth defects, reproductive harm, immunotoxicity, neurological and developmental toxicity, and disruption of the endocrine system. Immediate health effect from pesticide exposure includes irritation of the nose, throat, and skin causing burning, stinging and itching as well as rashes and blisters. Nausea, dizziness and diarrhea are also common. People with asthma may have very severe reactions to some pesticides, particularly pyrethrin/pyrethroid, organophosphate and carbonate pesticides. Pyrethroid targets the central nerve system in organisms; their main mechanism of action is interacting with voltage gated sodium channel in neurons, this interaction results depolarization caused by the prolonged influx of sodium ions during excitation. Chronic effects of pesticides include cancer and other

tumors; brain and nervous system damage; birth defects; infertility and other reproductive problems; and damage to the liver, kidneys, lungs and other body organs. Chronic effects may not appear for weeks, months or even years after exposure, making it difficult to link health impacts to pesticides. Pesticides can contaminate soil, water, turf, and other vegetation. In addition to killing insects or weeds, pesticides can be toxic to a host of other organisms including birds, fish, beneficial insects, and non-target plants.

Keywords: Pesticides, Health hazards, Environment.

Application of DSSAT Model to Optimize Sowing Date of Wheat under Changing Climate Scenario

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ABSTRACT

Wheat is one of the most widely cultivated cereal crops in the world. Due to climate change, wheat phenology and yield are highly affected. The only adaptive measure to overcome this issue is an exploration of optimum sowing date and variety selection. So, keeping in view the above circumstances, the study was conducted comprises firstly a collection of a long-term wheat crop yield dataset from 1980-2020 to see the decadal trends of warming and rainfall on crop yield among climatic variables. Similarly, field trials were conducted during the wheat growing season 2021-22 at University Research Farm (URF) Koont Chakwal and National Agriculture Research Centre (NARC) Islamabad. Experiments was laid out in Randomized Complete Block Design with four replications by using five wheat cultivars (Markaz-19, Barani-17, Zincol-16, Borlaug-16, and Pak-13). Five wheat varieties were planted after the gap of ten days at both locations by keeping individual plot sizes 6 m x 2 m and row spacing was kept at 25 cm. Data was recorded at different stages including tillering, anthesis, and maturity, also yield components were recorded from field experiments. The DSSAT (Decision Support System for Agrotechnology Transfer) cropping system model was calibrated based on field data and results showed that DSSAT simulates growth, development and yield of crop growing under described managements over the time with good accuracy. Hence, DSSAT can be used as decision support tool to optimize crop management operations.

Keywords: Wheat, Sowing date, DSSAT, Calibration, Management

Empowerment of Rural Women through Skill Development Programmes

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ABSTRACT

Microcredit programmes' primary demographic focus is on women. Globally, one of the top priorities for sustainable development is women's empowerment. This element is taken into account even in industrialised nations, where women face a variety of forms of discrimination in many contexts. Gender disparity has been identified as one of the most significant roadblocks to progress in emerging nations. All areas of the economy, including manufacturing, services, and agriculture, are adopting automation to varied degrees. Up to 12 million women in India are thought to be at risk of losing their jobs to automation by 2030. Men are at risk as well, but

because of preexisting restrictions, women are in greater danger. Women's empowerment has been identified as a key predictor of the success and wellbeing of women going forward. In India, gender-sensitive training design is required for skilling to be effective for women. Skill development must be bottom-up and long-lasting. The gendered reality of the labour market and the prevailing societal standards cannot be examined in isolation. In order to address the difficulties of recruiting and retaining women, policies must be gender-responsive. They must be connected to market demands, awareness initiatives, and post-placement assistance and welfare amenities. Better outcomes might be obtained by approaching skilling from the bottom up. Such an approach entails identifying women workers with supportive families by engaging local self-help group leaders, then giving these women the necessary knowledge to persuade them to pursue skilling.

Conversion of Traditional, *Phulkari* Embroidery, to Digital Form

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ABSTRACT
Phulkari, is a traditional handmade embroidery, literally meaning "flower work", was perpetuated by the women of Punjab (North-west India & Pakistan) during the 19th century and till the beginning of the 20th century (Rond, 2010).Even though the textile industry today, is imitating this art with the help of machines, *phulkari* work has almost disappeared in its original form, due lack of interest for manual work, profitability, industrialization etc..This study which is provides the landscape on present research. *Phulkari* designs were documented and top ranking motifs were selected for digitization. Digitization was done with the help of Wilcom E2 embroidery software. Finally, the developed products with Digital *Phulkari* Embroidery Technique were evaluated on various parameters. The study found that all the developed products with digital embroidery software were highly liked by the consumers and appreciated by the experts.
Keywords: Embroidery, *phulkari*, traditional, digital, softwares, assessments, marketability

Drip Irrigation – A Must for South-Western Haryana

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ABSTRACT
In India, the use of water is increasing and its demand for agriculture, industrial purpose, and personal usage is expected to rise more in the future decades. The problem of shortage of water is becoming more and more worse today. Water use efficiency is important for the survival of an increasing population as well as the country's vertical development and Drip irrigation is known to be the most efficient irrigation methods with 95-100% water use efficiency. Drip irrigation is an effective way to deliver water directly to the rootzone of the soil. The importance of drip irrigation can be understood by the fact that it reduces wastage of water and is considered a possible alternative for crops that require a lot of water. Drip irrigation is a type of micro-irrigation system in which water is supplied slowly in the form of drop by drop to the root zone of the crops. Drip irrigation helps in growing agricultural crops in limited water available and maintaining

landscapes during periods of less than average rainfall. Vegetable crops require frequent irrigation and wetted soil condition, if they are grown in sandy soil that has low water holding capacity and high infiltration rate. Under these circumstances, drip irrigation is only suitable method than other. By using this method, the vegetables can be grown in area where the water is limited. If the irrigation water is saline then drip irrigation method is useful. In the southern zone of Haryana state, there is a lack of drinking water facilities and also for irrigation. This area comes under the dry zone and due to unavailability of river water the ground water in this area is continuously decreasing and that's why the drip irrigation system is a must for south-western farmers of Haryana to sustain their life and This process does play important role in the society by saving the ample amount of water and through this farmer of southern Haryana can decrease their input cost by not using groundwater through generator.

Conclusion

In the coming future, there is a need to encourage sustainable agricultural practices like drip irrigation that can help in saving the much water resources. The process drip irrigation play an important role in the society by saving the ample amount of water and through this farmer of southern Haryana can decrease their input cost by not using groundwater through diesel generator.

Keywords: Drip, Irrigation, Farmers, Water

Interactive Effect of Thiourea and Zinc on Growth, Yield Attributes, Yield and Quality of Cauliflower (*Brassica oleracea*var. *botrytis* L.)

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ABSTRACT

A field experiment was conducted to study the effect of thiourea and zinc on quality and economics of cauliflower (*Brassica oleracea* var. *botrytis* L.) variety Snowball-16 during *Rabi* season of 2015-16 at Horticulture Farm, S.K.N. College of Agriculture, Jobner. The experiment consisted of sixteen treatment combinations with four levels of thiourea (Control, 500 ppm, 750 ppm and 1000 ppm) and four levels of zinc (Control, 2.5, 5.0 and 7.5 kg/ha) in randomized block design with three replications. The results indicated that the interactive effect of 1000 ppm thiourea along with 7.5 kg/ha zinc, being statistically at par to application of 1000 ppm thiourea +5.0 kg/ha zinc but found significantly superior with respect to leaf area (cm^2), chlorophyll content (mg/g), average weight of curd (kg/ha), curd yield (kg/plot), yield (q/ha), maximum net returns(Rs 218077/ha) and B: C ratio (2.61).

Keywords: *Brassica oleracea* var. *botrytis*, Thiourea, zinc, quality, net return and B:Cratio.

Bio-Efficacy of Bio-Rational Insecticides against Major Insect Pest of Pigeon Pea Ecosystem

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ABSTRACT

The bioefficacy of biorational insecticides evaluated against major pest of pigeon pea ecosystem. The results revealed that relative efficacy of treatments against aphid, jassid, pod bug population, Chlorantraniliprole 18.50% SCas most effective treatment followed by Flubendiamide 39.35% SC and Bt. The treatment of Karanj oil proved least effective. The overall efficacy of treatments against pod bug population revealed Chlorantraniliprole 18.50% SC as most effective followed by

Flubendiamide 39.35% SC and Bt. The treatment of karanj oil proved least effective followed by *Beauveria bassiana*. The treatments of Clothianidin 500% WG and NSKEexisted in the middle order of effectiveness. The treatments Flubendiamide 39.35% SC, Chlorantraniliprole 18.50% SC and Bt proved most effective against pod borer, *armigera, atomosa*and *obtusa*.
The yield showed that Chlorantraniliprole 18.50% SCtreated plants yielded maximum and it was followed by Flubendiamide 39.35% SC. The benefit cost ratio was highest in Chlorantraniliprole 18.50% SC (10.93) and lowest in Karanj oil (3.02).
Keywords: Bioefficacy, Pigeon pea, Biorational, Insect pest.

Impact of Weather Parameters on Head Borer Infesting Sunflower
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ABSTRACT
A systemic weather risk follows in sunflower production as about 80 per cent of the area is under rain-fed production. As far as productivity, Bihar leads with 1402 kg/ha followed by Tamil Nadu with 1328.7 kg, although both the states have less than 25000 hectares under the crop which is mostly irrigated. Among the various reason for low productivity of the crop pest infestation is one of the important cause. So present study was undertaken to analyze the impact of pest on the productivity of the crop and accordingly an long term experiment was conducted at Oilseeds Research Station, Latur, Maharashtra for sixteen years from 2003 to 2018, similarly the impact of weather parameters *viz*., rainfall, temperature and relative humidity on head borer *Helicoverpa armigera* infestation on sunflower . The observations on *helicoverpa* incidence were recorded weekly and correlated with weather parameters. In case of the year 2003 head borer population is negligible hence it was not included for present study purpose. For each weather variable two indices have been developed, one as simple total of values of weather parameter in 32^{nd} to 36^{th} SMW for head borer.The other one as weighted total, weights being correlation coefficients between pests infestation to forecast and weather variable in respective weeks .Further regression analysis was carried out for this purpose the weather variables which showed significant contribution were incorporated in the study. The first index represents the total amount of weather parameters received by the crop during the period under consideration, while other takes care of distribution of weather parameters with special reference to its importance in different weeks in relation to the variable to forecast. The study revealed that the overall incidence of pests was moderate during 2003-2018. Peak infestation of head borer 10.2 larvae /plant was observed during 42^{nd} SMW. Results also indicated that the R^2 value for for head borer- 0.86 & 0.67 for peak infestation of pest and age of sunflower crop at peak infestation of pest respectively. It clearly indicates that the significant R^2 value. Therefore the stepwise regression analysis was carried out for prediction model of head borer . The full regression model hence estimated and constituted. For head borer infestation was determined by , interaction between minimum temperature and evening relative humidity and minimum temperature and rainfall .while t he mean predictability of model for head borer prediction percent for age of crop at peak infestation was 91.33 and for maximum infestation 78.89 percent
Keywords: Weather indices, head borer, *Helicoverpa armigera,* Temperature, Rainfall, Humidity, Regression Model, Sunflower.

Forewarning of Leaf Hopper Incidence on Groundnut Crop with Help of Weather Based Indices

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ABSTRACT
An experiment was conducted at Oilseeds Research Station, Latur, Maharashtra for sixteen years from 2003 to 2018 to study the impact of weather parameters *viz*., rainfall, temperature and relative humidity on leaf hopper incidence. The observations on leaf hopper incidence were recorded weekly and correlated with weather parameters. The study revealed that the overall incidence of leaf hopper was moderate to high during 2003 to 2018. Peak period of leafhopper infestation (25.80 leaf hopper/3leaves) was observed during 34th SMW. Two indices were developed for each weather variables, one as simple total of values of weather parameter in different weeks and other one as weighted total, weights being correlation coefficients between variables to forecast and weather variable in respective weeks. The first index represents the total amount of weather parameters received by the crop during the period under consideration, while other takes care of distribution of weather parameters with special reference to its importance in different weeks in relation to the variable to forecast. The mean predictability of models was, for leaf hopper age of crop at peak infestation was 93.51 per cent and maximum severity of leaf hopper was 61.71 percent. Therefore the stepwise regression analysis was carried out for prediction model of leaf hopper and reliable forewarnings through this approach was possible at least one week in advance. The model was found significant with R^2 value 0.84 & 0.71 for peak infestation of pest and age of groundnut crop at peak infestation of leafhopper respectively.
Keywords: Weather indices, Leaf hopper, Temperature, Rainfall, Humidity, Regression Model, Groundnut

Studies on Grey Mildew Disease Progress in Relation to Weather Factors Infesting Cotton

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ABSTRACT
An experiment to record per cent intensity grey mildew and their relation to weather parameters was carried out in non-replicated design during *Kharif* 2003 to 2016, observations on PDI were recorded in the experiment as per the standards and disease scale. Weather parameters recorded in meteorological observatory at Cotton Research Station, Nanded were used for correlation and regression analysis using weather based indices method, For each weather variable two indices have been developed, one as simple total of values of weather parameter in 37th to 51th SMW for Grey mildew on cotton and the other one as weighted total, weights being correlation co-efficient between disease infestation to forecast and weather variable in respective weeks. Further regression analysis was carried out for this purpose, the weather variables which showed significant contribution *viz.,* relative humidity (AM and PM) and minimum temperature were incorporated and forewarning model was worked out. The overall incidence of disease was moderate during 2003-04 to 2016-17. Peak period of Grey mildew incidence (39.2157 per cent/plant) was observed during 2004-05. First appearance of disease was observed during 37th SMW, peak period of incidence was observed during 47th SMW, in most of the cases, however during the study period crop age at first appearance and crop age at peak period variations were

observed due to different sowing weeks.Among these, results indicated that the R^2 value for maximum severity of Grey mildew and crop age at maximum severity were 0.78 and 0.52 respectively. These being highly significant, the stepwise regression analysis was carried out for prediction model of Grey mildew on cotton . The full regression model hence estimated and constituted. Mean predictability of the model was 73.30 per cent.

Keywords: Weather indices, Grey mildew, Temperature, Rainfall, Humidity, Regression Model, cotton.

Perception of the Farmers of Banaskantha District of Gujarat State Regarding Effects of Climate Change on Agriculture

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ABSTRACT

Agriculture sector is vital for the food and nutritional security of the nation.In present era, agriculture sector is affected by various reasons like fragmentation of land, fluctuations in market prices, depleting natural resources, erratic monsoon conditions, climate change etc. During succeeding era, global agriculture production is declining due to these reasons and climate change is one of the important factors. Climate is the primary determinant of agriculture production as it directly affects the crop yield and livestock productivity.Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions. The study was conducted in Banaskantha district of Gujarat state. Erratic rainfall coupled with high temperature and high wind velocity due to arid and semi-arid region creates water shortage in soil of Banaskantha district. Hence, it was selected for the study to understand the perception of farmers about effect of climate change in the district. Among 14 talukas of Banaskantha district Vav, Tharad and Suigam talukas are most affected by varying climatic conditions like lower rainfall and aberrant temperature comparing to other talukas of Banaskantha District. Therefore, these three talukas Vav, Tharad and Suigam were selected purposively. Five villages from each taluka were selected randomly. Ten respondents were randomly selected from each village. Hence final sample was constituted with 150 respondents. For calculating Perception on five aspects selected viz. scientific understanding of climate change in relation to agriculture, causes of climate change, change in climatic parameters, effects of climate change and adaptation and mitigation to climate change was measured. Total score for each statement was calculated in each aspect. On the basis of obtained score, mean score for each statement in each aspect was calculated. On the basis of mean score rank was given to each statement in each aspect. From the study it was concluded that majority (68.68 per cent) of the respondents had moderate level of perception as well as in case of aspect wise perception regarding climate change it was found that the Perception about scientific understanding of climate change in relation to agriculture; Climate change is really happening (Mean score 4.13), Perception about causes of climate change; Indiscriminate tree cutting (Mean score 3.96), Perception about change in climatic parameters; Summer is becoming more hotter (Mean score 4.15), Perception about effects of climate change on agriculture; Reduction in area of cultivable land due to water erosion (Mean score 3.89) and Perception about adaptation and mitigation to climate change; Rain water harvesting in monsoon help farmers in time of scarcity (Mean score 4.12) were ranked first in all aspect wise perception regarding climate change.

Keywords: Farmers Perception, Climate change, Global warming

Miracle Food and its Health Benefits: Quinoa

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ABSTRACT
Quinoa (*Chenopodium quinoa*Willd.) it is an annual herbaceous plant and it belong family Chenopodiaceae, it is a granifer species indigenous to South America that the Andes people mostly cultivated in Chile, Peru, Ecuador, and Bolivia. that is mostly farmed for its edible seeds, The Incas used quinoa as one of their main food crops and referred to it as "the mother grain"; it supported their way of life and was revered. Due to specific reason that quinoa consist higher in protein, carbohydrates, fats, fibre, vitamins, and nutritional minerals than many cereals. Quinoa, which originated in the Andean area of northwest South America, is a pseudocereal that is botanically linked to spinach and amaranth (Amaranthus spp.).It attracts attention because of its great nutritional value, but more crucially because of how resilient it is to changes in weather, climate, and soil. While both its seeds and leaves are edible, it is the seeds that are the focus of the majority of scientific and economic research. As it balances lipids as well as rich in high protein content (16.3% dry basis (db), and quality of quinoa a balanced amino acid spectrum with high concentrations of lysine and methionine makes it well-known today. The carbohydrate content of quinoa seeds ranges between 52% and 69% (dry matter weight). It includes significant fibre content (2 to 9.5%). Constipation may be avoided or treated with fibre, and it may also reduce your risk of intestinal cancer, cholesterol, blood sugar level, lowering risk of diabetes and heart risk. It also makes you feel fuller for longer, which might aid in weight reduction as well as minerals like calcium and iron. It is rich source of vitamin B, E and C. Saponins, phytosterols, and phytoecdysteroids are the three main classes of phytochemicals found in quinoa. Due to its high nutritional value, therapeutic properties, and gluten-free composition, quinoa is said to have potential benefits for consumers in high-risk groups like children, the elderly, high-performance athletes, lactose-intolerant people, women at risk for osteoporosis, and people with anaemia, diabetes, dyslipidemia, obesity, and celiac disease.

Farmer's Attitude towards National Horticulture Mission in Haryana

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ABSTRACT
The majority of people in India is dependent directly or indirectly on agricultural sector, which is the country's largest economic sector. In 2005–06, the Indian government introduced the National Horticulture Mission, a program for the comprehensive development of horticulture, in recognition of the incredible potential of horticulture to promote the expansion of Indian agriculture. Indian Government is mainly focusing on more horticultural programmes to provide relief and rescue measures to the small and marginal farmers through NHM. The Government of Haryana is also focusing on the diversification of crop pattern through agricultural crops and the National Horticulture Mission will play a critical role in motivating farmers to adopt horticulture crops. The present study was undertaken in the year 2022 to assess the attitude of beneficiary's

farmers towards National Horticulture Mission in Sirsa and Karnal districts of Haryana. A total of 120 farmers were personally interviewed for the purpose of the study. The study revealed that 43.33 per cent of the respondents had a favorable attitude towards NHM and level of education, size of land holding, annual income from horticulture crops, annual family income, mass media exposure had significant association with attitude towards NHM at 5% level of significance, whereas type of family, size of horticultural land holding and their socio-economic status were found highly significant at 1% level of significance. This study recommends establishment of proper cold storage facilities for perishable horticultural crops and more efficient system for diffusion of information to the farmers so that they can adopt new practice efficiently.

Keywords: Attitude, Farmers, Agriculture

Green Economy and Climate Change: *Opportunities and Challenges of Adaptation and Mitigation*

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ABSTRACT

Climate change is a major challenge for a developing country like India that is particularly vulnerable to climate risks. It is alarming when economic growth and social upliftment are critical to India's development trajectory. In 2015, 196 Parties came together under the Paris Agreement to transform their development trajectories so that they set the world on a course towards sustainable development, aimed at limiting global warming to 1.5 to 2 degrees Celsius above pre-industrial levels. The Paris Agreement requests each country to outline and communicate their post-2020 climate actions, known as their Nationally Determined Contributions (NDCs). India also submitted its NDC wherein it committed to reduce the emission intensity of GDP by 33-35% by 2030. One of the ways through which it plans to achieve this is by creating an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent through additional forest and tree cover by 2030. This requires an insightful analysis into the existing legal and legislative framework in the country around forests and interrelated sectors. Forests in India are treated primarily as social and environmental resources, and only secondarily as a commercial resource. Forest and tree cover of the country is 80.7 million hectare which is 24.56% of the total geographical area (ISFR, 2019). More than 350 million people derive their full or partial livelihood and sustenance need from forests. Forests play a key role in mitigation of climate change through increasing carbon stocks. Climate change mitigation involving forests will be a result of trade-offs: in land use between forestry and other land-uses, between forest conservation for carbon storage and other environmental services, among utilization strategies of harvested wood products aimed at maximizing carbon storage. In this context, climate finance options for forests are proliferating which can help countries reduce greenhouse gas emission at scale. Between 2017 and 2019, almost $400 million was generated in global voluntary carbon market transactions, trading 105 million metric tons of carbon credits ($MtCO_2e$) from sustainable forestry and land use (Ecosystem Marketplace, 2021). Compliance markets trade greenhouse gas emission reductions that are regulated and directly initiated under the Kyoto Protocol's Clean Development Mechanism (CDM). Post 2020 new CDM projects cannot be registered due to expiry of Kyoto Protocol. But at the same time voluntary carbon markets shall provides new opportunities in absence of

compliance market.India is already on the path for the creation of a national market for carbon trading and carbon neutrality for corporate/ industrial sector. TERI has successfully implemented and registered the Afforestation Reforestation Clean Development Mechanism Project (A/R CDM) Project under Uttar Pradesh Participatory Forest Management and Poverty Alleviation Project (UPPFMPAP) in ten divisions of Uttar Pradesh. At present, the state governments of Punjab, and Gujarat in collaboration with TERI, have initiated pilots to promote agroforestry and generate carbon finance through sale of carbon credits in voluntary carbon markets for farmers. Through this project there will be increased farming production and productivity, contributing to the economic development of local communities and will ultimately enhances the income of farmers. Similarly, TERI is also executing carbon finance projects in eight protected areas specifically tiger reserves namely Dudhwa, Periyar, Pench Maharashtra, Pench Madhya Pradesh, Kaziranga, Manas, Kanha and Sudarbans., 25 Van Panchyats and community conservation areas in Uttarakhand. Such finance can help mitigate the human wildlife conflicts, and also help in relocation of villages, and physical HWC mitigation infrastructure. The approximate annual emission reduction is expected to be 3,00,000 tCO2e. Such pilots set a roadmap for other states in India to implement carbon finance projects. In a recent study in 2020. TERI has estimated that there is a financial requirement of ₹ 60,000 crore/annum are estimated for the sustainable management of the forest and to achieve 2.5–3.0 billion tonne of CO2e through additional forest and tree cover. Though the annual money spent under various state and centrally sponsored schemes is ₹ 11,256 crore. Thus, the financial gap of ₹ 48,744 crore for achieving the target can be filled by carbon finance. Carbon finance can be obtained of approximately INR 65,025 crore per annum against sequestered CO2 (TERI, 2020).

For forest carbon finance to thrive, many elements need to fall into place, such as stronger price signals, emission reduction strategies compatible with companies' deforestation commitments, greater representation of carbon markets in the Paris Agreement, and improved private-sector confidence in the role of offsets, to name a few. In specific to Indian context, the Carbon Neutrality Policy should be promoted at national and state level which will help in improving quality and health of forest and will also provide fair compensation to the forest dwelling communities. Therefore, such innovative finance mechanism through carbon market should be established at MOEF&CC level or agency recognized by Government of India to regulate the transaction at National Level, and also at international level later considering success of the mechanism.

Challenges in Designing Future Crops

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ABSTRACT

This study provides an overview and description of current and future crop protection practices including mechanical techniques, plant breeding and bio control induced resistance applying ecological principles precision agriculture and emerging plant protection products. The potential and impact of the new crop protection practices is assessed. It may be feasible to design resilient systems that are economically viable have limited environmental impact and help improve biodiversity. Diverse cropping systems would have a natural resilience to weeds pests and diseases. Potentially reduce the dependency plant protection products the main challenge is to integrate new varieties, mechanisation, and biocontrol tools in these systems.

Effective Utilization of Fodder Crop, Oat (*Avena sativa*) through Promotion of Comprehensive Fodder Production, Conservation and Utilization for Enhancing the Availability of Fodder in Eastern U.P.

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ABSTRACT
Oats are one of the crops grown during the Rabi season. It is an important Cereal crop as well as a fodder crop. Oats offer numerous health benefits like they are rich in protein and fiber, so it is helpful in reducing weight, controlling blood pressure, and increasing the power of fighting diseases. During the Rabi season, one of the crops grown is oats. It is a valuable cereal crop as well as a fodder crop. Oats have various health benefits, including being high in protein and fibre, which aids in weight loss, blood pressure regulation, and disease resistance. Oats can also be used to make straw or dry fodder. The cultivation of oats and wheat crops is remarkably similar. Oats grow best in temperate and subtropical areas. So, let us go through oats cultivation in-depth. Forages have never been given importance in agriculture by farmers as the area devoted to fodder crops is either neglected or almost constant since many decades and it is about 3% of the total cropped area in the state. About 0.94 m ha area is under forage production and there is no scope of its further expansion because of small land holdings and existing pressure for food and cash crops on agricultural land. However, possibility exists for improvement of productivity through appropriate management practices suited to different ecosystems. As world population is increasing at alarming rate, agricultural land is shrinking due to industrialization and habitat use. Hence, there is a need to utilize salt affected land to meet the food requirement. Although some success has been achieved through conventional breeding but its use is limited due to reproductive barrier and scarcity of genetic variations among major crops. However, there is a further need of improvement for successful release of salt tolerant cultivars at field level. There are Some Varieties of Oat (NDO-1, NDO-10, NDO-711, NDO-1101) which perform better in Salt Tolerant area.

Keywords: Forage, Oat

Effect of Different Zinc Levels and Zinc Mobilizing Cultures on Growth parameters of Banana (*Musa* spp.) cv. Grand Naine

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ABSTRACT
The research trial was carried out at Banana Research Station, Nanded (M.S.), VNMKV, Parbhnai, India during 2019-20 to 2021-21 to find out Effect of Different Zinc Levels and Zinc Mobilizing Cultures on Growth parameters of Banana (*Musa* spp.) cv. Grand Naine. The experiment was planned in Factorial Randomized Block Design with sixteen treatments replicated twice. The data showed that at different zinc levels, plant height of banana was found significant with application of different zinc levels and zinc mobilizing cultures. In case of zinc level, significantly taller plants (136.13 cm) and maximum stem girth (48.31) recorded with application of 15 kg $ZnSO_4$ ha^{-1}. While, number of leaves per plant and number of suckers per plant not reach

to significant level. In case of zinc mobilizing cultures, *Tricodermaviride*(S_3) recorded maximum plant height and stem girth with value 137.13 and 46.09 cm followed by *Pseudomonas strita* (S_1) with value 135.50 and 45.22 cm over control. However, number of leaves per plant and number of suckers per plant of banana were found non significant.
Interaction effect of zinc levels and zinc mobilizing cultures on plant height , stem girth and number of leaves per plant were found significant. Whereas, number of suckers per plant was found non significant in banana.
Keywords: *Tricodermaviride,* Plant height, suckers, leaf content, stem girth, banana

Soil Nutrient Availability and Leaf Nutrition of Banana (*Musa* spp.) cv. Grand Naine Influenced by Bio-fertilizers

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ABSTRACT:
The research trial was carried out at Banana Research Station, Nanded (M.S.), VNMKV, Parbhnai, India during 2019-20 to 2021-21 to find out the effect of biofertilizers on soil physico-chemical properties, nutrient availability and leaf nutrition of banana (*Musa* spp.) cv. Grand Naine. The experiment was planned in randomized block design with nine treatments i. e. T_1- 100% RDF (Control), T_2- 75% RDF + Soil application of *Trichoderma harzianum* , T_3- 75 % RDF + Soil application of *Azospirillum*, T_4- 75 % RDF + Soil application of PSB, T_5- 75 % RDF + Soil application of *Trichoderma harzianum* + *Azospirillum* + PSB, T_6- 100 % RDF + Soil application of *Trichoderma harzianum*, T_7-100 % RDF + Soil application of *Azospirillum*, T_8- 100 % RDF + Soil application of PSB and T_9-100 % RDF + Soil application of *Trichoderma harzianum* + *Azospirillum* + PSB which replicated three times. The result indicated that vailable N, P, K, DTPA- Fe, Zn, Cu and Mn were recorded maximum with application 100% RDF + Soil application of *Trichoderma harzianum@25 g plant^{-1} + Azospirillum@25 g plant^{-1}* + PSB*@25 g plant^{-1}* . Whereas, highest N, P, K, Fe, Zn, Cu and Mn leaf nutrient content of banana were also observed with the same treatment during both the years of experimentation.
Keywords: Organic carbon, available nutrients, leaf content, bio-fertilizes, banana

Effect of High-Density Planting in Greater Yam

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ABSTRACT
The present research was conducted at horticulture farm, RCA, Udaipur under during 2022-23. In this experiment 7 different spacing treatments of planting was used. The maximum tuber yield and no. of tubers per plant were recorded under T7 (60 X 60 cm) 26.0 tha^{-1} and 1.87 respectively followed by treatment T6 (75 X60 cm) 25.70 tha^{-1} and 1.67 respectively. While lowest tuber yield and no. of tubers per plant were recorded under T3 (90 X 75 cm) 16.79 tha^{-1} and 1.21 respectively. The highest B:C was observed in T2 (90 X 90 cm) 2.98 while minimum B:C was observed in T7 (60 X 60 cm) 1.91.

Effect of Different Irrigation Levels on New Wheat Genotypes

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ABSTRACT
The experiment was conducted at Instructional-cum Research Farm of Barrister Thakur Chhedilal College of Agriculture and Research station, Bilaspur, Chhattisgarh during *rabi* 2021-22. The soil of experimental field was clay loam in texture with PH 6.9. Fertilizer applied at the rate of 90:60:40 kg NPK ha-1. The experiments were laid out in spilt plot design with three replications. The treatments were comprising of three irrigation levels I0 (no irrigation), I1 (irrigation at CRI stage), I2 (irrigation at CRI and Boot leaf stage) as main plots and nine genotypes i.e., (V1) MP3288(C), (V2) HI1655, (V3)DDW47(d), (V4) HI8823(I), (V5) CG1036, (V6) DBW110(C), (V7) HI8830, (V8) DDW55(d) and (V9) HI8627(d) in sub-plots. The crop was sown on 30th November, 2021 and harvesting was done on 10th march, 2022.
The highest grain yield (q ha-1) and straw yield (q ha-1) and harvest index as (%) of mean were recorded under irrigation level I2 (Two irrigations at CRI and boot leaf stage) which was at par with I1 (one irrigation at CRI).This might be due to higher, number of tillers (m-2), Ear length (cm), weight of grains ear-1, number of grains ear-1 head and test weight (g) were recorded under treatment I2 (irrigation at CRI and Boot leaf stage). Among different genotypes highest grain yield, straw yield and harvest index were recorded under genotype (V5) CG1036 which at par with (V6) DBW110(C) while the minimum was recorded in (V4) HI8823(I), Among genotypes (V5) CG1036 recorded highest grain and straw yield which was at par with (V6) DBW110(C). Maximum gross return (83,804.13 ₹ ha-1), net return (56,104.13 ₹ ha-¹) and B:C ratio (2.05) was recorded in genotype (V5) CG1036` and the minimum gross return (62,794.76 ₹ ha-1), net return (35,094.76 ₹ ha-1), B:C ratio (1.26) was recorded in (V4) HI8823(I).

Influence of Organic Manures and Bio-Fertilizers on Biochemical Parameters of Dragon Fruit [*Hylocereusundatus* (Haworth) Britton & Rose and *Hylocereuspolyrhizus* (F. A. C. Weber) Britton & Rose]

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ABSTRACT
Organic farming is commonly referred to as eco-farming or biological farming, is the most environment friendly form of agriculture. Priority should be given for using organic manures and bio-fertilizers such as cow urine, panchagavya, vermiwash, bio-digested liquid, jeevamruta, PSB, VAM, azotobacter, rhizobium, etc. in combination with organic sources that are organically based, such as FYM, vermicompost, poultry manure, sheep manure, goat manure, compost, etc. to ensure continued production and better on-farm resource utilisation In this background a study was carried out on the influence of organic manures and bio-fertilizers on biochemical parameters of dragon fruit during the year 2019 to 2021. The experiment consisted of thirteen treatments and replicated thrice using Randomized Complete Block Design (RCBD). The pooled data from two successive years of study for red and white skinned dragon fruit revealed that treatment T_{13}

comprising of 100 per cent N through vermicompost + PSB at 10 kg ha^{-1}+ VAM at 10 kg ha^{-1} had significantly greater impact on parameters like TSS (11.56˚ and 10.35˚B), Vit-C (9.57 and 7.39 mg $100g^{-1}$), Titratable Acidity (0.36 and 0.38 %) and Total sugars (9.63 and 8.74 %).
Keywords: *Hylocereus*spp, biochemical, FYM, RCBD, TSS

Evaluation of Seed Lots of Quinoa (*Chenopodium quinoa*Willd.) Genotypes

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ABSTRACT
Quinoa *Chenopodium quinoa* Willd. is an annual dicotyledonous pseudo cereal with seeds rich in vitamins, minerals, protein and fibers. The high content of vitamins A, B, and E and polyphenols like phenolic acids or flavonoids, contribute to its high antioxidant capacity, which may prevent cancer, cardiovascular and other chronic diseases therefore quinoa seeds are an excellent example of "functional food". Quinoa seed quality was influenced by the low germination rate and reduced vigor which consequently reduces longevity that is lower seed quality reduces the germination percentage and vigour of the seed. Quinoa seeds are of the achene type and have an external structure made of dead cells that surround the seeds which can interfere with their germination. Storage conditions are the main factor that affects the seed vigour in quinoa. Taking into consideration, the laboratory experiment was carried out in the year 2022 in College of Forestry, VCSG Uttarakhand University of Horticulture and Forestry, Ranichauri. The experiment comprised of two factors *viz.*three seed lots (2019, 2020, and 2021) and ten quinoa genotypes. The trial was conducted in factorial randomized block design with four replications to assess the seed quality of quinoa genotypes. Based on the present investigation, it is concluded that the freshly harvested seeds should be preferred to grow the quinoa crop over two or more year old seeds. Based on seed quality parameters, EC507738, EC507742 and EC507743 were found most suitable genotypes of quinoa to take a good crop.

Evaluation Studies of Forewarning Module of Grey Mildew Disease Infesting Cotton

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ABSTRACT
An experiment to record effectively of the module to predict intensity grey mildew on cotton was carried out in paired plot design during *Kharif* 2014-15, observations on PDI were recorded in the experiment as per the standards and disease scale at Cotton Research Station, Nanded. Weather parameters recorded in meteorological observatory at Cotton Research Station, Nanded were used were used for correlation and regression analysis using weather based indices method, For each weather variable two indices have been developed, one as simple total of values of weather parameter in 37^{th} to 51^{th} SMW for Grey mildew on cotton and the other one as weighted total, weights being correlation co-efficients between disease infestation to forecast and weather variable in respective weeks. Further regression analysis was carried out for this purpose, the weather variables which showed significant contribution *viz.*, relative humidity (AM and PM) and

minimum temperature were incorporated and forewarning model was worked out. The data on overall incidence of disease during 2003-04 to 2013-14 was used for model development and it's evaluvation was carried out in the year 2014-15. Significant differences in PDI and yield of cotton was observed in the plots untreated and treated according to the prediction of disease. A overall PDI of 23.47 per cent was recorded in untreated plot with 1330 kg/ha Seed Cotton Yield whereas that of protected crop it was 5.31 per cent PDI and 1684 kg/ha Seed Cotton Yield. Hence effectively of the module to predict intensity grey mildew on cotton was proved.

Keywords: Weather indices, Grey mildew, Temperature, Rainfall, Humidity, Regression Model, PDI , Seed Cotton Yield and Cotton.

Principal Component Analysis of Yield Attributing Traits in Derived Lines of Katarni Rice

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ABSTRACT

In Bihar the traditional aromatic non-basmati Katarni rice is grown in the few blocks of Bhagalpur, Banka, and Munger, districts. However, it matures late, has weak straws, is tall, and is prone to lodging. With the objective of developing a semi-dwarf and early maturing variety, Katarni was crossed with three semi-dwarf high yielding cultivars namely Rajendra Sweta, IR 64 and BPT5204. The generation was advanced to the F6 generation and 54 derived lines of Katarni were examined in this study on the basis of 14 morphological parameters. Seventy percent of the entire variability was accounted for by five principal components, all of which had Eigen values above one. Between the first PC (23.31%) and second PC (35.59%), the total variation was 63.90%. Trait biplot analysis revealed substantially favorable genotypes for plant height . The genotypes biplot analysis showed that entries KIR-46, KIR-48, KRS-30, KRS-32, KRS-40 KRS-43, KRS-14, KRS-15, KRS-16, KRS-17, KRS-9, KRS-25 and KMTU-54 were found to be diverse and can be used further for varietal development.

Keywords: Eigenvalue, Hybridization, Katarni, Principal component.

Bio-intensive Management of Fruit Borer, *Helicoverpa armigera* Hub. in Tomato

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SNIATTE, CCSHAU, Hisar

ABSTRACT

Fruit borer, *Helicoverpa armigera* is a notorious pest oftomato crop which is difficult to control by a single management practice. In this context, a study was conducted at Research Farm, CCS Haryana Agricultural University, Hisar during 2021-22. Various bio-intensive modules involving different combinations of management practices *viz*. spray of azadirachtin, *Bacillus thuringiensis, Beauveria basiana, Helicoverpa armigera Nuclear PolyhedrosisVirus* and *Trichogramma* release were evaluated against tomato fruit borer. Field experiment was conducted in randomized block design in plot size of 5.4 × 4.2 m. and each treatment was replicated thrice. Results revealed that among various bio-intensive modules, spray of azadirachtin (300 ppm) followed by *Bt* and *HaNPV* caused maximum reduction in larval population (66.80%), fruit infestation on number (63.98%) and weight basis (65.36%) and increase in tomato yield (34.73%) over control. Module involving spray of *Bt* followed by *Trichogramma* release and spray of *HaNPV* was however *on a*

par with the former one in terms of reduction in larval population and fruit infestation but not yield, which was significantly lower. Among bio-intensive modules, incremental cost benefit ratio was higher (1:16.09), where *Trichogramma* release was followed by spray of azadirachtin and *Bt*, followed by module involving spray of *Bt* followed by *Trichogramma* release and *HaNPV* spray (1:12.87). However, it was minimum (1:8.03) in module involving spray of azadirachtin followed by *Beauveria basiana* and *HaNPV*. It can be inferred that tomato fruit borer may effectively be management by using different bioinensive management practices in a suitable combination.
Keywords: Tomato, *Helicoverpa armigera*, Biointensive management, *Bt*, *HaNPV*

Endophytic Diversity and Metabolomics of Berginia Ciliata from the High Altitude Region of Ladakh.

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ABSTRACT
Medicinal plants available in high altitude regions have been reported to have huge medicinal value. *Berginiaciliata* is a well known medicinal plant in the traditional Amchi system of medicine practiced by the local population of Ladakh. The plant is also known as Pashembeda in the traditional ayurvedic system and is known to cure calculi in Kidneys. The high Altitude region of Ladakh is rich in its Biodiversity and harbours tremendous potential in the form of medicinal plants as 80 percent of medicines are known to have been taken from plant sources.Though these plants have been studied to a great extent for their medicinal values but the importance of endophytes in those plants and thge relationship between metabolite secretion and endophyte presence need to be explored well.The current study is related to the diversity of various endophytes via metagenomics and to study prominent metabolites via GCMS. Diverse number of microbes be it fungi or bacteria were found .The observation suggest that these microbes play a crucial role in the survival of these plants in abiotic stress conditions.The problem could further pave way for determination of new PGPRs and there by utilising those for stimulation of seeds for sustainable growth of Agricultural crops in changing climatic conditions in the desert area of Ladakh.
Keywords: Medicinal plants metabolites endophyte Ladakh, sustainability

Morpho-Physiological and Phenological Response of Rice (*Oryza sativa* L.) Genotypes to Low Temperature Stress at Reproductive Stage

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ABSTRACT
The yearly changes in atmospheric temperature projected to negatively affect food production in several locations. Rice exposure to low temperature stress can decrease plant growth in different stages, notably at the reproductive period. A field experiment conducted in ARS Gangavathi, Karnataka. The experiment laid out in factorial randomized block design where four different rice

genotypes (GNV-10-89, GNV-1801, GNV-1108 and BPT-5204) transplanted under two different dates of transplanting D_1 (normal *Kharif*-15th September) and D_2 (late *Kharif*-30th September). Low temperature during the reproductive stage was 14.1°C which inhibited the morphological, physiological, phenological and yield traits of rice crop. All the observations recorded at flowering stage (95 DAT). The results revealed that, morphological traits like plant height, number of green leaves, number of productive tillers, total dry matter, total leaf area and root length were high in D_1 than D_2 (101.6 & 99.76 cm, 21.5 & 16.1 hill^{-1}, 14.5 & 11.5 hill^{-1}, 29.0 &21.1 g hill^{-1}, 3.79 & 4.11 dm^2 hill^{-1} and 14.6 & 18.2 cm), physiological traits such as photosynthetic rate (14.55 & 13.45 µ mole CO_2 m^{-2} s^{-1}) and Transpiration rate (12.86 & 11.01 m mole H_2O m^{-2} s^{-1}) similarly phenological traits, DPI (80.6 & 90.5 days), DF (98.3 & 102.3 days), DPM (116.7 & 127.2 days) and DHM (124.7 & 135.4 days). Reproductive traits like pollen viability (91.3 & 87.4 %) and spikelet fertility (84.3 & 75.9 %) and the grain yield (7744.8 & 6531.3 kg ha^{-1}). Among the genotypes GNV-10-89 (10270.9 kg ha^{-1}) recorded the higher grain yield and lower was observed in BPT-5204 (3937.5 kg ha^{-1}) these results conclude that, the late *Kharif* transplanting was not suitable for this region as there was sharp drop down of temperature (14.1°C) at reproductive stage which leads to high spikelet sterility. By looking to the results obtained, among four genotypes GNV-10-89 recorded high grain yield followed by GNV-1108 these two genotypes considered as moderately tolerant, GNV-1801 is moderately sensitive and BPT-5204 is sensitive to low temperature stress.

Keywords: Low temperature stress, Rice crop, Reproductive stage, Phenological traits and Grain yield.

Influence of Plant Growth Retardants on Morpho-Physiological Parameters and Yield of Pigeonpea (*Cajanus cajan* L. Millsp)

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ABSTRACT

The field experiment was conducted at Agricultural Research Station, Bheemarayanagudi, during *Kharif* 2021- 22 to know the influence of plant growth retardants on morpho-physiological and yield parameters in pigeonpea. The experiment was laid out in randomized complete block design and replicated three times with eight treatments including control, nipping at 60 DAS, mepiquat chloride @ 1000 ppm, thiourea @ 1000 ppm, chlormequat chloride @ 1000 ppm, daminozide @ 1250 ppm, ancymidol @ 1000 ppm and paclobutrazol @ 150 ppm were applied through foliar application at 60 DAS. Results revealed that nipping and all growth retardant treatments significantly reduced the plant height (cm) and increased total number of branches, total dry matter production, total leaf area, leaf area index and seed yield compared to control. Among the treatments, foliar application of mepiquat chloride @ 1000 ppm was recorded significantly lower plant height (153.72 cm) and higher total number of branches (37.85 plant^{-1}), total dry matter production (149.12 g plant^{-1}), total leaf area (85.83 dm^2 plant^{-1}), leaf area index (2.384) and seed yield (1970 kg ha^{-1}) as compared to all other treatments. The treatment T_5 (chlormequat chloride @ 1000 ppm) was recorded second best morpho-physiological parameters and yield in pigeonpea.

The results concluded that foliar application of mepiquat chloride @ 1000 ppm at 60 DAS was found best in recording better growth parameters and higher yield in pigeonpea.
Keywords: Pigeonpea Crop, Plant growth retardants, *Kharif season*, nipping

Effect of Deficit Irrigation on Yield and Quality of Onion Crop Under Surface Irrigation.
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ABSTRACT
Deficit irrigation is important to increase the efficiency in view of limited water resources for agriculture. It is essential to find the most sensitive stage of crop and influence of deficit irrigation on crop yield. The field experiment was conducted to study the response of yield of onion *(Allium cepa L.)* cv. N-2-4-1 crop under the deficit irrigation approach during rabi seasons for two consecutive years at Instructional Farm of the Department of Irrigation and Drainage Engineering, Mahatma Phule Krishi Vidyapeeth Rahuri. Experiment was carried out in Randomized Complete Block Design (RCBD) with 27 treatments and 2 replications based on different combinations of the quantity of water stress during different crop growth stages. Water applied per irrigation and soil moisture contents before and after irrigation was monitored throughout the season. The present study shows that the onion yields and field water use efficiency are higher with low water stress and it was reduced with increasing water stress. The 40 % deficit water at vegetative stage reduced onion yield 30.16%. The 40 % deficit water at bulb development stage reduced onion yield by 29.61% whereas 40 % deficit water at bulb enlargement stage reduced onion yield by 15.07%. The results revealed that water stress imposed early in the growing season at the 1st and 2nd stages reduced the yield significantly. Therefore, adequate irrigation to be provided at the early crop growth stages for realizing high yields. A water deficit imposed late in the season, at the 3rd stage, only marginally affected the yield. Hence vegetative stage and bulb development stage of onion crop are more sensitive stages.
Keywords: Onion, deficit irrigation, post harvest attributes, crop water use.

Effect of Nano Nitrogen on Seed Quality of Finger Millet (*Eleusine Coracana* (L.) Gaertn.)
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ABSTRACT
Finger millet (*Elusine coracana* (L.) Gaertn.) belongs to the family Poaceae and the genus *Eleusine*. It is an annual kharif crop and is extremely popular, because of its better nutritional qualities compared to other major cereals. In India, it is used as staple food grain especially by tribal and lower income class.At present, the crop productivity depends upon fertilizers. The indiscriminate and unbalanced use of inorganic fertilizers has negatively impacted on the health of

soil. Due to leaching losses, volatilization and denitrification losses, these inorganic fertilizers not only contribute to green house gas emissions but also certain health hazards. As a result of these circumstances, there is a requirement to use some advanced technologies that can increase agricultural production, improve the seed quality of the crops without hurting the environment or increasing production costs. Keeping this in view the investigation was conducted in 2022 in College of Forestry, Ranichauri, Tehri Garhwal of VCSG Uttarakhand University of Horticulture & Forestry, Bharsar, Pauri Garhwal, Uttarakhand. The laboratory experiments were conducted in completely randomized design (CRD) with four replications to assess the seed quality of the harvested seeds of finger millet which contain two establishment methods and fourteen treatments of different nano nitrogen. The aim of the study was to assess seed quality parameters *viz.*, physiological tests, biological tests and stress tests of finger millet seeds. On the basis of mean performance, it could be concluded that to reduce the use of chemical fertilizers without compromising the seed quality of finger millet significantly, the treatment drill sowing with 50% recommended N with Foliar spray of 0.4% nano nitrogen solution and transplanting with 75% recommended N with Foliar spray of 0.4% nano nitrogen solution shows better seed quality parameters in comparison to other treatments.

Consequence of Perceptive Farming Implements in Agriculture: A Survey

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ABSTRACT
This paper is based on a comprehensive survey on Impact of Artificial Intelligence AI based smart farming tools in agriculture. The United Nations FAO (Food and Agriculture Organization) states that the world population would increase by another 2 billion in 2050 while the additional land area under cultivation will only 4% at that time. In such circumstance use of latest technological solutions to make farming more efficient. A direct application of AI or machine intelligence-based tools in the farming sector could act to be an epitome of shift in how farming is practiced today UsingAI based smart farming tools viz. Drones, AGV and Robots. we can develop smart farming practices to minimize human efforts in farming to enhance productivity with quality. The smart farming solution based on AI tools enables a farmer to do more with less, enhancing the quality product with ensuring to establishes direct supply chain between producer and consumer. This is a survey-based paper impact of AI based smart farming tools throws a vision of how the diverse sectors of agriculture can be filled using drones, robots and AGVs AI based smart farming tools. It also investigates the future of AI based tools in agriculture and the challenges in imminent.
Keywords: Agriculture, AI [Artificial Intelligence], Robotics, Drones and AGVs

Impact of Four Fold Technology in Increasing the Productivity of Rice in Nashik District of Maharashtra State

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ABSTRACT

The western part of Nashik district is hilly tract, however receives on an average 1200mm extended rainfall and nurtures rice based cropping system with tribal agricultural livelihood. Nashik district has 78,129 hectare area under rice (Oryza sativa) cultivation in the year 2021-22. It was observed that the productivity of rice is less due to use of conventional method of transplantation. Decreasing productivity and excess use of urea demands some alternative establishment planting method to sustain productivity of rice. KVK, Nashik introduced the four-fold technology of rice plantation in Behedpada and Jategaon villages from Tryambakeshwar tahsil of Nashik District through front line demonstrations. Demonstrations were implemented on 30 hectares of land covering 50 tribal farmers successively for three years. The four fold technology viz. Reuse rice husk ash 1 kg per square meter to nursery beds, and application of the husk 2 ton per hectare at the time of transplanting, 3 ton per hectare green manuring with Gliricidia, Controlled planting with Spacing as 15-25 X 15-25 cm, 170 Kg per hectare Urea-DAP (60:40) briquette. The check plots were also maintained for comparison.

The four-fold technology was assessed on different parameters contributing to productivity viz. seed-rate per hectare, tillers per plant, length of ear head, percent increase in yield and net income incurred by the farmers. It was observed that seed rate per hectare was reduced to 42.86 per cent, tillers per plant were increased to 47.05 per cent, length of ear-head was increased to 33.33 per cent. It was noticed that average increase in yield was 8.24 quintal per hectare. The overall increase in yield was observed to be 39.44 per cent. The net income realized in demo plot was Rs. 42094 against Rs. 22141 in local plots. The results show that four fold technology in rice can prove to be a very promising, technically and economically feasible alternative to conventional method of planting.

Keywords: Rice, Four-fold technology, Urea-DAP briquette

Temperature Effects on The Development of Life Stages of Fall Armyworm, Spodoptera frugiperda (J.E. Smith) (Lepidoptera: Noctuidae) on Maize

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ABSTRACT

The effect of temperature on the development of different life stages of *Spodoptera frugiperda* on maize was assessed at the Centre for Agro Climatic Studies, University of Agricultural Sciences,

Raichur at five different constant temperatures *viz*., 18, 22, 26, 30, and 32 °C with a constant relative humidity 65 ± 5 % for all the temperatures under growth chambers conditions. Over the temperature studied, the duration of different life stages decreased with a rise in temperature from 18 to 32 °C. Wherein, the duration of the egg stage reduced from 6.00 days (18 °C) to 2.00 days (32 °C); for larva from 31.50 to 10.10 days and for the pupae from 30.86 to 6.0 days. The temperature range of 26 to 30 °C was found to be favourable for growth and development whereas the temperature extremities of 18 and 32 °C was not favourable for the growth and development of fall armyworm; at 18 °C there was no eclosion and at 32 °C there was eclosion of adults but mortality occurred within an hour. The linear regression studies revealed that lower developmental threshold temperatures of 11.50, 11.49, 13.91, and 20.13 and corresponding thermal constants of 42.90, 234.52, 148.86, and 494.12 degree days were recorded for the incubation period, larval period, pupal period and total life cycle respectively in order. The present study revealed that the upper threshold of 32 °C and a lower threshold of 18 ° C were detrimental for the development of life stages of fall armyworm. These estimated thermal thresholds and degree days might be used to predict the fall armyworm activity in the field for devising strategies for effective management of fall armyworm.

Keywords Biology of fall armyworm, Degree days, Lower thresholds, Upper threshold, Temperature, Fall armyworm

Seedling Resistant Test of Wheat Genotypes against Selective Pathotypes of Stem and Leaf Rusts Under Glass House Condition

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ABSTRACT

Fifty two wheat genotypes from AVT received from the Indian Institute of Wheat and Barley Research, Karnal (Haryana) during *Rabi* 2019-20 were screened for testing their resistance against selective and virulent pathotypes of stem and leaf rusts under glass house condition. These genotypes were tested at seedling stage against thirteen pathotypes of stem rust*viz.*11, 24A, 40, 40-1, 40A, 42, 42-B, 117-2,117-4, 117-5, 117-6, 122 and 295 and nine pathotypes of leaf rust *viz.* 12-4, 12-5, 77-1,77-4, 77-5, 77-9, 104A, 104-1and 108.

Among 52 wheat genotypes, sixteen genotypes from AVT *viz,*. HI-1636, HI-1637, RAJ-4541, HI-1544, HI-1634*, MP-3288, MACS-6222(C), HI-8818(d), HD-3090(C), MACS-6749, HI-1641, HI-1642, HI-1633*, MACS-6752, HI-8805(d)(I)(C), and MPO-1357(d) were found resistant to stem rust disease of wheat. While, thirty three wheat genotypes *viz,*. HI-1636, MP-1637, MACS-6747, HI-1637, RAJ-4541, GW-513, HI-1544, HI-1634*, HD-2864, CG-1029*, MPO-1357(d), MP-3288, DDW-47(d)(I), WHD-964(d), DDW-48(d)*, MACS-6222(C), MACS-3949(d)(C), HI-8818(d), UAS-428(d)(C), GW-519, HD-3090(C), MACS-6749,HI-1641, HI-1642, HI-1633*, MACS-6752, NIDW-1149 (d)*,UAS-446(d)(C), MACS-4087(d), AKDW-2997-16(d)(C), HI-8805(d)(I)(C), UAS-472(d) and MPO-1357 (d) were found to be resistant to leaf rust disease of wheat. Whereas, sixteen genotypes *viz,*. HI-1636, HI-1637, RAJ-4541, HI-1544, HI-1634*, MP-3288, MACS-6222(C), HI-8818(d), HD-3090(C), MACS-6749, HI-1641, HI-1642, HI-1633*, MACS-6752, HI-8805(d)(I)(C) and MPO-1357(d) showed resistance to both rusts under glasshouse condition.These AVT wheat genotypes resistant to both rust pathotypes are recommended for further breeding programme and farmers use.

Keywords: Advanced Varietal Trial (AVT), National Initial Varietal Trial (NIVT), Pathotypes

Prevalence of Forest Fire in Boudh Forest Division of Odisha and its Management strategy

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ABSTRACTS
A devastating forest fire can easily destroy the whole ecosystem of any locality, which changes the environment in a wrong direction. It has created deteriorating effects such as biodiversity loss, forest degradation, soil erosion, imbalanced atmospheric pattern, and global warming due to loss of carbon from the forests in the atmosphere. Thus, forest fires have become a serious environmental and ecological concern. In Odisha, forest fire is one of the most dangerous but regular phenomenon in summer season throughout the state as it has mostly dry deciduous type of forest. The forest of interior western and southern parts of Odisha are more vulnerable to forest fire compared to those in the eastern coastal parts. Due to large amount of litter falling in the Boudh forest division situated in the middle part of Odisha, forest fires are more prevalent and almost all forest fires are found in this area are anthropogenic. From the month of February it has been initiated and continues up to the May. Due to occasional rain fall and storm in the month of May, it gradually decreases. The proper integrated forest fire management practices are not adopted by the forest department and other stake holders. The accurate prior planning with community participation can prevent and manage the forest fire disaster in this area in order to check carbon emission and reduce temperature rising in summer.
Keywords: Forest fire, Biodiversity loss, Western and southern part of Odisha, Boudh Forest

Division, Dry deciduous forest, Anthropogenic, Integrated Forest fire Management, Carbon Emission, Reduce Temperature

Genetic Diversity of *Eremurus himalaicus* Baker using RAPD markers

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ABSTRACT
Eremurus himalaicus Baker has been recognized as an important medicinal plant due to its role in the treatment of anaemia, and inducing lactation in post-partum period in conventional and folk medicines. Tribal members treat fever, diarrhoea, and diabetes with powdered roots and cooked leaves. Genetic diversity was studied in 11 *E.himalaicus* populations collected from 11 different regions of Kashmir. A total of 48 bands were amplified in 11 populations using 7 RAPD markers. Out of these, 37 bands were polymorphic and 11 were monomorphic. The highest number of polymorphic bands were obtained for OPA-10 primer amplifying 9 bands of which 7 were found to be polymorphic. Except for OPA-11, the majority of the primers exhibited more than 75% polymorphism. Highest marker index calculated was that of OPA-05, OPA-02 followed by OPA-07 and least was observed in case of OPC-02 with an average of 0.52 per primer. Highest marker index calculated was that of OPA-05, OPA-02 followed by OPA-07 and least was observed in case of OPC-02 with an average of 0.52 per primer. Highest resolving power was obtained with primer OPA-03 whereas least were observed for OPA-07 and OPA-11 with an average of 4.15. The Resolving Power varied from 2.21 in OPA-07 to 6.72 in OPA-03, the MI from 0.49 in OPC-02 to 0.54 in OPA-02,OPA-05, the Hz value ranged from 0.39 in OPA-10 to 0.49 in OPA-03,

OPC-02, the Dp value ranged from 0.47inOPA-10to 0.69inOPC-02andthe EMRfrom 1.72 inOPA-11 to6.54inOPA-10. Drung population had the highest diversity followed by Shaginag population and Chandanwari population had the lowest diversity respectively. The generated dendrogram based on the dissimilarity matrix using the neighbor- joining approach showed three distinct clusters.

Keywords: *Eremurus himalaicus*, medicinal plant, genetic diversity, RAPD markers, conventional use

Influence of Sulphur, Zinc and Iron with PGPR on Coriander (*Coriandrum sativum* L.) Agronomic Traits and Quality under Arid Climate

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ABSTRACT

Coriander (*Coriandrum sativum* L.) is a popular leafy vegetable and spice crop produced around the world for its soft green leaves and pungent fruits. With agronomic traits and quality purpose understanding, field experiments were conducted in two consecutive seasons of 2021-22 and 2022-23 at ICAR- National research centre on seed spices, Ajmer (Rajasthan). Treatment details are following for the research report- Absolute control (T1), Control (RDF + PGPR) (T2), Soil application @ 5 kg Zn ha^{-1} (T3), Foliar application Zn @ 0.5 % (T4), Soil application @ 10 kg Fe ha^{-1} (T5), Foliar application Fe @ 1.0 % (T6), Soil application @ 20 kg S ha^{-1} (T7), Soil application @ 5 kg Zn ha^{-1} + Soil application @ 20 kg S ha^{-1} (T8), Soil application @ 10 kg Fe ha^{-1} + Soil application @ 20 kg S ha^{-1} (T9), Soil application @ 5 kg Zn ha^{-1} + Foliar application Fe @ 1.0 % + Soil application @ 20 kg S ha^{-1} (T10), Foliar application Zn @ 0.5 % + Soil application @ 10 kg Fe ha^{-1} + Soil application @ 20 kg S ha^{-1} (T11), Foliar application Zn @ 0.5 % + Foliar application Fe @ 1.0 % + Soil application @ 20 kg S ha^{-1} (T12), Soil application @ 5 kg Zn ha^{-1} + Soil application @ 10 kg Fe ha^{-1} + Soil application @ 20 kg S ha^{-1} (T13). The treatments, T12 recorded significantly highest yield & essential oil (1983.3 kg/ha & 0.35%) followed by T13 (1951.1 kg/ha & 0.32%) which are on at par with each other and significantly superior over absolute control (898.9 kg/ha & % 0.07 %).the NPK content in grain of coriander were higher in treatment T13, T12 and T13, respectively. However, Zn and Fe content in seed were highest observed in treatment T11 and T10 due to foliar application of Zn and Fe, respectively. The combined application of foliar Zn, Fe and soil S were significantly superior for yield, nutrient content, and transfer coefficient and quality parameter in coriander seed.

Keywords: Coriander, sulphur, iron, zinc, PGPR, agronomic traits and quality

Supply Chain Management: A Necessity for Better Food Security

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ABSTRACT

India produces enough food to meet the needs of its entire population, but it cannot feed most of them. India is the second-largest producer of fruits and vegetables, but twenty-five to thirty

percent of its food is lost or damaged because there aren't enough cold storage facilities, dedicated fleets, or cold trucks for distribution. Feeding India's population of over a billion people is a problem, but providing wholesome food to people at the proper time is more important. Fruits and vegetables, where there is a significant annual wastage, are the food category most vulnerable to a lack of cold storage. Food losses occur as a result of weaker quality and safety standards driven by client demands, particularly in developed countries. Fresh agricultural items, such as fruits and vegetables, can suffer large losses during postharvest processing (up to 30% per year). Between on-farm food production and storage at a retail facility, around 25-30% of worldwide food supply is wasted, owing primarily to inadequate chain management and spoilage. Cold chain solutions have been used for many years to prevent fruit and vegetable quality loss from farm to fork. However, significant losses continue to occur throughout the packaging, pre-cooling, transportation, and storage of these fresh agricultural products. Various advanced tools, such as, radio frequency identification, spectroscopy, multi-sensors, electronic noses, , imaging technology, printed sensors and acoustic impulse response can be used to reduce the quality loss of fruits and vegetables during the packaging, storage, and transportation cold chain operations. The Internet of Things (IoT) and virtual representation models of a specific fresh produce (digital twins) are new technologies that can assist in monitoring and controlling the uncharted quality evolution during the postharvest life of a fresh produce. These advancements can aid in the diagnosis and mitigation of potential problems affecting the quality of fresh produce in supply chains.

Keywords: cold storage, annual wastage, weaker quality, storage, packaging, supply chain

Green Jobs and Policy Measures for Sustainable Development

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ABSTRACT

The transition to a green economy is a necessity, an opportunity and a challenge for sustainable development. The review paper focuses on analyzing the impact of green jobs and various policy measures for sustainable development. The information is reviewed from various secondary sources such as research papers, journals, books and websites. In a nutshell, it is evident that green jobs reduce the environmental impact of enterprises and economic sectors by enhancing the efficiency of energy, raw materials, and water; decarbonizing the economy and reducing greenhouse gas emissions; reducing or avoiding all forms of waste and pollution; and protecting or restoring ecosystems. It is a necessity so far as the current use of resources and emissions from production and consumption exceeds the carrying capacity of natural systems. The overuse of land, soil, water and natural resources and the loss of biodiversity cannot be overlooked, even if the effects and scarcities are scattered unevenly from region to region. By the same token, emissions from greenhouse gases, contaminants and waste exceed the ecosystem's ability to regenerate itself. With an increasing population and growing income in many emerging countries, the situation is intensifying. Production and consumption are far from a sustainable economy and respecting planetary boundaries. An economy that is geared towards preserving and using the natural environment in a sustainable way is not necessarily characterized by sacrifice and limitations. Green jobs include opportunities for managers, scientists and technicians particularly in informal sectors where most: youth, women, farmers, rural populations and slum dwellers may be a major player. India has large potential of human capital so there is a big scope of green jobs. However, some green jobs are also dangerous such as recycling and

waste management, biomass energy and construction. Recent developments in technology and the process of globalization along with climate change issues have shifted the priority of global labor markets. In developed economies the measures in this direction has been initiated but developing nations have not yet taken the leap. India has a large share of traditionally trained manpower (i.e. potters, rural artisans etc) which is already in-line with the green skill domain; the remaining contemporary technical manpower has to be transformed both at the level of skill as well as in the thought process. This will aid towards building a greener economy. Since the green economy is a new concept which requires enormous resources and human capital by creating green jobs, ensuring real, sustainable economic growth, and preventing environmental pollution, global warming, resource depletion, and environmental degradation. In summary, there is a need to promote and create lots of green jobs to make the world a better place for future generations. It will also put pressure on the businesses to be responsible to the environment.

Effect of Foliar Application of Salicylic Acid on Certain Morpho-Physiological, Biochemical and Yield Parameters of *Kharif* Maize (*Zea mays L.*) Grown under Rainfed Condition.

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ABSTRACT

An experiment was performed in the kharif- 2022 at the Agricultural Research Farm of the Institute Of Agricultural Sciences, BHU, Varanasi to study the Effect of foliar application of Salicylic acid with respect to certain morpho-physiological, biochemical and yield parameters in kharif maize taking Variety CPP-858. Significant differences were observed with respect to morpho-physiological parameters like LAI (Leaf area index), sink size , test weight and harvest index was found to increase in the plants treated with Salicylic acid than those grown under control plot . Similar results were obtained with regard to biochemical parameters such as chlorophyll 'a', 'b', total chlorophyll content, Protein content,total soluble sugar content in leaves and seeds as well which showed an increasing trend in response to exogenous application of Salicylic acid. Similar results were obtained with respect to the yield and yield attributing parameters. Hence, the above work done essentially reflect the importance of Salicylic acid as a potent growth modulating hormone for crop plants especially grown under water stressed/ dryland conditions.

Keywords: *Zea mays L.*, Protein content, Drought stress, Chlorophyll content.

The Resilience of Rice under Water Stress will be Driven by Better Roots: Evidence from Root Phenotyping, Physiological, and Yield Experiments

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ABSTRACT
Rice is the principal food grain crop of the world, grown on over 164 million hectares. Water is an important production constraint in food crops. Till recently, crop breeding efforts have mainly focused on the shoot, whereas most of the major drivers of the yield gap directly influence the root system, thereby implicating the plant's resource acquisition efficiency. Despite the substantial experimental evidence for the importance of root traits in drought tolerance, lesser efforts have been directed towards drought-adaptive root traits based on the selection index in rice. The above-ground components are easy to phenotype, and lesser efforts towards root traits stem mainly from the phenotyping bottlenecks of reliable recovery and evaluation of root traits. Moreover, greater phenotypic plasticity of root traits in response to changes in soil resource status, and lack of less costly screening techniques for roots is still a challenge, leading to comparatively lesser information about the potential role of roots in developing drought-resilient rice varieties. Root phenes are not as high in number as the huge shopping list of above-ground traits. Exploring the natural variation of root traits could assist rice improvement programs in developing varieties with desired root phenes for target environments. More importantly, elucidation of the relationship of root traits with the physiological and biochemical responses contributing to grain yield is also imperative. In this paper, we discuss the potential role of roots in determining the resilience of rice varieties for future farming systems based on evidence from root phenotyping, the relationship of root phenes with physiological efficiency and yield under water stress in rice.
Keywords: Rice; climate change; root architecture; physiology; QTL

Gender Sensitisation of Rural Women for Attaining Nutritional Security
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ABSTRACT
Women have a special role in healthy nutrition of the population. Women's awareness on nutrition not only affects their own health status but also family health status. The public health depends upon women's understanding of healthy nutrition issues. Women, therefore, play a key role in implementing healthy nutrition policy, both in the family and in society as a whole. Women constitute fifty per cent of the world population. They play a positive and constructive role and contribute significantly towards the economic, social and political development of the society. In India nearly three fourth percentages of women are suffering from various types of problems due to lack of knowledge, information and education on various nutritional aspects. Although women are primarily responsible for nutrition and health in the family, most of them do not have the necessary resources themselves. The reason for poor outreach was lack of orientation of the functionaries, no community involvement and weak nutrition education programmes. The rights of women and girls play an important role in rural development, agriculture, food security and nutrition. Women are particularly affected by poverty and malnutrition (about 60 per cent of the world's under-nourished are women). Nutritional awareness of women can be increased by using print media. Print media as educational channels has motivating role to educate rural women to participate in improving household food security. Media's role is important as nutritional deficiencies remained a devastating problem affecting infants, young children, adolescent and women. There is a need to inform women about detrimental consequences of nutrition deficiencies not only on child survival, growth and development, but its impact on brain development,

academic achievements besides reducing overall adult productivity impending social and economic development.

Keywords: Print media, nutritional deficiency, development, food security

Potential Agroforestry Interventions for Sustainable Livestock Farming in Changing Climate Scenario in Arunachal Pradesh : A Review

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ABSTRACT

In Arunachal Pradesh, a distinctive gap exists between the requirements and supplies of nutrients for livestock. It is desirable that adequate feed resources should be built up as one of the mitigation strategies in response to changing climate scenario. A feasible and hence, the most viable proposition could be the inclusion of agroforestry-based feed resources in livestock ration with suitable and complete feed technology that can utilize these resources with maximum efficiency. For the objective of this review, potentially available agroforestry-based feed resources in the state include crop residues, plantation wastes and browse foliage. It is known that some of these products are low in energy, protein and contain high concentrations of lignin, silica and several anti-nutritional substances. Numerous multipurpose browse trees and shrubs have been identified as having significant potential in agroforestry systems in the region. Browse plants that have been identified and have recently been studied include *Gmelina arborea, Moringa oleifera, Trema orientalis, Terminalia catappa, Ficus hirta, Bauhinia purpurea* and Bamboos. Protein form plant leaf sources is perhaps the most naturally abundant and cheapest source of protein, such that there has been growing realization in use of plant leaf meals in livestock diets. Several authors have concluded studies on these leaves to determine their nutritive values and usefulness in livestock nutrition. Results obtained from these studies have shown beneficial and economic values from the inclusion of these leaf meals in the diet of livestock.

Keywords: Agroforestry-based feed resources, browse plants

Effect of Different Fertigation Levels on Yield and Quality of Banana. Cv. Grand Naine

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ABSTRACT

An investigation on Effect of different levels of fertigation on , yield and quality of banana (Musa Paradisica L) was conducted at Banana Research Station, Nanded, during year 2016-17,2017-18,2018-19,-2019-20 . The field experiment was laid out in Randomized Block Design with seven treatments and three replication. The experiment consist of seven treatments *viz,* T_1-50% RDF (Through fertigation) T_2-60% RDF (Through fertigation) T_3-70% RDF (Through fertigation) T_4 -80% RDF(Through fertigation)T_5-90% RDF (Through fertigation) T_6-100% RDF (Through fertigation)T_7-Control (RDF through soil application) . Observation on growth attributes ,bunch attributes yield atrributes, quality atrributes were recorded. The different fertigation treatment significant influence on finger charecters. The significantly maximum height girth of finger (14.92cm), length of finger (20.61) were recorded in treatment T_6-100% RDF (Through fertigation). However significantly highest weight of bunch (22.77 kg) and banana yield (101.10Mt/ha) was recorded in treatment T_6-100% RDF (Through fertigation) and was found at

par with treatment T_5-90% RDF (Through fertigation and T_3. The lowest weight of bunch per plant (18.61) was recorded in treatment T_7-Control). In quality attributes weight of pulp (12.67g) , pulp to peel ratio (2.73) reducing sugar (11.55%) .) were recorded in treatment T_6-100% RDF (Through fertigation). The significantly highest b;c ratio was recorded by the treatment T_6-100% RDF (Through fertigation and was found at par with treatment T_3. The treatment T_3. 70% RDF (Through fertigation was found best for maximum yield and beter economic returns of banana.

Keywords: Fertigation, Banana, Grand Naine

Field Evaluation of Soil Application of Bio Agent on Yield and Sigatoka Leaf Spot Disease of Banana Cv . Grand Naine

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ABSTRACT

A experiment was conducted on field evaluation of soil application of bioagent on growth yield and sigatoka leaf spot disease of banana Cv. Grand Naine. The field exprimentt was laid out in Randomized Block Design with nine treatment and three replications conducted at banana Research station, Nanded VNMKV, Parbhani. Study Bioagent *VizTricodermaharzianum., Azospirillum Phosphate solublizing bacteria* were applied through soil at 25g per plant at the time of planting and 75 dayes after planting in two equale split doses. Recommended dose of fertilizer was applied through urea DAP and murate of potash in split doses in split doses. The different bio agent treatment significance on yield character of banana. Significantly highest number of finger (154.17), weight of bunch(22.34kg) and banana yield (99.91 mt/ha) was recorded treatment T_9 -100 % RDF + Soil application of *Trichoderma harzianum+Azospirillum+* PSB. (99.91 Mt/ha) and was found at par with T_5 - 75 % RDF + Soil application of *Trichodermaharzianum+ Azospirillum +* PSB (94.63 Mt/ha). Significantly minimum PDI of sigatoka (19.52 %) was recorded in T_9 *i.e.* 100 % RDF + soil application of *Trichoderma harzianum + Azospirillium + PSB* and was found at par with T_5 *i.e.* 75 % RDF+ soil application of *Trichoderma harzianum + Azospirillium + PSB.* The data showed that the significant difference for percent diseases index of sigatoka leaf spot was observed among different treatment. The maximum PDIof sigatoka (30.60) was recorded in treatment T_1. The use of 75% RDF along withapplication *of 25g Trichoderma harzianum, Azospirillum and PSB* per plant was found significant for higher yield and minimum disease severity of sigatoka leaf spot .

Keywords: Banana, Sigatoka, Bio-agent, *Trichoderma, PSB, Azospirillum,*

Race Specific Adult Plant Resistance Test against Selective Prevalent Stem Rust Pathotypes under Glasshouse Condition

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ABSTRACT

Fifty-two wheat genotypes from AVT received from the Indian Institute of Wheat and Barley Research, Karnal (Haryana) during *Rabi* 2019-20 were screened at adult stage under glasshouse condition for evaluating their resistance to pathotypes of stem rust *viz*., 40A and 117-6.

Among these, eighteen wheat genotypes *viz.*, MP-1361, HI-1637, HI-1634*, HD-2864, MPO-1357(d),UAS-466(d)(I), DBW-110, DDW-48(d)*, MACS-6222(C), HI-1646, HD-3090(C),

RAJ-4083(C), HI-1641, HI-1642, MACS- 6752, NIDW-1149(d)*, MACS-4087(d) and NIAW-3170(I)(C) were found resistant to 40A whereas, twenty seven wheat genotypes *viz.*, HI-1636, MACS-6747,HD-3337, GW-322, HI-1634*, HD-2932, HD-2864, MPO-1357(d), HI-8627(d), UAS-466(d)(I), WHD-964(d) MACS-6222(C), MACS-3949(d)(C), HI-8818(d), UAS-428(d)(C), GW-322(C), HI-1646, HD-3090(C), RAJ-4083(C), UAS-3008, MACS-6749, HD-2932(C), HI-1642, UAS-446(d)(C), HI-1605(C), MACS-4087(d), HI-8805(d)(I)(C) and MPO-1357(d) showed resistance to 117-6. Out of total genotypes evaluated, ten genotypes *viz*., HI-1634*, HD-2864, MPO-1357(d), UAS-466(d)(I), MACS-6222(C), HI-1646, HD-3090(C), RAJ-4083(C),HI-1642 and MACS-4087(d) were found resistant to both the pathotypes 40A and 117-6 under glasshouse condition. These AVT genotypes, resistant to both pathotypes of stem rust 40A and 117-6 are recommended for further breeding programme and farmers use.

Keywords: Advanced Varietal Trial (AVT), Adult Plant Resistance Test (APRT), Pathotypes

Impact of Rice Residue and Nitrogen Management on Crop Productivity and Nitrogen use Efficiency

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ABSTRACT

The rice-wheat cropping system (RWS) is a predominant cropping pattern of agriculture in the Indo-Gangetic Plains of South Asia. The RWS needs strong interventions, including recycling rice straw, to increase soil health with minimal negative environmental effect. Thus, the field experiment was conducted on two soils (sandy loam and clay loam) with four rice residue management treatments and seven nitrogen (N) application methods to study the effects of rice residue and N management on wheat yield and N use efficiency in the RWS during the 2020-21 and 2021-22. In zero tilled plots, wheat sown using a happy seeder with rice straw retained as surface mulch (T_2) showed 4 %, while rice residue incorporated with a super seeder machine at sowing (T_4) exhibited 2.4%, and rice residue incorporated using MB plough at three weeks before wheat sowing (T_3) recorded 1.8% higher grain yield as compared to conventional tillage after removal of straw (T_1) during the year 2020-21, respectively being ascribed to an increase in yield contributing traits due to moderation of soil temperature, increased nutrient availability and soil moisture content due to residues retention at the surface. During 2021-22, the overall increase in grain yield in T_2, T_4 and T_3 was 6.5%, 2.6% and 1.3% over T_1, respectively. Application of N fertilizer significantly increased the wheat yield from 61.1 to 71.1% and 65.4 to74.1% on sandy loam, and 51.8 to 60.7% and 58.0 to 67.0% on clay loam over no N control in 2020-21 and 2021-22, respectively. On sandy loam, the wheat grain yield of 5.63 t/ha in 2020-21 and 5.24 t/ha in 2021-22 obtained in N_7 (drilled 50 % N through nitrophosphate) at the time of sowing, 40% N as urea at first irrigation and remaining 10 % N as the foliar application was significantly higher than the other modes of N application. The maximum grain yield (5.77 t/ha and 5.41 t/ha) was recorded in the N_7 treatment, which was at par with the grain yield (5.70 t/ha and 5.34 t/ha) of N_4 treatment during 2020-21 and 2021-22, respectively. In 2021-22 terminal heat due to higher canopy temperature significantly reduced grain yield on both soils in T_1, T_3, and T_4 in comparison to T_2. The maximum agronomic efficiency of N (AE_N) was recorded in T_2 on sandy loam and clay loam soil (15.2 and 14.7 kg grain kg^{-1} N respectively) during 2021–2022. The highest AE_N on sandy and clay loam soil was recorded (19.4 and 18.6 kg grain kg-1 N) and (17.9 and 18.1 kg grain kg^{-1}N) in N_7 treatment during 2020-21 and 2021-22 respectively. Highest recovery efficiency (%)

was also witnessed on sandy and clay loam soil in T2 treatment. In N_7 attained highest recovery efficiency (59.7 and 55.9%) on sandy loam and maximum recovery efficiency (60.1 and 57.9%) on clay loam soil during 2020–2021 and 2021–2022 respectively. Favorable interaction of optimum N fertilizer application methods and residue management treatments improved overall soil health and wheat productivity.

Keywords: Residue Management, Nitrogen, Soil health, Zero tillage, Grain yield

Prospects and Constraints of Beekeeping Based Entrepreneurship - A Review

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ABSTRACT

India is an agrarian economy and the path of prosperity of Indian economy passes through rural hinterlands. Entrepreneurship plays an important role in creating employment and income enhancement opportunities. Beekeeping is an important allied occupation in agriculture sector. The diverse agro-climatic conditions in the nation provide a lot of scope and opportunities for beekeeping. It supports agricultural activities through cross-pollination and an increase in the yield of the crops. Beekeeping is an income generating activity and thrives on a number of hive products such as honey, bee pollen, royal jelly and bee venom. Beekeeping has emerged as a profitable and sustainable entrepreneurship option for rural entrepreneurs. The purpose of this paper is to review the entrepreneurial opportunities and constraints in beekeeping in the current settings. The paper is based on various secondary data sources such as research papers derived from various online databases, magazines, government annual report etc. Web of Science, Scopus, and Google Scholar were searched with keywords such as small scale entrepreneurship, beekeeping, opportunity, constraints, etc. The comprehensive review of literature and data sources throws up various entrepreneurial opportunities and constraints in beekeeping in rural India. Indian beekeepers in general and Punjab beekeepers in particular face the problem of depleting flora and have to undertake migratory beekeeping. Migratory beekeeping comes up with its own set of problems including the major problem of cost escalation. Establishing market linkages is another chronic problem for the beekeepers. Disposing off their hive products with the traders not only curtails profit margins but also adds to uncertainty in income through the fluctuating prices. As of now the option of direct market access is exercised on very limited basis. Besides, the beekeepers are facing the issue of mixing of corn based syrup in the honey by the organized sector. This issue leads to lower demand for honey and makes the beekeepers less price competitive. For providing a boost to the beekeeping in India, there is a pertinent need to link the beekeepers with the end consumers, to give boost to the local flora and to administer the suitable policy interventions for dealing with the syrup mixing issue.

Keywords: Entrepreneurship, Beekeeping, Opportunity, Constraints.

Temporal and Spatial Analysis of Drought Characteristics in Birbhum District, West Bengal using Standardized Precipitation Evapotranspiration Index at Different Time Scales

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ABSTRACT

Drought is one of the most severe climate-related hazards that pose significant challenges for water management, agriculture, and food security, particularly in arid and semi-arid regions. With the increasing frequency and severity of droughts worldwide, it is essential to understand the regional patterns and trends of drought and their relationship with climate change. Birbhum district, West Bengal, is no exception to this phenomenon, and its water resources have been severely impacted by droughts in recent decades. So, the study analyzed the temporal and spatial variations of the Standardized Precipitation Evapotranspiration Index (SPEI) using data from 12 meteorological stations from 1981 to 2021. This study examined the effectiveness of the SPEI as a drought monitoring indicator at various timescales (1-, 3-, 6-, 9-, and 12-month). The modified Mann-Kendall (M-K) test was used to determine the significance of drought characteristic trends. The study found that the temporal variations in the SPEI became more consistent as the timescale increased. The M-K test indicated that the SPEI exhibited decreasing trends at 1 and 3 months, but increasing trends at 6, 9, and 12 months. The severity of droughts has been intensified by climate change, with increasing temperatures exacerbating the water deficit in the region.The research findings can guide policymakers and local authorities in implementing measures to improve water management practices, enhance water-use efficiency, and reduce the region's vulnerability to droughts. By comparing and analyzing the SPEI at different timescales, this study provides useful insights for developing effective drought monitoring and management strategies.

Keywords-drought; SPEI; Mann-Kendall; IDW; meterology

Comparing the Suitability of DTPA and Mehlich-3 for Determination of Available Zinc in Rice Growing Soils of West Bengal.

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ABSTRACT

The greenhouse experiment was carried out at the Central Research Farm of Bidhan Chandra Krishi Viswavidyalaya, Nadia in 2016 during *Kharif* season. Soils for the experiment were collected from thirty different rice growing fields situated in thirty blocks covering eight districts under different agro-climatic zones of West Bengal. Rice cultivar Satabdi- 4786 was used as a test crop for the greenhouse experiment. Crop was harvested at maximum tillering and harvesting stages. Two extractants namely DTPA and Mehlich-3 was compared for accessing its suitability in context to soil available zinc (Zn) and further correlated with yield and other growth-related parameters. In this study, a chelating and an acid extractant was compared in search for a more suitable extractant to predict Zn availability in the soils under study. Soil and plant samples were collected at two different stages of plant growth viz. at maximum tillering and harvesting stages. All forms of extractable Zn were highly and significantly correlated with each other, which indicated that the two extractants could extract Zn from more or less similar pools from soil. The acid extractant Mehlich-3 extracted higher amount of soil Zn (2.13-3.62 mg kg^{-1}) than DTPA

(0.53-1.94 mg kg^{-1}) as being an acid extracted it could extract Zn from the soluble, adsorbed in organically complexed forms as are present in soils. However, DTPA was found to have higher correlations with yield, concentration and uptake of Zn by the crop, Although Mehlich-3 extracted higher amount of Zn from the soils, its use is precluded because of lower correlations with the plant parameters compared to DTPA. The study was conducted in an attempt to find an extractant to be accepted irrespective of nature of soils, crop species and under all environment conditions in rice soils of West Bengal.

Keywords: zinc, DTPA, Mehlich-3, extractant, rice

Effect of Insecticides on Foraging Behavior of Honeybees in Safflower, *Carthamus tinctorius* L.

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ABSTRACT

The field trial on response of different species of honeybees to the insecticides in safflower was conducted at research farm of Department of Agricultural Entomology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani during 2020-21 and2021-22.The studies revealed that the maximum number of honeybees population of *Melipona irridipenis*(7.28bees /m^2 /min.), *Apisdorsata*(5.70bees /m^2 /min.), *Apiscerana indica* (4.95bees /m^2 /min.), *Apisflorea*(4.26bees /m^2 /min.) and *Apis mellifera* (3.52bees /m^2 /min.) was recorded in an untreated control plot followed by the treatment seed treatment with thiamethoxam 30 FS @ 10 ml/kg seed and seed treatment with imidacloprid 48 FS @ 9 ml/kg seed in which 5.63, 5.48, 4.78, 4.08, 3.34 and 5.67, 4.98, 4.29, 3.57, 3.16 *M. irridipenis*, *A. dorsata*, *A. cerana indica*, *A. florea* and *A. mellifera* bees /m^2/min. were recorded, respectively. The next better treatments were soil drenching with clothianidin 50 WDG, seed treatment with thiamethoxam 30 FS and one foliar spray of cyantraniliprole 10.26 OD, seed treatment with thiamethoxam 30 FS and one foliar spray of spinetoram11.70 SC, seed treatment with imidacloprid 48 FS and one foliar spray of cyantraniliprole 10.26 OD, seed treatment with imidacloprid 48 FS and one foliar spray of spinetoram 11.70 SC, soil drenching with clothianidin 50 WDG and one foliar spray of cyantraniliprole 10.26 OD, soil drenching with clothianidin 50 WDG and one foliar spray of spinetoram11.70 SC, two foliar sprays of cyantraniliprole 10.26 OD and two foliar sprays of spinetoram11.70 SC in which honey bees population of *M. irridipenis*, *A. dorsata*, *A. ceranaindica*, *A. florea* and *A. mellifera* bees /m^2/min. were recorded in the range of 3.63 to 5.30, 2.94 to 4.51, 2.24 to 3.87, 1.58 to 3.08 and 1.00 to 2.74 bees /m^2/min., respectively.

Keywords: Honey bees, cyantraniliprole, neonicotinoid, safflower, spinetoram, foraging behavior, clothianidin

An Exploration of the Agri-food System of West Bengal and Suggestive Measures to Attain Sustainability

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ABSTRACT
Sustainable agri-food system contributes towards food security and nutrition for all in such a way that will not hinder the needs of future generation.The food system's sustainability is influenced by natural and human factors. In the food system, input dealer's role performance influenced was by the factors like cosmopoliteness, extension participation, credit and information orientation and the types of inputs being sold had a vital contribution. Crop diversification, irrigation, fertilizer use, road connectivity, market and storage facilities has been founded as the major drivers of agrarian transition in favor of non-food grains. The inherent nutrient status of the soil had declined due to overuse of inorganic fertilizers and had shown a potential negative effect on the productivity of paddy cultivation.
Keywords: Agri-food system, Crop diversification, Extension participation, cosmopoliteness, nutrition

Performance Evaluation of Jamun (*Syzygium cumini* L.) Pulp Extractor

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ABSTRACT
Jamun is a potentially important indigenous minor commercial fruit as well as have high medicinal uses. Jamun is perishable in nature and underutilized fruit. The Jamun fruit has excellent processing qualities for pulp and seed. The quality of Jamun fruit is greatly deteriorated between its harvesting and consumption so there is considerable wastage of fruit. The main problem in Jamun processing is to extract pulp from the seed. The shelf-life of pulp is very short; only few hours at ambient condition but can be stored under frozen condition for more than six months. Manual extraction of pulp from its seeds is very difficult. It is a very tedious, time consuming and unhygienic process. To overcome these problems of extraction of Jamun pulp from its seed, we aim to evaluate the performance of developed Jamun pulp extractor which produces good quality pulp with minimum pulp losses. The developed Jamun pulp extractor consisted of main frame, brush roller, cylindrical sieve, feeding hopper, pulp and seed outlet, pulley and belt and electric motor. The pulp extraction was preferably achieved by the frictional and shearing action between the Jamun fruits, bush roller and cylindrical sieve of the Jamun pulp extractor. In order to evaluate the performance of machine, experiment was conducted at brush roller speed (1.8, 2.8 and 3.7 m/s), clearance between the cylindrical sieve and brush roller (8, 10 and 12 mm), and feed rate (120, 180 and 240). The optimized operational parameters of Jamun pulp extractor namely, speed of brush roller, clearance between cylindrical sieve and brush roller and feed rate were found to be 2.8 m/s, 10 mm and 180 kg/h, respectively for maximum pulp extraction efficiency of 95.31 % and minimum pulp loss of 4.66 %, respectively with maximum coarseness of Jamun pulp as 23.
Keywords: Jamun pulp, Jamun seed, Pulp extractor, Jamun Pulp extraction,

Standardization of Propagation Techniques in Jamun (*Syzygium cuminii*) and Lasora (*Cordia myxa*)

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ABSTRACT

The experiment on propagation of jamun and lasora was started during 2017 at CCS HAU, Regional Research Station, Bawal (Rewari), Haryana. Propagation in jamun and lasora was done by T budding and soft wood grafting to standardize the best time of bud/ graft take success rate in vegetative propagation with eight treatments *viz*. middle of February, March, April, May, June, July, August and September. The experiment was replicated three times and ten plants per replication were propagated in CRD. The sprout of scion about 15 cm or more was considered as successfully propagated plant. On the basis of long term study the maximum success rate of bud takes 63.3 % and 69.3% was observed during the month of August and July in jamun and lasora, respectively. However, minimum bud takes and soft wood success was recorded as 13.3 % and 10.0 % in February in both the crops, respectively. The per cent success rate of soft wood grafting was recorded maximum 56.3% in both crops in the month of August and July in lasora and jamun, respectively.

Keywords: Budding, jamun (*Syzygiumcuminii*), lasora (*Cordia myxa*), propagation, soft wood grafting

Valorization of Aquatic Plant *Nymphaea mexicana* for Biofuel Production: an Emerging Source of Bio Renewable Energy

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ABSTRACT

Macrophytes are an essential component of aquatic ecosystems performing a number of functions. But their excessive growth causes terrible nuisance urging their removal from water bodies. Every year several thousand metric tonnes of macrophytic biomass is removed from water bodies and disposed off without any further use which otherwise can prove an efficient renewable energy source. The present study investigates the efficiency of macrophyte *Nymphaea mexicana* for the production of bioethanol and biodiesel. For bioethanol, dried biomass was hydrolyzed using different concentrations of dilute sulphuric acid followed by fermentation using *Saccharomyces cerevisiae*. Ethanol yield of 0.16 g/g biomass was obtained after 96 hours of fermentation. For biodiesel, the dried biomass was Soxhlet extracted to obtain crude lipid followed by transesterification using sulphuric acid and methanol. A crude lipid yield of 34% was obtained using methanol and diethyl ether (2:1 ratio) solvent system. Fatty acid methyl ester (FAME) analysis of transesterified lipid using GC-FID showed that fatty acids such as C16:0, C16:1, C18:0, C18:1, C18:2, C18:3, C24:0 and C24:1 contributed about 90% of the total fatty acids, which are commonly present in biodiesel. Thus, it can be concluded from the data that *Nymphaea* has the potential to find useful applications in the area of biofuels and bioenergy. The development of a large-scale production will be aided by more investigation into the techno-economic analysis of the production of biofuel utilizing this biomass.

Keywords: Biofuel; Macrophyte; Bioethanol; Biodiesel; Transesterification; Fermentation

Frontline Demonstration Technologies under *Rainfed* Condition of Productivity Enhancement of Black Gram (*Vigna mungo* l.) through Shahdol District (M.P.)

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ABSTRACT

Pulses are rich in proteins and are the second most important constituent of Indian diet after cereals. Among the different pulses, black gram is a rich source of protein which is one of the

essential nutrients of the human diet. Blackgram (*Vigna mungo*) is one of the most important pulse crop and occupied a major position among pulse in Madhya Pradesh State. India is the world's largest producer as well as consumer of blackgram. In Madhya Pradesh is occupies in area of 0.64 million ha with the production and productivity of 0.26 MT and 413 kg/ha respectively. In India black gram is a grown in 3.11 million ha area with total production of 1.90 MT and average productivity is 642 kg/ha (Anonymous 2013). The most important states for pulses are Madhya Pradesh, Uttar Pradesh, Maharashtra, Andhra Pradesh, Karnataka and Bihar which together account for 80%of total production. The main reason for low productivity of sesame is use of low yielding varieties (local), low yield might be due to damage occurs by pests and diseases, insufficient weed control or no control, poor soil fertility and imbalanced nutrition, lack of mechanization (not cultivated by farmers due to seed shattering when not sufficient and unrealized genetic potential. Keeping this in view, the present investigation was undertaken to study the level of knowledge of farmers regarding black gram cultivation, extent of adoption of improved practices, to out the yield gap in black gram production technology. Front line demonstrations on black gram were conducted by Krishi Vigyan Kendra, Shahdol on 50 farmers' fields of Shahdol district during *Kharif* seasons of 2021-22 to 2022-23 on light and medium black soils with low fertility status at farmer's field in the villages of Pathra, Chatha, Amraha, Bhamraha, Kathotia, Madwa, Lamro, Pachadi, Majhgawa, Giriva, Sabo, Jarwahi, Jalditola, Balabahara, Nougai, Bhatiya and DholkuShahdol district of Madhya Pradesh. The improved technologies consisted of improved high yielding variety, pre-emergence weedicides, use of biofertilizers as a seed treatment, fungicides and neem based pesticides as insect-pest management. The improved technologies resulted higher mean net income of Rs. 30950/ha with a yield of 800 kg/ha during 2021-22 and Rs.31438/ha with a yield of 774 kg/ ha respectively during 2022-23.

In Vitro **Evaluation of Bioagents and Phytoextracts against *Alternaria Cucumerina,* Causing Leaf Blight of Bottle Gourd.**

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ABSTRACT
Alternaria cucumerina (Ellis and Everh.) Elliott leaf blight is one of the threat limiting to bottle gourd (*Lagenariasiceraria*) cultivation in India. Considering economic importance of the crop as well as destructive nature of the disease, present *in vitro* studies were undertaken to evaluate the bioefficacy of nine bioagents and eight solvent (acetone) phytoextracts against *A. cucumerina.*
The results revealed all of the test biocontrol agents as potential antagonists, which significantly inhibited mycelial growth of *A. cucumerina,* over untreated control. However, *Trichoderma harzianum* resulted with significantly highest mycelial inhibition (84.45%), followedby*T.hamatum* and *A. niger* 82.78%), *T. koningi*(78.89%),*T. asperellum*(76. 12%), *M. anisopliae* (74.45%), *Verticillium lecanii*(48.89%), *Bacillus subtilis* (38.58%)and*Pseudomonas fluorescens* (36.67%). All eight test phytoextracts (each @10 and 20%) were found fungistatic to *A. cucumerina* and significantly inhibited mycelial growth of the test pathogen, over untreated control. Average mycelial growth inhibition of *A. cucumerina* ranged from 49.99 % to 81.67 %.However, it was numerically highest with *Lawsoniainermis*(81.67 %), followed by *Eucalyptus globulus* (73.73 %),*Zingiber officinale* (68.06 %), *Azadirachta indica* (65.28 %), *Lantana camara*L. (61.95 %), *Allium sativum* L. (54.44 %), *Vitex negundo* (51.10 %) and *Allium cepa* (49.99 %).

Thus, locally available plant species with antimicrobial properties and antagonistic microorganisms can be used as an alternative to the chemicals, to manage leaf blight of bottle gourd.

Keywords: *A. cucumerina*, *Lagenariasiceraria*, Bioagents, Phytoextracts.

In Vitro Efficacy of Fungicides against *Alternaria cucumerina*, Causing Leaf Blight of Bottle Gourd

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ABSTRACT

Alternaria cucumerina (Ellis and Everh.) Elliott leaf blight is one of the threat limiting to bottle gourd (*Lagenaria siceraria*) cultivation in India. Considering economic importance of the crop as well as destructive nature of the disease, present *in vitro* studies were undertaken to evaluate the efficacy ofseven each systemic fungicides (each @ 500 and 1000 ppm) and non-systemic / combiproduct fungicides (each @ 2000 ppm and 2500 ppm), to assess theirpotential against *Alternaria cucumerina.* Results indicated that among systemic fungicides mean mycelial growth inhibition recorded with the test systemic fungicides rangedfrom 63.89 to100 percent. However, significantly highest and cent per cent (100%) inhibition was with Propiconazole25 % EC and Tebuconazole 25.9 % EC, followedby Hexaconazole 5% SC (96.36%). Among non-systemic/combiproduct fungicides highest mean mycelial growth inhibition recorded withCarbendazim 25% + Mancozeb 50% WP (96.11%), followed by Mancozeb75%WP (95.83%%) and Chlorothalonil75%WP(91.11%).

Keywords: *Lagenariasiceraria, Alternaria cucumerina,* Fungicides, Systemic, Non-systemic, Inhibition.

Storage Behavior of Guava Varieties Based on Biochemical Parameters

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ABSTRACT

An experiment was conducted with an aim to study biochemical changes of fifteen varieties of guava stored at ambient storage conditions at Department of Horticulture, Chaudhary Charan Singh Haryana Agriculture University, Hisar, Haryana during rainy and winter season of 2018. All varieties exhibited considerable variation in their performance for most of the biochemical parameters. It was observed that there is significant increase in TSS and TSS: acidity, during both the seasons, regardless of varieties. On the other hand, Acidity and ascorbic acid of all the varieties was found to be decreased over the passage of storage time. However, all the varieties exhibit increasing trends in reducing sugar, non-reducing sugar and total sugar during the storage period but during winter season sugars parameters first increase for six days then slightly decrease on 8th day. Among varieties, Hisar Safeda exhibited maximum reducing sugar and highest TSS: acid ratio in winter season, while, in rainy season TSS: acid was found maximum in Arka Mridula. Total sugar and reducing sugar in winter season and TSS in rainy season were recorded maximum in cv. Pant Parbhat. Pectin content during both the seasons and ascorbic acid, total sugar and non-reducing sugar in rainy season were recorded maximum in cv. L-49. Barf Khana had the maximum ascorbic acid in winter season and acidity found minimum in Arka Mridula and

Allahabad Safeda in rainy and winter season respectively. Winter season fruits of all the varieties were much more superior to rainy season fruits
Keywords: Storage, TSS, guava, Hisar Safeda

Edible Films - A Novel Technology for Post-Harvest Management of Horticultural Crops
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ABSTRACT
Reducing post harvest losses is very important in horticultural crop; ensuring that sufficient food, both in quantity and in quality is available to every inhabitant in our planet. Edible films and coating are thin layers of edible material applied to food produces that play an important role in improving shelf life, conservation, distribution and marketing. Waxing also enhances the glossiness of horticultural produce. Therefore, appearance is improved making them more acceptable.The application of wax emulsion to freshly harvested healthy produce protects them against excessive moisture loss, higher rate of respiration, heat build up or thermal decomposition physical, chemical, mechanical damage and microbiological activities. The texture and quality of fresh produce is maintained as nearer to the fresh conditions as possible for a long time. Various type of coating either derived from natural sources, petroleum derived polymers, polysaccharides, polypeptides, etc. In recent years edible films and coating received considerable attention because of their advantages including use as edible packaging materials over synthetic films. Use of edible films contributes to reduction of environmental pollution. In recent times, herbal coating of aloe-vera, citral, starch, cellulose, eugenol, chitin and essential oils are widely used for coatings purposes. Thus recent advances in the incorporation of antimicrobials, texture enhancer and nutraceutical to improve quality and functionality of fresh horticultural produce could be a milestone for post harvest management.
Keyword: Edible film, Natural sources, Polymer, Quality, Waxing.

Success Story: A Way to Double Farm Income with Livestock Based IFS Model
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ABSTRACT
Krishi Vigyan Kendra, Dhule, Dist. Dhule was established in 1983. This is the extension gate of the most renowned parent institute under the Mahatma Phule Krishi Vidyapeeth, Rahuri also the administrative control over the KVK. It is financially sanctioned and Co-monitored by the ICAR-Agriculture Technology and Research Institute (ATARI), Zone-VIII, Pune. The KVK is engaged in conducting the On Farm Trials, Frontline demonstration, Vocational trainings, Extension Activities based on the existing cropping system etc of Dhule district. Accordingly, we made the success stories too; here we laid the success story of young progressive dairy farmer Mr. Manoj Kumar Masule. He has an ancestral 2 Ha livestock based farm at Chaugaon Tal &Dist- Dhule, Maharashtra. As his father is a farmer, along with his education, he is interested in doing agricultural work in their farm and used to help his father. After completing his Diploma, he tried like others to find a job. But considering his interest in agriculture and agriculture complementary fields, he stopped looking for a job and decided to work in agriculture along with livestock fields and started farming and concentrated his full time in agriculture. In the beginning he grown

traditional crops as per tradition but he was not getting the expected profit from it, same was the situation in livestock production too. He approached KVK during 2019-20 with a request to help him in sustainability in the agricultural production and Livestock production too. Considering the land availability and the potentiality of milk demand in their local market, we insisted him to initiate the scientific management of buffalo farming in his area. Accordingly, he attended the training programme conducted by the Krishi Vigyan Kendra on scientific management of Livestock and Crop production practices of high value crops taught and discussed thoroughly. Also KVK, conducted the trials of perennial fodder crop i.e Mahatma Phule Krishi Vidyapeeth Rahuri intervened varieties of hybrid Napier as Phule Jaywant, Phule Gunwant. With addition to this Silage feed technology is being successfully used under the guidance of Krishi Vigyan Kendra to reduce the cost of production of concentrated feed to increase milk production in livestock, and getting Rs.69000/- per month in last year after deducting expenses from the milk production of animals i.e from 11 Buffalos and 7 Cows. At present 1acre land is in under cultivation of the same fodder (Phule Jaywant, Phule Gunwant) as a source for green fodder and which, helps in the reduction of cost of green fodder as a feed. In addition to this, KVK scientists provided regular guidance on fodder cultivation and feed ration for concentrate feed preparation that would minimize the feed cost. And using cow dung in one's own farm is helping to improve soil productivity. From Agricultural production Drumstick, Onion cultivation he got a net profit of Rs.16 Lakhs during last year under the technical backstopping of KVK, Dhule. He provided regular employment to 4-5 people through this livestock based farming model.

Keywords: KVK, Success, Livestock, IFS etc.

A Success Story of Progressive farmer: Organic Farming

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ABSTRACT

Krushi Vigyan Kendra, Dhule is a pioneer KVK of Mahatma Phule Krishi Vidyapeeth, Rahui, Dist-Ahmednagar, Maharashtra, which was established in the year 1983. Since, last 40 years KVK, resourcefully and meritoriously engaged in transfer of recommended technologies of concerned universities, ICAR-NRCs of India in particular Maharashtra among the populace of farming community, through different innovative, newer extension activities, KVK mandatory activities i.e OFT's, FLD's, trainings, demonstrations, group discussion, farmers scientists forum meetings, ex-trainee sammelan, diagnostic visits, filed visits, kisan gosthi, farmers rallies, Agriculture exhibitions, etc. As a result of it, farmers initiated application of the different recommended technologies under the technical backstopping of the KVK. Shri. Dilip Ramdas Patil, is a progressive organic farmer of Vadane village of Taluka & District Dhule, Maharashtra State, with 2.4 ha cultivable land. He is very renowned farmer among the organic farmers in North Maharashtra region and doing organic farming since last 15-16 year under the technical backstopping of KVK, Dhule, MS. After practicing traditional farming in 4-5 years he was forced to change his farming practices for increasing the yield of crops by adopting latest University technologies under the KVK guidance but cost benefit outcome is not as per his expectation, which is might be due to the more cost of production. As a result, he started practicing organic farming with thought of to help in reducing the cost of cultivation and would be reduce the pH of the soil and improve the fertility status of soil. In the initial years he had the problems of pests and

diseases and soil was also not good enough to give better yield. He discussed their problems with KVK scientist and officials from department of Agriculture to find sustainable solution on it. Accordingly, he owns 13 no.of indigenous dairy cows which helped in the organic produce with use of its bi produce such Urine, Cow dung etc. Also he prepare on farm organic produce as Bijamrut, Jivamrut, Ghanamrut, FYM etc. with addition to this he prepared the herbal bio pesticide such as Nimark, Dashparni for application in the field as and when necessary. Initiated the cultivation green manure plants Gliricidia on the bunds of the Farm and their leaves used in soil for improvement of percent soil organic carbon with productivity of soil. After practicing all that organic material in their filed he focus on growing of Maize, Soybean, Pigeon Pea, Wheat, Gram, Chilli, Custard apple, leafy vegetables organically with certification. From selling of this organic produce he got annual net income of Rs. 731380/- during last year (Rs.304742/-per Ha.)

Keywords: KVK, Organic, Success, Bijamrut, Jivamrut, Ghanamrut etc.

A Comparative Study on Quality Seed Potato Production in Valleys of Gilgit Baltistan

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ABSTRACT

A comparative study on adaptability of various exotic and high yielding potato varieties was conducted at three different agriculture research stations of Gilgit Baltistan (GB). A randomized complete block design was used with three replications for collection of DATA and a uniform layout was used in all experimental areas. The furrows were prepared having a distance of 75 cm and seed to seed distance was kept at 15 cm apart from each other. Initial dose of Nitrophos @ 25 kg/kanal was applied during sowing time of seed potato and Urea @ 08 kg/kanal was applied at three different stages. The standard agronomic practices were applied in the field during the cropping season. In the current study Lady Rosita, Roko, Kuroda and Bartina showed 100% germination at Yaseen followed by Melanto, Asterix and Sante (99%) while, the least germination rate(78%)was recorded in the var. Zena Red in all locations. Maximum plant height was recorded in Pameela in all locations with highest plant height in Yaseen region (100.3 cm). Maximum number of stems (05) was recorded in Bartina at Naltar followed by Lady Rosita (4.4) and Roko (4) stems plant^{-1}. In the current study potato variety Roko produced 32.1 mt/ha at Babusar and 31.8 mt/ha at Naltar. On the other hand the potato variety Sante and Zena Red were found as least productive in these areas with a production of 8-10 mt/ha at Naltar and Yaseen. The high yielding varieties on basis of their acclimatization and yield performance will be multiplied on large scale though progressive farmers in collaboration of the extensive activites of agrituclute extension department.

Key word: Gilgit Baltistan, potato, seed potato variety, adaptation, yield

Effect of CCC and Nano CCC on Tuber Yield of Potato (*Solanum tuberosum* L.) cv. Kufri Bahar

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ABSTRACT

Biotechnological or Nano technological innovations are needed in agriculture sector to increase production & productivity of agricultural commodities in India. So, keeping in this view A 2 year's experiment was conducted to evaluate the effect of CCC and Nano CCC on yield of Potato (*Solanum tuberosum* L.) cv. KufriBahar at Rajasthan College of Agriculture, Udaipur during November, 2020 to February, 2022 in RBD with 12 treatments which replicated thrice. Foliar application done twice at tuber initiation & tuber bulking stage. The results revealed that T_{12} (Nano CCC 0.20%) got maximum production of tuber as well as productivity comparative to all CCC and lower doses of Nano CCC (0.04-0.16%).

Evaluation of Arrowroot (*Maranta arundinacea*. L) Genotypes In Chhattisgarh

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ABSTRACT
Arrowroot (*Maranta arundinacea*. L) is an underutilized local crop potentially to be developed as carbohydrate source and functional food which are easy to digest because the content of the glycemic index (IG) is low so it is very good for health. The arrowroot starch has high digestibility and is commonly used as a thickener in many foods such as puddings and sauces, cookies and other baked goods. Looking to the importance of crop present investigation was undertaken at Shaheed Gundadhur College of Agriculture & Research station Jagdalpur, IGKV, Raipur (C.G.) during the *kharif*season of 2020-2021 to evaluate different genotypes of Arrowroot. Total seven entries of arrowroot *viz*., Tar 18-1, Tar 18-4,Tar 18-5, Tar 18-10,Tar 18-11,Tar 18-12,Tar 18-14obtain from CTCRI, Trivandrum and evaluated in simple R.B.D. with three replications.Studies showed that, significant effect on the Plant Height (cm) recorded in Tar 18-1 (166.37) followed by Tar 18-5 (142.17),maximumstarch % recorded in Tar 18-14 (24.53) followed by Tar 18-12 (24.67), maximum dry matter % obtain in Tar 18-14 (35.07) followed by Tar 18-1 (34.40), highest TSS% obtain in Tar 18-5 (8.63) followed by Tar 18-11 (8.33), biggest tuber weight obtain in Tar 18- 12 (144.50 gm) followed by Tar 18-4 (134.33), no. of tubers per plant recorded by Tar 18-11 (18.73) followed by Tar 18-5 (17.67), maximum weight of tubers per plant and tuber yield (t/ha) obtain in Tar 18-12 (1.03 kg & 57.04 t) followed by Tar 18-14 (0.92 kg & 51.30 t) respectively. Entry Tar 18-12 and Tar 18-14 can be selected and utilize in future breeding program for yield and starch.

Keywords: Arrowroot, evaluation, genotypes, yield

Evaluation of Greater Yam (*D. alata*) for Yield Attributing Charaters

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ABSTRACT
The greater yam (*Dioscoreaalata* L.) is the most widely distributed yam species in the world. In India it is grown in AP, MP, CG, Orissa, Kerla, Rajsthan and many other states for its tuber. Field experiment was conducted during *kharif* season of 2020-21 at AICRP on tuber crops project,

SaheedGundadhur College of Agriculture & Research Station, IGKV, Jagdalpur, C.G to determine and evaluate the growth, yield and quality performance of greater yam genotypes under South Chhattisgarh condition. Treatments comprised of 8 different genotypes and the experiment was laid out in randomized complete block design with three replications. The evaluation performance of different genotypes was assessed by analyzing data on vegetative growth, yield and quality. Results demonstrated that there is significant difference on performance of different greater yam genotypes. Based on the mean performance, SreeKarthika recorded for higher dry matter and starch %, TGy 17-10 observed maximum tuber yield per plant and per hectare (3.19 kg & 39.42 t) followed by SreeKarthika (2.39 kg & 29.55 t). The studies suggest that it can possible to isolate superior genotypes during the selection process based on evaluation.

Keywords: Greater yam, Genotypes, evaluation, yield.

Design, Development and Performance Evaluation of Battery-Operated Multi-Crop Planter by using RSM Method

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ABSTRACT

To reduce the dependency on the fossil fuels a low-cost Battery Electric Vehicle (BEV) was developed in the department of Farm Power & Machinery, Dr. PDKV, Akola, present investigation was made as multi-crop planter attachment for battery electric vehicle. The developed BEV multi-crop planter was tested in the laboratory and on the experimental field for optimization of the operating parameters for soybean crop. It was observed that an electric motor of 1 kW, 48 V, BLDC capable to propelled the vehicle. Design and development of multi-crop planter was carried out on the basis of power availability, number of rows, type of seed metering mechanism, hopper size etc. In the laboratory trial calibration of planter for seed rate, miss index, multiple index, quality feed index, uniformity index was determined at three levels of forward speed viz., 2 km/h, 2.5 km/h, 3 km/h and three level of sub-hopper opening 50 %, 75 %, 100 % were chosen to optimize the performance parameters. The RSM results shows that the optimized performance of multi-crop planter with 2.5 km/h forward speed on 75% sub-hopper opening for all the performance parameters for soybean crop. The field tests were carried out on the optimized parameters it was observed that the effective field capacity of the planter was found 0.261 ha/h with field efficiency of 77.35 per cent.

Keywords: Planter, Electric Vehicle, Battery, Response Surface Methodology, Mechanization.

Development and Performance Evaluation of Battery Electric Vehicle Operated Sprayer

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ABSTRACT

The development of a low-cost Battery Electric Vehicle (BEV) sprayer with a boom sprayer attachment is an important step towards reducing dependency on fossil fuels and promoting sustainable agriculture practices. The developed BEV sprayer having a components like electric motor (1kW, 48V, BLDC), charge controller, battery pack, electronic shelf, drive wheels, caster wheels, spray boom attachment (width 6 m, 9 no. of nozzles), water dispensing pump (12 lit/m),

sprayer tank (200 lit.) and control walls etc. The developed BEV sprayer was tested in laboratory and experimental field to optimize the operating parameters for green gram crops. The forward speed studied for spray nozzles were 2, 2.5 and 3 km/h. All the nozzles were tested at operating pressures of 2.5, 3, 3.5 kg/cm^2 with 0.6, 0.8,1.0 mm orifice diameters in the laboratory tests. The height of nozzle was maintained at 381 mm above target crop. The RSM results showed that the optimized performance of the sprayer with 0.8 mm orifice size nozzle on 3.0 kg/cm^2 pressure and a forward speed of 2.5 km/h for the green gram crop. The field tests were carried out on the optimized parameters it was observed that the effective field capacity of the sprayer was 1.09 ha/h with field efficiency of 79.81 per cent. The average application rate of the spray mixture was observed as 150.33 l/ha. For spraying and propelling of the BEV sprayer, the power requirement was observed as 443.85 W/km. The payback period was analyzed to be 4.13 years of machine operation.

Keywords: Sprayer, Electric Vehicle, Battery, testing, Environment, Agriculture

Two Novel Species of Fungi Endophytic to *Ephedra gerardiana* Wall. Ex. Stapf in Ladakh, India

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ABSTRACT

Endophytic fungi are the ubiquitous mycosymbionts that reside within the healthy plant tissues for complete or a part of their lifecycle without causing any visible negative symptoms. Mostly mutualistic in nature, these symbionts confer a plethora of direct and indirect benefits to their host plants *via* the production of diverse secondary metabolites, getting food and shelter in return. Despite gaining a lot of attention in the recent years, the plants inhabiting harsh habitats are still underexplored for their endospheric microbiomes. Therefore, the endosphere of such plants is expected to harbor novel endophytic taxa. In context to these facts, endophytic assemblages associated with a gymnosperm *Ephedra gerardiana* Wall. ex Stapf inhabiting cold arid desert of Kargil, Ladakh (India) were unravelled. Two endophytic fungi designated as ES2^T (MCC 9655^T) and EIT4^T (MCC 9756^T) isolated from the sterile stem tissues were found to be novel species of the genus *Parathyridaria* and *Astragalicola*, respectively, following cultural, micromorphological, and molecular analyses. Phylogenetic analysis based on concatenated nuclear ribosomal ITS (internal transcribed spacer) and LSU (large ribosomal subunit) sequence datasets strongly supported their taxonomic placement. Exploring the endophytic mycobiomes from the plants growing in extreme environmental conditions may unveil a treasure of undescribed, unique, and essential microbes. Besides unearthing the hidden mycoflora and adding to our knowledge, novel endophytes may prove to be the source of potent novel metabolites with applications in diverse fields.

Keywords: Cold desert, New taxa, Phylogeny, Taxonomy

Comparative Study of Effect of Tannery Polution on E.Coli, Pseudomonas sp.

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ABSTRACT

Since ancient times different types of plants are used in health and related issues.Some plantsare rich in ayurvedic properties. Systemic analysis of ayurvedic plants provides a variety of bioactive

molecules for the development of newer pharmaceutical drugs. Similarly, In India, Azadirachta indica (Neem), Eucalyptus and Lantana camars has been commonly used ashygiene tools. Different types of studies have showed that these plants have antibacterial, antiplaque, anticarious effects. To test the effect of pollution on these plants, this study has been planned to test on the E. coliculture. Aqueous and Methanolic extracts of three plants i.e. Neem, Eucalyptus and Lantanaselected from non-polluted and polluted areas, were separately used on culture of E. coli andseudomonasantimicrobial activity were measured in terms of colony forming units.
Findings of results encouraging to show the effect of Tannery pollution on the efficacy ofselected plants with their antibacterial efficiency.
Keywords: Medicinal Plants, Tannery Pollution, E.coli, Azadirachta indica, Latana Camara, Eucalyptus Alba, Colony forming Units.

State Level Empirical Analysis
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ABSTRACT
Sustainable agriculture has been the agenda of the globalized word at various international platform. For instance alleviating poverty, zero hunger and ending malnutrition by 2020 as well as climate smart agriculture are the top most priority of sustainable development goal (SDGs). Agriculture sector seem to be a viable option for fulfilling these priorities. In India, agriculture sector is the backbone of the economy because it's contribute around 15 per cent in gross domestic production and around half of the population of the nation is directly or indirectly engaged with this sector. The population and urbanization of India has been increased rapidly and climatic factors also affect the Indian agriculture. Therefore, sustainable agriculture system in India is necessary for meet out the food and nutrition security of the nation. It is in this context the present paper examine the state level trends of social, ecological and economic parameters and also identify the impact of agro climatic factor On Indian agriculture sustainability at state level. The secondary database has been used to obtain the objective of the study from 1991 to 2020. The fix effect model of regression has been used to identify the impact of climatic factors on agriculture by using panel data. The result shows that there are wide variations of agriculture performance among the states and agro climatic factors had adversely affect the agriculture sustainability. The present paper suggest the agro climatic region specific policies to mitigate the adverse effect of climatic factors on sustainable agriculture there are also need to improve agriculture infrastructure, crop diversification, sustainable resource management and sustainable farm practices to enhance the farmers income and welfare.
Keywords: Sustainable Agriculture, Climatic Factor, Fix Effect Model, Farmers Welfare, and Agriculture Infrastructure.

Carbon Neutral Agriculture: A Mitigation for Changing Climate
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ABSTRACT
Agriculture sector accounts for about 24 % of greenhouse gas (GHG) emissions globally. In India, it contributes 17 % of the total net CO_2 equivalent emissions. To resolve the pressing issue ofthe growing GHG emissions, feasible interventions for promoting carbon neutrality in agriculture are

essential. Carbon neutral agriculture refers to the net zero balance of emissions and sinks of all the greenhouse gases on farms in terms of their CO_2 equivalents, resulting in climate neutral systems. It mainly encompasses the process of carbon sequestration for attaining the goal of carbon neutrality. Carbon sequestration is the process of capturing, securing and storing carbon dioxide from the atmosphere and can be achieved through adopting agronomic measures like conservation agriculture, fertilizer management, cover cropping, water management, soil conservation and agroforestry. Among these, conservation agriculture (CA) is a key agronomic measure to achieve the goal. It promotes minimum soil disturbance, maintenance of permanent soil cover and diversification of plant species. Proper fertilizer management helps to reduce GHGs emission from agricultural fields. An apparent increase in soil organic carbon (SOC) stock in soils upon balanced fertilization through organic and inorganic sources. Livestock manure also contributes GHG emissions, which should be checked by proper on farm manure management.

Inclusion of cover crops can increase the SOC stock of crop land and thus effectively compensate CO_2 emissions. The net ecosystem carbon balance can be improved by cover crops in bare fallow. Water management and soil conservation measures are important aspects of carbon neutral farming. Alternate wetting and drying of soil could save water and reduce greenhouse gas emission. There are direct links among soil carbon sequestration, soil conservation, GHG emission. Agroforestry, when properly practised, offers several benefits. The sequestration rate is at least five times higher than the annual cropping practices without trees.

Carbon neutral agriculture, offers a sustainable land use management method, beneficial for both environment and the society. To overcome barriers and embrace low carbon options in Indian agriculture, bold policy directives supported by technological innovations and investments are needed so that farmers in India can shift to carbon neutral agriculture.

Keywords: Carbon neutral agriculture, carbon sequestration, conservation agriculture, agroforestry

Scientific Studies and Development in Social Sciences

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ABSTRACT

Any academic field or scientific discipline that examines human conduct in relation to its social and cultural dimensions is known as social science. Scientific study has two levels: a theoretical level and an empirical level since theories and observations are the two pillars of science. The empirical level is concerned with testing the theoretical concepts and relationships to see how well they reflect our observations of reality, with the goal of ultimately building better theories. The theoretical level is concerned with developing ABSTRACT concepts about a natural or social phenomenon and relationships between those concepts (i.e., build "theories"). The science advances as a theory gets better and better at fitting the observed reality. Theory and observations are constantly being switched between in scientific inquiry. In order to do scientific inquiry, both theory and observations are required. For instance, it is not regarded as legitimate scientific inquiry to ignore theory and depend entirely on observations when drawing conclusions.

India has had a veritable expansion in higher education institutions and research activity over the past several years, particularly in the areas of social science study and numerous development-related topics. The establishment of these institutions has been spearheaded not only by traditional institutions of higher learning like universities but also by the federal government, state governments, and numerous autonomous and semi-autonomous organisations like the University

Grants Commission (UGC) and the Indian Council of Social Science Research (ICSSR).These institutes produce a wide range of research, including interdisciplinary, multidisciplinary, discipline oriented, and commissioned work; policy studies; data collection; work of more or less purely intellectual or academic interest; and research that is speculative or future-focused. The study in this paper is focused on the social sciences' introspection and offer perspectives on some of their institutional, epistemological, and axiological facets. Scientific research and development in the social sciences will be extremely helpful to students and academics in social science methodology and the philosophy of science, as well as to those proposing new research initiatives, and will substantially aid in the development of scientific techniques. This is especially crucial in the case of the social and behavioural sciences, where the relationship between the researcher and his subject of study exhibits unique traits that set it apart from the sciences of natural history and life. The theoretical and methodological skills necessary to function at the theoretical and empirical levels, respectively, are required for conducting scientific studies. Methodological expertise (or "know-how") can be easily learned through PhD programmes and is generally uniform across disciplines. Theoretical abilities, or "know-what," on the other hand, are much more difficult to perfect and need years of observation and reflection. They are also tacit abilities that cannot be "taught," but are instead learnt by experience. Galileo, Newton, and Einstein were just a few of the world's finest scientists who were also expert theorists. These individuals are known for the theories they proposed that altered the trajectory of science. An ordinary researcher needs methodological skills, but an exceptional researcher needs theoretical capabilities!

Performance of Pigeon Pea Var. TJT 501 Through Cluster front Line Demonstration in Real Farming Situation of District Sidhi, Madhya Pradesh

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ABSTRACT

Pigeonpea is a popular kharif crop in the Sidhi district. From 2016-17 to 2018-19, the Krishi Vigyan Kendra (Farm Science Center) set up a Front Line demonstration, introducing new and high producing varieties and applying scientific procedures to their cultivation. FLDs were conducted in several villages in the Sidhi district. During these years of research, a total of 90 ha of land were covered by package demonstrations on pigeonpea against their own challenges, with 225 farmers benefiting from the technology. Under scientific technology, the highest average yield, net return, and lowest wilt incidence and pod borer damage were achieved at 13.45 q/ha, Rs 38679 / ha, and 0.27 percent and 7.1 percent, respectively, compared to farmers practices at 7.88 q/ha, Rs 20103 and higher wilt incidence 0.44 percent and pod borer damage 14.3 percent. Under recommended practices, the highest number of pods/plant (87.7), number of grain/pod (3.4), Test weight (82.6g), and grain yield (13.48 q/ha) were observed when compared to farmers' conventional practices, which had the lowest number of pods/plant (74.3), number of grain/pod (2.7), Test weight (78.7g), and grain yield (7.66 q/ha). Improved technology yielded a maximum average cost-benefit ratio of 3.10, compared to 2.58 for farmers' technology. The demonstration's economic viability was demonstrated by a favorable cost-benefit ratio, which persuaded farmers to embrace improved technology practices. The method was acceptable for increasing the production

of the pigeonpea crop, and it is recommended that similar demonstrations be conducted as part of the technology transfer programme by KVKs or other TOT institutes.

Keywords: yield, C: B, wilt incidence, pod borer damage technology gap and relative spread index

Vase Life and Keeping Quality of Tuberose as Influenced by Floral Preservatives and Growth Regulators

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ABSTRACT

The investigation entitled, "Vase life and keeping quality of tuberose as influenced by floral preservatives and growth regulators" was carried out at laboratory of Department of Horticulture, CCS Haryana Agricultural University, Hisar during the year of 2022. This experiment comprised of fifteen treatments having different combinations of seven chemicals viz; sucrose (2% and 4%), citric acid (250 mg/l and 350 mg/l), silver nitrate (25 mg/l and 50 mg/l), aluminium sulfate (150 mg/l and 300 mg/l), gibberellic acid (100 mg/l and 150 mg/l), benzyal adenine (100 mg/l and 150 mg/l) and salicylic acid (100 mg/l and 150 mg/l) along with control (distilled water). It was designed in Completely Randomized Design with three replications. Results revealed that the vase solution of 4% sucrose+150 mg/l salicylic acid was found significant in increasing number of opened florets per spike, percentage of opened florets per spike, freshness index and vase life as compared to control. Similarly; this treatment (4% sucrose + 150 mg/l salicylic acid) was also found significant in reducing number of unopened florets per spike and proximal end browning. However, the earliest opening of 3rd basal floret was recorded in treatment containing 4% sucrose+300 mg/l aluminium sulfate. From this investigation; it may be concluded that treatment consisting of 4% sucrose + 150 mg/l salicylic acid was found promising in enhancing vase life and keeping quality of tuberose.

Keywords: Tuberose, floral preservatives, growth regulators, vase life and keeping quality

Assesment of Integrated Nutrient Management on Yield in Nagpur Mandarin

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ABSTRACT

Mandarin *Citrus reticuleta* is a major fruit crop in Yavatmal district. It is an irrigated crop required critical nutrient management for better orchard management. Soils of Yavatmal district is black cotton soil mostly vertisols, entisols and inceptisoils. Mandarin is growing on jambherii.e. rangpur lime and rough lemon rootstock under the present soils conditions. Mandarin is successfully grown in such soils pertaining to well drained condition of soils. Av. Rainfall of the district is 950 mm. Rains are well distributed with 90 to 120 rainy days. However from past certain years, irregularity in rainfall, change in temperature, application of chemical fertilizers with reduse use of organic mannures may lead reduction in yield also sometimes cause premature fruit drop due to unfavourable climate. Therefore, nutrient management in combination of biofertilizers with timely irrigation are the major practices that not only contribute the quality but

assured high yield also. As a traditional practice farmers were applying nutrients in inadequate dose. Hence on farm trials in farmers orchards were conducted to assess the recommended INM practice with use of biofertilizers on yield of Nagpur mandarin. Application of 75% RDF (50 kg FYM + 900 g N + 300 g P2O5 + 300 g K2O/tree) + 100g PSB + 100g *Azospirillum* + 100 g *Trichoderma*/tree were assessed against farmers practice of unrandom nutrient application through chemical fertilizers. It was observed that, application of 75% RDF+ 100g PSB, *Azospirillum* and *Trichoderma* each/tree recorded higher yield and B:C Ratio with 40.53% increased yield over farmers practice.

Keywords: Nagpur mandarin, INM, PSB, *Azospirillum*, *Trichoderma*

Krushi Mahotsav an Unique Approach of Transfer of Technology

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ABSTRACT

Transfer of scientific technologies from research station to farmers' fields plays the vital role for rural development and rural upliftment. Transfer of technology takes place through Central Government, State Government and various NGOs to some little extent. Due to wide geographic area, illiteracy, lack of skilled government officers and many other reasons people cannot aware about scientific technologies. Implementation of these programmes in rural area are essential for improving standard of living of rural community. The government of Gujarat organizes Krushi Mahotsav every year before monsoon. Krushi Mahotsav is a unique and combine approach of transfer of technology in the whole rural area. There are 18000 villages in Gujarat and *Krushi Rath* equipped with scientific technology through posters, panels, TV moves in every village. The scientists of agricultural universities are appointed to deliver latest technical know-how. It was started in 2005, it is a festival especially designed for the benefits of farming community and the duration of the festival is of one month, eight Krushi Mahotsav have been completed till study. There was need of deeper probe into the resultant effect of Krushi Mahotsav. Four districts of Gujarat state Banaskantha, Mahesana, Sabarkantha and Kachchh were randomly selected for this study. From each selected district, two talukas and from each taluka three villages were selected randomly for the study. A list of villagers/farmers who had attended all the three Krushi Mahotsav (2006, 2007 and 2008) was made available from government authority. Later on ten farmers from each village were randomly selected which consisted a sample size of 240 respondents. An attempt was made to know the suggestions of the beneficiary farmers for effective acceptance of the Krushi Mahotsav. The beneficiary farmers' suggestions were elicited through a simple open-ended question.

Suggestion expressed by the beneficiary farmers for effective acceptance of the Krushi Mahotsav were provide technology with the farmers and consider group demand while, offering technology through Krushi Mahotsav followed (Rank-I), make the necessary ensured arrangement for relevant input supply, credit delivery and marketing of farm produce (Rank-II), on the spot solution of farmers' problem be made available during Krushi Mahotsav (Rank-III), involvement of farmers

from different farming systems in preparing action plan of Krushi Mahotsav (Rank-IV), technology is tested adequately before its transmission to farmers' field under close supervision of researchers, extension personnel and farmers (Rank-V).

Keywords: Krushi Mahotsav, Beneficiary farmer

Combining Ability Analysis for Fruit Quality Traits in papaya (*Carica papaya* L.)

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ABSTRACT

Papaya is a popular crop grown around the world known for its high yield potential and nutritionally rich fruits. The varieties that are grown in India for commercial cultivation is limited in number. This limitation has increased crop vulnerability to attack of insect pest and diseases, ultimately leading to crop failure. So, there is a need for development of more number of hybrids with diverse traits. Prior to the beginning of any improvement program, the parental lines should be evaluated by their combining ability. The knowledge of combining ability helps in identifying best parent combiners which may be hybridized to exploit heterosis, and superior hybrid combinations. Combining ability analysis is one of the efficient tools which helps in selecting parents and crosses for the improvement of particular characters. In the present investigation the papaya inbreds and hybrids were evaluated for thirteen traits related to vigour, earliness and yield. In randomized block design with three replicates, 6 inbreds, namely, PusaNanha (PN), Pune Selection 3 (PS 3), P-7-2, P-7-9, P-9-5 and P-9-12 and 30 hybrids of papaya were produced in 6 x 6 full diallel mating design (excluding the parental combinations). Parent P-9-12, was identified as best general combiner for traits determining the post-harvest storage of fruits like fruit firmness, shelf life and other fruit quality traits like TSS, carotenoids and lycopene. Further, in case of total phenolics, total flavonoids and antioxidant capacity, parent, P-9-5 was distinguish with maximum positive GCA effect. Maximum SCA in positive direction was observed in PS3 x P-7-2 for TSS, PS3 x P-7-9 for total phenolics, P-9-12 x P-9-5 for total flavonoids, P-9-12 x PS3 for antioxidants, PN x P-9-5 for lycopene and PS3 x P-7-9 for β-carotene and total carotenoids. In case of fruit firmness and fruit shelf life, the hybrid P-9-5 x PS3, exhibited maximum SCA in positive direction.

Keywords: papaya, combining ability, GCA, SCA, fruit quality

Estimates of Genetic Variability and Scope of Improvement in Yield and Quality Traits of Brinjal (*Solanum melongena* L.)

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ABSTRACT

The analysis of variance revealed that mean sum of squares due to genotypes was highly significant for all the traits indicating ample variation among the genotypes. Based on mean performance most promising genotypes were NDB-126, 2018/BRLVAR-11, and NDB-125 which

produced significantly higher yield per plant over the best check Punjab Sadabahar. The estimates of the phenotypic coefficients of variation (PCV) were higher than the genotypic coefficients of variation (GCV) for all the traits. The highest phenotypic and genotypic coefficient of variation was observed for number of fruit per plant followed by total marketable fruit yield per plant, total fruit yield per plant, average fruit weight, fruit circumference, fruit length, number of primary branches number, plant height. While days to 50% flowering and days to first fruit harvest exhibited low value of variability. The heritability estimates for different characters ranged from 40.30 (days to first harvest) to 98.70 (total fruits yield per plant) per cent. High heritability was recorded for all the characters except days to first fruit harvest. Genetic advance in per cent of mean ranged from 5.12 per cent (days to first fruit harvest) to 73.67 per cent (number of fruit per plant) and it was low (<10) in days to 50% flowering (9.42), days to first fruit harvest (5.12). While it was high (>20) in number of primary branches (28.53), fruit length (41.15), fruit circumference (45.71), average fruit weight (65.82), total fruit yield per plant (69.36), marketable fruit yield per plant (72.27) and number of fruit per plant (73.67) high. High heritability coupled with high genetic advance were recorded for the traits *viz.*total fruit yield per plant, marketable fruit yield per plant, average fruit weight and number of primary branches, fruit length and fruit circumference. Thus, there exists ample genetic variability and as consequence scope of improvement in the available germplasm of brinjal.

Key word- Genetic variability, PCV, GCV, heritability, genetic advance.

Effect of Varieties and Nitrogen Sources on Soil Moisture Depletion, Total Water use, and Water use Efficiency of Wheat under Alternate Furrow Irrigation Method

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ABSTRACT

A field experiment was conducted at Agronomy Research Farm, CCS HAU, Hisar during *rabi* season of 2021-22 with the objective to studynutrient uptake of FIRB planted wheat as influenced by varieties and nitrogen application under alternate furrow irrigation method. The research experiment was carried out in split plot design with sixteen treatment combinations replicated thrice. The four varieties (WH 1105, HD 3086, HD 2967 and WH 1184) were assisted in main plot and nitrogen sources *viz.* control, 100% RDN through urea, 50% RDN through urea + 50% RDN through VC and 50% RDN through urea + 25% RDN through VC + 25% RDN through FYM in sub plots. Among different varieties higher water use efficiency, soil moisture depletion and total water use was found in HD 3086, which was followed by WH 1184. Among different nitrogen sources, higher water use efficiency and total water use was found in 50% RDN through urea + 25% RDN through VC + 25% RDN through FYM followed by 50% RDN through urea + 50% RDN through VC, and higher soil moisture depletion was found in 100% RDN through urea.

Keywords: Alternate furrow irrigation, water use efficiency, soil moisture depletion, and wheat

Effect of Organic Manures and their Different Levels on Bulb Characters of Tuberose cv. Prajwal

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ABSTRACT
The world elite society is giving emphasize on utilization of organic wastes, farm yard manure, compost, vermicompost and poultry manure as the most effective measure to save the environment to some extent as these are excellent sources of organic matter as well as primary plant nutrients. Organic manures decrease soil salinity, improve the soil structure along with increasing organic matter, water and air permeability in soil. The present research was conducted to study the effect of organic manures and their different levels on bulb characters in tuberose (*Polianthes tuberosa* L.)" cv. Prajwal at Deen Dayal Upadhyay Centre of Excellence for Organic Farming, Chaudhary Charan Singh Haryana Agricultural University, Hisar during 2020-21. In this experiment, three organic manures *viz*., FYM, vermicompost and poultry manure were taken along with their five levels *viz*., control (0 Kg/m^2), 2 Kg/m^2, 3 Kg/m^2, 4 Kg/m^2 and 5 Kg/m^2. This experiment comprised of fifteen treatments which was laid out in split plot design with three replications. The plot size was kept 1.5 m x 1.5 m with spacing 30 cm x 30 cm between row to row and plant to plant. Uniform bulbs of cv. Prajwal were taken for planting.
The results of experiment revealed that among the different organic manures, vermicompost gave best results over poultry manure and FYM. Maximum values in terms of number of bulbs per clump (20.13), diameter of bulb (2.80 cm) and weight of bulb (30.35 g) were recorded with the application of vermicompost while minimum values in terms of number of bulbs per clump (17.27), diameter of bulb (2.65 cm) and weight of bulb (25.56 g) were recorded in FYM. Among different levels of organic manures, maximum values with respect to number of bulbs per clump (21.61), diameter of bulb (2.88 cm) and weight of bulb (34.38 g) were observed when organic manures were applied at the rate 4kg/m^2 while minimum values with respect to number of bulbs per clump (13.28), diameter of bulb (2.41 cm) and weight of bulb (17.30 g) were recorded in control (0 Kg/m^2).
Keywords: Tuberose, FYM, vermicompost, poultry manure, bulb characters

Design, Development and Testing of Battery Electric Weeder
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ABSTRACT
Weeding is the most important intercultural operation aimed at controlling unwanted plants between the rows. To overcome the limitations of the traditional method of weeding, the eco-friendly battery powered electric weeder is expected to revolutionize the market with the benefit of reducing increased pollution, less reliance on fossil fuels and unexpected fuel price increases. The developed battery electric weeder had a 350W, 24V BLDC electric motor capable of driving the vehicle. The developed BEV weeder had overall dimension (L x B x H) of 990 x 660 x 1000 mm. The battery-powered electric weeder was designed to drive between row crops with a spacing of 45 cm. The width weeder was taken as 30 cm. Two 12 V, 18 A batteries were used as power source which continuously work for 2.4 h at maximum power requirements. The independent parameters selected for optimization were three turning angles (60°, 70° and 80°), three forward speeds (2 km/h, 2.5 km/h and 3 km/h) and three operating depths (2 cm, 3 cm and 4 cm). The RSM result showed that the weeder performed satisfactorily with the approach angle (70 degrees), forward speed (2.437 km/h) and operating depth (2.368 cm) with a minimum specific pull of 0.323 N/mm and a maximum weeding efficiency of 88.38%. the average battery voltage and motor current required for battery operated weeder during field trials were observed as 23.87 V

and 12 V respectively. The theoretical field capacity, effective field capacity, and field efficiency of the battery electric tiller were 0.11 ha/h, 0.08 ha/h, and 74.42%, respectively. Savings in operating costs were found to be 27.39%.

Keywords: Weeder, Electric, Battery, Environment, Agriculture

Carbon Farming: A Prospective View

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ABSTRACT

Climate change is a serious concern across the globe because of its potential impact on the economy, ecology, and environment. Scientific evidence indicates the role of Green House Gases (GHGs) in global warming that triggers climate change (Fan and Ramirez, 2012). Agriculture is a major source of greenhouse emissions and it is also a ripe target for large-scale GHG mitigation because of its potential to sequester carbon in vegetation and soils (Lal *et al*., 2015). The new concept, carbon farming is an affordable way to address farmers about climate change in a way that engages them in changing land management activities to reduce emissions or sequester more carbon. Carbon farming consists of practices that can improve the rate at which CO_2 is removed from the atmosphere and converted to plant material or soil organic matter. Carbon farming is successful when carbon gains resulting from enhanced land management and conservation practices exceed carbon losses. (IPCC, 2007). Carbon farming involves farmers and investors to produce tradable carbon offsets from farm fields through carbon trading, which ultimately leads to generate stable income for farmers without compromising with environmental benefits (Nath *et al.*, 2015).

Badgery *et al.* (2020) reported a total amount of 9951 Mg of CO_2 -e sequestered under a 5-year pilot scheme in Central West New South Wales, Australia. They also demonstrated the potential use of Market-Based Instrument (MBI) to encourage farmers to undertake measures to increase SOC stocks under the pilot scheme. Sapkota *et al.* (2021) reported that adoption of Nutrient Expert tool-based fertilizer recommendation would yield 13.92 million tonnes (Mt) more rice and wheat production with a saving of 1.44 Mt N fertilizer, and a reduction in GHG emissions of 5.34 Mt CO_2 e per year over farmer's current practice. Nayak *et al.* (2015) suggested that the management options with great mitigation potential for rice paddies are controlled irrigation, replacing urea with ammonium sulphate, N inhibitor application, integrated rice fish or duck farming, and reduced N fertilizer application. Whereas the combined application of chemical and organic fertilizer, conservation tillage, and reduced N application are the possible measures that can mitigate overall GHG emission from upland crops. Their economic analysis showed a mitigation potential of 412 Mt CO_2 -eq in 2020 which is about a 35% reduction as compared to baseline. Based on these studies, it can be concluded that carbon farming can deliver cost-effective technological options for climate change mitigation.

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Challenges Faced by Peri-Urban Dairy Farmers in Adapting to Changing Climate Issues in Surat District, Gujarat

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ABSTRACT

Peri-urban dairy farmers in India are highly vulnerable to climate change issues. India is already facing the impact of climate change, including erratic rainfall, heat waves, and droughts, which affect agriculture and livestock production. The present study aimed to identify the constraints faced by peri urban dairy farmers in Surat district and suggest measures to strengthen their adaptation capacity under changing climate scenarios. The study collected data through random sampling from 100 respondents using both qualitative and quantitative techniques. The findings of present study show that the five major constraints were lack of proper training or knowledge to use adaptation strategies (81.00 percent), insufficient technical guidance to adopt livestock practices (79.00 per cent), non-availability of critical inputs of adaptation strategies (77.00 per cent) , lack of local body to create climate awareness (74.00 per cent) and too little availability of livestock insurance policies for milch animals (71.00 per cent).Addressing these constraints requires a multi-pronged approach that includes improving information access and awareness, promoting climate-resilient livestock management practices, developing drought-tolerant varieties of feed and fodder crops, enhancing access to resources and credit, and promoting policies that incentivize farmers to adopt climate-resilient practices. This could help to enhance the resilience of peri-urban dairy farming systems in the face of changing climate issues.

Keywords: Climate Change, Dairy Farmers, Peri urban

Impact of Weather on Infestation of Major Insect Pests and Disease of Sweet orange in Chatrapati Shambhaji nagar and Jalna District in Marathwada Region of Maharashtra during 2022-23

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ABSTRACT
Investigations on Infestation of Major Insect Pests on Pomegranate In ChatrapatiShambhajinagar District were carried out under field condition during 2022-23 at ChatrapatiShambhajinagar Districts of Maharashtra, Keeping this in view scientific survey of infestation of major insect pests and diseases of Pomegranate was carried out during the year 2022-23, the major Sweet orange growing ChatrapatiShambhajinagar and Jalna districts in Marathwada region of Maharashtra under Horticulture Crop Pest Surveillance, Advisory and Management Project (HORTSAP) by using ICT tools and given ETL based advisories were issued twice in a week to monitor the major insect pests and diseases of Sweet orange. In ChatrapatiShambhajinagar District, Sweet Orange fruit Crops blackfly population (0.20) was constant though out the years. The population of Citrus Psylla, fruit sucking moth and leaf minor was observed in the 37th to 41st Standard Meteorological Weeks. The highest fruit infestation of Mites was observed above Economic Threshold Level (1.64) among all pests in the 3rd SMW and average population of mites was observed in (0.21) in ChatrapatiShambhajinagar district. The Maximum villages of ETL was observed in Paithan Talukas of ChatrapatiShambhajinagardistrict, The fruit infestation of mite crossed ETL during August to till dates during 2022-23. The maximum phytopthora infestation was recorded in 35th SMW is (0.29) and negligible population was recorded in Thrips, Whitefly and Bark eating caterpillars during the throughout the seasons. In Jalna District, the highest fruit infestation of Mites was observed above Economic Threshold Level (0.80) during 29th MW among all Pests. The maximum phytopthora infestation was recorded above Economic Threshold Level (1.08) in 41st SMW in Jalna district and bark eating caterpillar was recorded maximum damage (1.75) in 29th SMW. There was no Economic Threshold Level of Pests found Except Mite and Phytopthora disease.

Keywords: Sweet Orange, Thrips, Psylla, HORTSAP, ETL

Morphometric Study of Melon Fruit Fly *Bactrocera cucurbitae* (Coq.) on Host Bitter Gourd

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ABSTRACT
Biological studies on melon fruit fly, *Bactroceracucurbitae* were conducted at Department of Entomology laboratory, VNMKV Parbhani Maharashtra. To study the morpho metric features of melon fruit fly on host bitter gourd during *rainy* season 2021. The research revealed that the freshly laid eggs of melon fruit fly were pure white in color and elliptical in shape. The mean length and breadth of egg was 0.735±0.057 mm and 0.153±0.017 mm, respectively. Maggots passed through three instars to attain pupal stage. The first, second and third instar maggot measured on an average 1.44±0.03, 5.02±0.40 and 8.13±0.95 mm in length and 0.25±0.02,

0.47±0.09 and 1.41±0.20 mm in breadth, respectively. The average length and breadth of pupa was 4.81±0.84 mm and 2.19±0.13 mm, respectively. The average length and breadth of female was 8.54±0.43 mm and 2.49±0.11 mm, respectively, whereas, the male measured 7.07±0.55 mm in length and 2.42±0.16 mm in breadth indicating that females being larger in size than males.

Keywords: Melon fruit fly, Bitter gourd, *Bactroceracucurbitae*, Biology, Morphometric etc.

Per cent Infestation of Stem fly, *Melanagromyzasojae*on Soybean in Marathwada Region of Maharashtra under Changing Climate

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ABSTRACT

The severity of stem fly is becoming a major concern to soybean growing farmers. Keeping this in view scientific survey of stem fly, *Melanagromyzasojae*per centinfestation on soybean was carried out during 2022-23, in eight major soybean growing districts (*viz.*Parbhani, Nanded, Hingoli, Osmanabad, Aurangabad, Jalna, Latur and Beed) of Marathwada region of Maharashtra state under Crop Pests Surveillance and Advisory Project (CROPSAP) by using ICT tools and given 1,824 ETL based advisories were issued twice in a week to monitor the stem fly infestation. On the basis of district wise roving survey of soybean the results revealed that the per cent infestation of stem fly was noticed in all districts of Marathwada region and it was ranged from 0.00% to 0.53%. The maximum per cent infestation was recorded in Osmanabad district (0.53%) followed by Aurangabad district (0.23%). The peak activity was recorded in Osmanabad district (4.54%) during 37th SMW. ETL crossed by stem fly in 30 villages of eight districts of Marathwada regions *Viz*., Aurangabad (02), Jalna (03), Latur (06), Nanded (03), Osmanabad (16). On the basis of roving survey data revealed that the stem fly infestation start after germination and it was gradually increased and reached peak in September moth in most of the districts of Marathwada region of Maharashtra.

Keywords: Soybean, roving survey, stem fly, *Melanagromyzasojae*, per cent, ETL, Marathwada, CROPSAP

Screening of Plant Morphological Characteristics of Safflower against Safflowe Aphid

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ABSTRACT

The investigation entitled “Studies on host plant resistance against safflower aphid (*Uroleuconcompositae* Theobald) was carried out at the Department of Agricultural Entomology, VNMKV, Parbhani, duringrabi2021-22. In screening studies, 15 safflower genotypes were screened againstthe safflowerаphidunderfieldconditions. Basedonfoliagedryinggrade, aphidpopulation, plantmorphological characters and yield contributing characters it is observed that the safflowergenotype entries having more spines, green, thin and waxy leaves, thin capitula, small sizedseeds sheltered less aphid population than genotype entries of non-spiny, erect plant type, leathery leaves with succulent stems. Considering the all plant morphological characters morespinygenotypesviz.,SSF-682,SSF-695,SSF-714,SSF-704,SSF-734 were observed resistance

against safflower aphid compared to nationalcheckA-1.Mostlytheplantmorphology play scrucial role in the aphid resistance mechanism.
Keywords: *Uroleuconcompositae,* safflower aphid, capitula, genotypes

Impact of Weather Parameters On Safflower Aphid and it Natural Enemies
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ABSTRACT
The investigation entitled "Studies on host plant resistance against safflower aphid (*Uroleuconcompositae*Theobald)wascarriedoutattheDepartmentofAgriculturalEntomology,VNMKV,Parbhani,duringrabi2021-22. Seasonal incidence study revealedthat, firstincidenceof *Uroleuconcompositae*(Theobald) was observed during the 51st MW (5 aphids/5cm apical twig/plant).The aphid population increasedgradually andreachedpeakreadingof 234aphids/5cm apical twig/plant during 5th standard meteorological week. Thereafter, gradual decrease in the populationofaphidandshowedfluctuationinresponsetoweatherparametersviz.,maximumtemperature, minimum temperature, morning relative humidity, evening relative humidity,rainfallandbrightsunshinehours.Correlationbetweenaphidpopulationandweatherparameters indicated that maximum and minimum temperature had negatively significantcorrelation and positive non-significant correlation with morning relative humidity, eveningrelative humidity,rainfallandbrightsunshinehours.
During the population dynamics study, incidence of lady bird beetle started about 21daysaftergerminationrecorded0.33ladybirdbeetle/5cmtwig/plantduring1stmeteorological week it gradually increases upto 5th standard meteorological week recordedpeak of 4 lady bird beetle/5cm twig/plant when the corresponding weather parameters i.e.maximumtemperature,minimumtemperature,morningrelativehumidityandevening relative humidity were 30°C, 8°C, 83% and 19% respectively. Lady bird beetle had negativesignificant correlation with low temperature and positive non-significant relation with relativehumidity,rainfallandbrightsunshine hours.
Incaseof *Chrysopa*incidencestartedabout21daysaftergerminationrecorded0.1*Chrysopa*/5cm twig/plant during 1st meteorological week it gradually increases up to 4threcorded peak of 2 *Chrysopa*/5cm twig/plant when the corresponding weather parameters i.e.maximumtemperature,minimumtemperature,morningrelativehumidityandeveningrelative humidity were 26.80°C, 9.9°C,78% and 34% respectively. *Chrysopa*had negativelysignificant correlation with maximum and minimum temperature and positive non-significantcorrelationwithrelativehumidity,rainfallandbrightsunshinehours.
Keywords: Weather parameters, *Uroleuconcompositae,* safflower, Natural enemies

Seasonal Incidence Of Major Insect Pests Of Brinjal In Relation To Weather Parameters
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ABSTRACT
An experiment seasonal incidence of major insect pests of brinjal in relation to weather parameters was conducted during *kharif* 2021-22 Agricultural Research Farm, Department of Entomology,

College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S.) Seasonal incidence of aphids on brinjal ranged from aphids during 46th to 5th standard meteorological week during 2021-22. The aphid population variation observed from 8.60 (46th SMW) to 7.80 (5th SMW) aphids / 3 leaves. Peak incidence of aphid recorded (12.00 aphids /3 leaves) at 47th SMW. The population of jassids ranged from 46th SMW (9.27 jassids/3 leaves) to 5th SMW (6.40 jassids/3 leaves). The peak incidence of 10.40 jassids /3 leaves (46th SMW). The population of whitefly on brinjal was ranged from 12.53 (46th SMW) to 3.87 (5th SMW) whiteflies/3 leaves plant. Highest population of whitefly 12.53 whitefly during 46th SMW. The infestation was ranged from 46th SMW (9.13%) to 5th SMW (4.82%). The peak incidence of shoot borer was observed during 46th SMW i.e. 9.13 per cent. The infection of *L. orbonalis* on brinjal was ranged from 46th SMW (8.27%) to 5th SMW (9.67%). The peak incidence of fruit borer was observed during 52th SMW (29.13%).

Keywords: Weather Parameters, brinjal, SMW, jassids, *Leucinodes orbonalis*

Seasonal Occurrence of Melon Fruit Fly *Bactroceracucurbitae* (Coq.) and Natural Enemy Associated With It on Host Bitter Gourd

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ABSTRACT

The experiment was conducted at College of Agriculture, Vasantrao Naik Marathawada Krishi VidhyapeethParbhani. Fruit fly was the major pest of bitter gourd in damaging fruits. It cause bitter gourd fruit damage range from 15.65 to 59.33 per cent in *rainy* season whereas, 28.99 to 61.14 per cent in *summer* season. Per cent fruit infestation was significant and positively correlated with relative humidity (*rainy* season r = 0.87 and *summer* season r = 0.77) and rainfall (*rainy* season, r = 0.71) of weather factors whereas, non-significantly and positively correlated with other weather parameters like maximum temperature, minimum temperature, wind velocity, Evaporation and sunshine hours during both seasons. It shows that percent fruit infestation both on number basis and weight basis showed significant and positive correlation with number of maggots per fruit (r = 0.838 and r = 0.857 respectively,) during rainy season and summer season (r = 0.682 and r = 0.905 respectively). The recorded melon fruit fly natural enemy during *rainy* season 2021 was larval- pupal parasitoid *Psyttaliafletcheri* (Silvestri). The larval pupal parasitoid shows highest 16 per cent parasitism against melon fruit fly.

Keywords: Melon fruit fly, Parasitoid, Bitter gourd, Natural enemies *etc,*

Use of Improved Agricultural Technologies among farmwomen

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ABSTRACT

In India, around 75% of the population earns their livelihood from agriculture farming. Rural Indian women are extensively involved in agricultural works. A woman is the nucleus of the

family, particularly, in rural India. Women represent only 46 percent of the total population; they contributed 65% to the development of our society. The study was conducted in two agro-climatic zones of Haryana state (Jhajjar, Karnal from Eastern zone; Bhiwani, Hisar from western zone). Total 8 villages were selected randomly and 25 farm women were selected randomly from each village. Thus a total of 200 farm women were selected from the study. The results of the study revealed that majority of women belonged to 31-46 years of age group were educated upto the intermediate level, with 5-6 members in their families, belongs to general caste, and living in the joint family type. The results revealed that participation of farmwomen was higher in activities like seed treatment, transplantation, raising nursery, weeding, grain storage, manual harvesting, collection of animal dung and its transportation to fields.

Keywords: Improved technologies, use, farmwomen, harvesting,

Pollinator's Community of Ajwain and Their Population Dynamics Influenced by Climate Change

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ABSTRACT

Ajwain (*Trachyspermumammi* L.) is an important seed spice crop belongs to Apiaceae family. It is growing worldwide but India is dominating country, produced 19620 tonnes seed from 35880 ha area with average productivity of 547 kg/ha in 2019-20. It is most widely used as spice; possessing nutritional as well as several medicinal properties. The crop is highly cross-pollinated in nature, wherein 70.05–77.83% cross pollination incurred through pollinators. Pollination is a most important ecosystem service carrying by animals for sustainability and continuity in majority of angiosperms in the world.

Ajwain crop was accompanied with 34 insect pollinators in arid to semi-arid regions belong to 7 orders and 14 families. Most of insect pollinators started their foraging at 9.00 hr and reached their respective peak activity between 12.00 to 14.00 hr and ceased at 18.00 hr. The population dynamic pattern of bee species on ajwainduring entire flowering season (Fig 1A) revealed that *A. florea, A. mellifera, A. dorsata*and solitary bee sp. 1 were recorded as most dominant and regular pollinators for ajwain crop in the region. The climatic factors like temperature, sunshine hours, light intensity, relative humidity and rainfall significantly influenced the activities of these insect pollinators. Reduced populations of insect pollinators on ajwain flower significantly lower the yield and quality.

Ecological Sustainability Assessment of Paddy Production in India

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ABSTRACT

Paddy is one of the most widely produced and consumed crops in India. The sustainable farming of paddy is of concern, which means that more output is produced by using less ecologically destructive resources and more profits are made by farmers. The present study was undertaken to analyse the economics and ecological sustainability associated with paddy cultivation across major producing states in India using cost of cultivation data from the various reports of the Directorate

of Economics and Statistics, Government of India for the period from 2011–12 to 2020–21. The results revealed that the cost of paddy cultivation was higher in Andhra Pradesh, followed by Kerala, Haryana, TN, Karnataka, Punjab, West Bengal and UP, respectively. With respect to net returns per hectare, they were higher in Punjab, followed by Haryana and low in the state of West Bengal. The results clearly indicated that paddy cultivation was more profitable in Punjab and Haryana, with returns on investment of 1.51 and 1.44, respectively. Sustainability is an important dimension that needs to be considered along with profitability. The sustainability-indicating ratio of ecologically destructive input costs to the total cost of cultivation was less in UP (0.0794) and WB (0.0829), indicating less use of ecologically destructive inputs, and it was high in Karnataka (0.1395) and AP (0.1231). The ratio of ecologically non-destructive input costs to the total cost of paddy cultivation was higher in Kerala (0.0264) and TN (0.0225), indicating more use of eco-friendly inputs in paddy production. Thus, it is necessary to create awareness among farmers about sustainable farming practises, without affecting the profitability.

Keywords: Cultivation, Ecologically destructive inputs, Paddy, Profitability, Sustainability

Natural Farming: A Key to Sustainable Agriculture

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ABSTRACT

With the increase in population India along with world is going to face inevitable crisis of food in the near future with lack of sustainable farming practices in the root levels. Healthy soil is the basis upon which sustainable agriculture is built. Farming methods vary mostly due to crop protection techniques and soil inputs. The destructive use of chemical fertilisers and pesticides in conventional chemical farming practices alters the nature of the soil destroys beneficial soil micro flora and raises crop production costs. Significant levels of heavy metals from the polluted soil may enter the food chain and have a negative impact on health. The essence of natural farming is to minimize the external inputs to the farm land and nurture the soil fertility. Natural farming, popularly known as zero budget natural farming, is an innovative farming approach. It is low input based, climate resilient and low cost farming system because all the inputs (insect repellents, fungicides, and pesticides) are made up of natural herbs and locally available inputs, thereby reducing the use of artificial fertilizers and industrial pesticides. It has been demonstrated that the spread of advantageous soil microorganisms results in soil enrichment. It promotes the organic coexistence of crop plants and soil micro flora. Mulching can maximize the moisture content in the soil forms the cover for the earthworms and minimizes the weed propagation. It has undoubtedly made an indelible mark on farming in India that resonates with principles of agro ecology.

Keywords: Fertilizers, Farming, Inputs, Natural, Soil, Sustainable,

Development of New Bivoltine Silkworm *Bombyxmori* L. Hybrids for Better Economic Traits in Marathwada Region.

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ABSTRACT
Sustainability of cocoon crop depends upon performance of bivoltine races in Marathwada region of Maharashtra under hot and dry humidity stress condition, during October 2022. Emphasis was given to evolve bivoltine Silkworm breeds and hybrids suitable to tropical conditions for achiving primary objectives of establishing bivoltine Sericulture with quality raw silk. Attempt is being made here to develop bivoltine double and single hybrids to tolerant to Marathwada region of Maharashtra. Promising silkworm hybrids CSR_{50} x CSR_{51}, CSR_{16} x CSR_{17} and double hybrid FC_2 x FC_1 were tested for better economic traits *viz*, fecundity, 10 mature larval weight (g), larval duration (days), Shell ratio (%) and cocoon yield per 10,000 larvae brushed.
Keywords: Fecundity, 10 mature larval weight, *Bombex Mori* L bivoltine silkworm.

Evaluation and Identification of Bivoltine Silkworm Parents of *BombyxMori* L. for the Tropics

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ABSTRACT
The trend of Sericultural development in India clearly shows a quantum jump in mulberry silk production since last four decades. The bulk of this comes from polyvoltine x bivoltine hybrids and hence, the quality of raw silk is poor when compared to international standards. This has necessitated the evolution of better bivoltine hybrids. The bivoltine silkworm breeds are the basic and important input for the production of high-grade raw silk. Keeping in view an attempt made to evaluate five parental CSR bivoltine breeds *viz.*, CSR_5, CSR_{16}, CSR_{17}, CSR_{50} and CSR_{51} of *Bombyx mori* L. from the CSGRC, Hossur with an objective to develop and evaluate the performance of bivoltine silkworm hybrid of *Bombyx mori L*. for tropics by utilizing the breeding resource material through conventional breeding under Marathwada conditions at Sericulture Research Unit, Vasantrao Naik Marathwada Krishi Vidhyapeeth, Parbhani during monsoon 2021 and 2022. Observations on the different economic traits of silkworm, *Bombyx mori* L. were taken. The perusal of the data reveals that the fecundity was recorded from 468.00 (CSR_5) to 549.31 (CSR_{17}) and hatching per cent ranged from 93.47 (CSR_{16}) to 96.11 (CSR_{50}). The larval weight varied in the range of 34.24 to 44.06 g whereas, larval duration was observed in the range of 22.00 days to 24.31 days. Single cocoon weight 1.601 (CSR_5) to 1.812 (CSR_{50}) g. Single shell weight 0.357 to 0.425 g. Maximum shell weight recorded in CSR_{17}(0.425 g), Shell percentage 19.36 per cent (CSR_5) to 22.85 per cent (CSR_{17}). Maximum yield per 10, 000 larvae was recorded by CSR_{17} (17.78 Kg), was observed significantly superior compared to other parents studied It is observed that CSR_5 (22 days) was having shortest larval duration. These findings are important for breeding programs, as diversity between silkworm genotypes is vital for selection of suitable parents required for successful development of improved variety and hybrids of silkworm that have the potential to adapt to the fluctuating environments and high temperature.
Keywords: Bivoltine hybrids, *Bombyx mori* L. cocoon weight, evaluation

Impact of Weather Factors on Girdle Beetle, *O. brevis* Infestation in Soybean

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ABSTRACT
An experiments were conducted during *kharif* 2017 and 2018 at the farm of AICRP on Soybean, VNMKV, Parbhani (Maharashtra) to study the *Obereopsis brevis* infestation in soybean and their correlation with weather factors carried out in unprotected plot which was non-replicated and the plot size was 10 m x 10 m which was divided in four quadrants. JS 335 (Jawahar*)* variety was used for experiment with spacing 45x5 cm. Observation were recorded at 7 days intervals starting from 7 days after germination (DAG). One meter row length was marked at 5 places. Total number of plants and girdled plants were recorded and data was presented in per cent plant infestation. The first infestation of girdle beetle (2.0% each) initiated in 30th and 31st MW during kharif2017 and 2018 respectively. At the time of physiological maturity plant infestation were 13.0 and 12.0 per cent recorded during 40th and 41st MW during both the year. The girdle beetle infestation showed positively significant correlation with bright sunshine hours (r=0.790**). The non-significant, positive correlation with rainfall (r=0.429), evening relative humidity (r=0.036). The multiple regression equation fitted with weather parameters in order to predict pest infestation of *O. brevis*. The investigation revealed that the weather parameters contributed for 97.1 per cent and 92.1 per cent of total variation in the infestation of girdle beetle on soybean during 2017-18 and 2018-19, respectively. The coefficient of determination was very high indicating that the prediction of the girdle beetle infestation by using weather factors was reliable.
Keywords: Weather factors, Girdle beetle, Correlation, Bright sunshine, Rainfall, Soybean

***In- vitro* Evalution of Fungicides for the Management of Soybean Pod Blight**
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ABSTRACT
Soybean (*Glycine max*(L.) Merrill) is one of the commercially important oilseed-cumleguminouscropextensivelygrowntheworld,undervaryingsoiltypesand climatic conditions.Soybeanplanthealthisacriticalcomponentofprofitablesoybeanproduction.Soybean cropissubjectedtoavarietyofdiseasessuchasfungal,bacterialandviral.There are somemostimportantfungaldiseasesofsoybeanpodssuchasAnthracnose/Podblight(*Colletotrichumtruncatum),Fusarium*blight(*Fusariumgraminearum*)and*Alternaria*blight (*Alternaria alternata*). Soybean crop is susceptible to the pathogens at all thestages of development particularly from bloom to pod fill. Anthracnose/pod blight insoybeancausesconsiderabledamagebyreducingplantstand,seedquality,seedgermination and yield (Chandrasekaran and Rajappa, 2002).Hence, the present investigation was undertaken with effect of different fungicides on soybean psd blight.The samples of soybean pods collected from farmer's field from Latur. Thepathogens associated with podblight of soybean were isolated successfully on the PotatoDextrose Agar. The isolates were purified and maintained forfurther studies. The pathogenicity of the test pathogens was proved successfully onsusceptible soybean Cv. JS-335 in pot culture by spore suspension method. Based onsymptomatology,culturalandmorphologicalcharacteristics,microscopicobservationsthetestpathogenwasidentifiedas*Colletotrichumtruncatum*. *In vitro* efficacy of fifteen fungicides (systemic, contact and combi-product)wasevaluatedagainst*Colletotrichumtruncatum*. Amongsystemicfungicides thehighest mycelial growth inhibition was recorded in Carbendazim 50

% WP (94.16 percent), followed by Propiconazole 25 % EC (89.16 per cent), Difenoconazole 25 % EC(89.16 per cent). Incontactandcombi-productfungicidescentpercentaveragemycelialgrowthinhibitionwasrecordedinCopperoxychloride 50 % WP and Carbendazim 12 %+ Mancozeb 63 % WP (100.00 per cent)followedbyCaptan70%+Hexaconazole5%WP(88.88percent),Thiophanatemethyl45 % + Pyraclostrobin 5 % FS (85.55 per cent) and Mancozeb 75% WP (84.99 percent),respectively.
(**Keywords:** Soybean, Pod blight, *Colletotrichum truncatum*, Management, Fungicides,)

Evolutionof Bioagents against *Fusariumgraminearum* and *Alternaria alternate* Associated with Deterioration of Soybean

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ABSTRACT

Soybean (*Glycine max*(L.) Merrill) is one of the commercially importantoilseeds-cumleguminouscropextensivelygrowninttheworld,undervaryingsoiltypesand climatic conditions. Soybean contains 18-20 % oil and 38-42 % higher qualityprotein hence considered as a high nutritional value crop. Soybean plant health is acritical component of profitable soybean production. Over 80 plant pathogens werereported to cause disease problems worldwide. Soybean crop is subjected to variety ofdiseases,mostimportantfungaldiseasesofsoybeanpodsare:Anthracnose/Podblight(*Colletotrichumtruncatum),Fusarium*blight(*Fusariumgraminearum*)and*Alternaria*leaf spot/blight (*Alternaria alternata*). Hence, with the need of environmentally safeapproach, the present investigation was undertaken on management of fungiassociatedwith deterioration ofsoybean pods by using bioagents. Thediseasespecimensofinfectedsoybeanpods(*Fusarium*blight and *Alternaria* blight) were isolated on PDA medium. Isolates werepurified and maintained on PDA slant tubes for further studies. The pathogenicity ofthetestpathogens(*Fusarium*blightand*Alternaria*blight)wasprovedsuccessfullyonsusceptiblesoybeanCv.JS-335inpotculturebysporesuspensionmethod.Basedonsymptomology,pathogenicity,culturalandmorphological characteristics, the test pathogens were identified as *Fusarium graminearum*and *Alternariaalternata*.*In vitro* efficacy ofbioagents against*Fusariumgraminearum*and *Alternaria alternata*was studied. However, among tested bioagents*Trichodermaharzianum*and*Trichodermahamatum*were found most effective against *Fusarium graminearum*and *Trichoderma hamatum*and*Trichodermaharzianum*werefoundmosteffectiveagainst*Alternariaalternata*.
Keywords: Soybean, *Colletotrichum*, *Fusarium*, *Alternaria*, fungicides, bioagents, phytoextracts

Impact of Climate Change and Abiotic Stresses on Agriculture and Management Strategies

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ABSTRACT

Today, climate change is a widely accepted fact. Food security for the 21st century will be the main challenge for humankind in the years to come, given the declining production efficiency of agro-ecosystems due to depleting natural resource bases, serious effects of climate change on diversity and abundance of insect-pests, and the extent of crop losses.

India has more challenges from the effects of impending climate change because it is a tropical nation. Pest damage varies in India's many agro-climatic areas due mostly to the diverse effects of abiotic elements including temperature, humidity, and rainfall. This involves a worsening of yield losses as a result of anticipated changes in crop diversity and an increase in insect pests as a result of climatic change. For rural farmers whose livelihoods are directly dependent on agriculture and other climate-sensitive industries, it will have major environmental and socioeconomic effects. Due to its complexity, uncertainty, unpredictability, and varied effects throughout time and place, dealing with climate change is a very arduous task. A crucial and difficult topic in agricultural study is how crop plants, insect pests, and their natural enemies respond to abiotic stress.

Planning and developing adaptation and mitigation plans for upcoming pest control programmes must carefully consider how impacts of climate change on crop production, as mediated by changes in populations of major insect pests, would affect crop productivity.

Screening agricultural germplasm for susceptibility to a variety of biotic and abiotic stressors requires coordinated efforts. Despite the use of improved crop types and agrichemicals for pest and pathogen control, The relationships between crops, pests, and pathogens will probably get much more complex as the climate changes and becomes more changeable, necessitating further research. Continued research in this area will give plant breeders fresh germplasm to incorporate into modified cultivars that are beneficial to farmers. Environmental stresses which include both abiotic and biotic stresses are the major force that governs the food production in tropics. Drought, high and low temperature, flood, salinity and air pollution are most frequent abiotic stresses which are caused by various environmental factors, and phytopathogens, insect pests, nematodes and weeds act as biotic stresses which affecting the agricultural production.

To achieve sustainable crop production to feed growing human population, strategic measures should be taken in management of these environmental stresses. One of the approach/strategy is the application of plant growth promoting rhizobacteria in agriculture. Large-scale application of PGPR to crops as inoculants would be attractive to increase crop yield as it would substantially reduce the use of chemical fertilizers and pesticides, which often pollute environment and contaminate the foodstuffs. Research and field trials of PGPR over decade have opened up new horizons for the agricultural bioinoculants industry. Development of superior or novel PGPR strains with improved plant growth promotion traits and development of transgenic crop plants expressing PGPR gene with increased resistance to various abiotic stresses.

Sustainable Biochar for Mitigation of Global Climate Change and Soil Management through Continuous Biochar Reactor

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ABSTRACT

Agricultural crop residues represent a large amount of biomass. Agricultural crop residues are materials left over after different agricultural processes. Burning of agricultural crop residues in

the field releases a large amount of pollutants into the atmosphere and causes serious environmental pollution. Due to high carbon content and abundant availability, crop residues could be used as a source of biochar to lessen the adverse effects to environment. The bio-char produced from agricultural crop residues instead of burning is a viable and sustainable way of management of agricultural crop residues and reducing the harmful consequences of crop residue burning. Biochar conversion through slow pyrolysis could be one of the techniques for the safe disposal of crop residues. Biochar is a fine-grained, carbon rich, highly porous product remaining after biomass has been subjected to thermo-chemical conversion process (Pyrolysis) at temperature of 350-600 °C in an environment with little or no oxygen which is also known as black carbon, black gold of agriculture now a days. The biochar can be used as an energy source, and acts as a soil amendment. It enhances the soil's physical (i.e., bulk density, water holding capacity, permeability, etc.), chemical (i.e., nutrient retention, nutrient availability, etc.") and biological (microbial population, earthworm, enzyme activities, etc.) characteristics which thereby improve plant growth and development. The biochar properties are greatly influenced by the feedstock source and pyrolysis conditions. The addition of bio-char influences the physical properties of the soil by altering the structure, porosity, pore size distribution, density and packing which has the potential to improve plant growth. A continuous pyrolysis reactor operated on electrical energy was designed and developed for continuous output of 25kg/h. Various agricultural crop residues viz; wheat, soybean straw & cotton stalk were used in the pyrolizer. It was found that 35-40% biochar yield was obtained using this continuous type biochar reactor. Thus, bio char prepared from soybean straw, wheat straw and cotton stalk will be an effective strategy for properly managing crop residues. Therefore, use of continuous pyrolysis reactor for producing biochar could be a potential management strategy for agricultural sustainability and food security.

Keywords: Agricultural crop residue, Soil Amendment, Natural Farming, Pyrolysis, Biochar, Sustainable, Carbon sequestration, GHG emissions

Role of Plant Growth Regulators in Ornamental Crops

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ABSTRACT

Plant growth regulators are organic compounds, natural or synthetic, which when present or applied at low concentration, results changes in plant growth or development. In flowering crops, different natural plant hormones and growth regulators like auxin, cytokinin, gibberellic acid, ethylene, abscisic acid and others hormones like brassinosteriods, salicylic acid, jasmonates and polyamines are present. In ornamental and foliage plants PGRs helps in regulation of plant height

and flowering, breaking of dormancy of propagating materials, enhancing lateral branching and extending vase life. In another study, Murugan et al. (2020) recorded the effect of plant growth regulators on growth, flowering and xanthophyll content of African marigold and found that NAA @ 150 ppm recorded maximum number of flowers, flower weight, flower yield (447.2 g per plant) and xanthophyll content. Veluru et al. (2018) also analysed the effect of GA3 on plant growth, flowering and in substituting the artificial light conditions in chrysanthemum cv. Thai Chen Queen and concluded that GA3 application substituted artificial light condition during vegetative phase and improved flower quality and post -harvest life of flowers under short day conditions. Hence PGRs significantly contribute in enhancement of flower quality, yield and shelf-life in ornamental crops.

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Keywords: Plant growth regulator, Flower quality,Yield.

Nutritional and Anti-nutritional Components of *Vespa magnifica* (Hymenoptera: Apidae) and *Anoplophoraglabripennis* (Coleoptera: Cerambycidae) Two Potential Edible Insects of Manipur, Northeast India

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ABSTRACT

The practice of entomophagy as a food provides nutritional food security, family livelihood and a great source to supplement food items that would meet the people's present and future need. Edible insects are preferred as eggs, nymphs, larvae, pupa and adult insects, and eaten as fried, cooked along with other ingredients according to consumer's choice, roasted or are even consumed as raw repeatedly. The nutritive contents of two potential edible insects available in market commonly used as delicious food by different ethnic communities of Northeast India, especially in Manipur namely *Vespa magnifica*(Hymenoptera: Apidae) and *Anoplophoraglabripennis* (Coleoptera: Cerambycidae) were evaluated. *V. magnifica* and *A. glabripennis* contained 40.9 and 27.8% protein, 22.0 and 42.3% fat, 1.67 and 1.59% carbohydrates, 0.69 and 3.07% fibre, 5.4 and 1.9% ash content respectively giving higher values compared with few conventional food items of animal origin like egg, chicken, pork, etc. Mineral analysis by Atomic Absorption Spectrophotometer showed that the insects can supplement rich amount of calcium, sodium, potassium, iron, magnesium and phosphorus to human diet. Both the studied edible insects showed non toxic level of antinutritional properties. The IC_{50}% of the studied insects were found to be 0.813 mg/ml (*V. magnifica*) and 0.618 mg/ml (*A. glabripennis*) showing higher values as compared to standard Ascorbic acid. The species with lesser IC_{50} % values had stronger antioxidant properties. Respective values of anti-nutrients like total phenol and tannin content (mg/g) in insect samples dry weight showed *V. magnifica* (38.7 & 50.0) and *A.*

glabripennis (26.8 & 12.5). Documenting the significance of food insect becomes the foremost requirement in linking between people's livelihoods and economic prosperity.
Keywords: Edible insects, nutritional, anti-nutritional, food security, economic support.

Cold Resistance Characteristics of Maize in Bredlines under Field Conditions Decisive to Temperature Change

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ABSTRACT
In terms of both output and productivity, maize (Zea mays L.) is the most productive and widely grown cereal crop in the world. It is known as queen of cereal and may be used as food, feed, fodder and industrial crop. Both abiotic (drought, cold/frost, low N input, water logging) and biotic stresses (disease and pests) are the major limiting factors in reducing maize productivity. In northern India, winter maize is grown in the month of October and November. During winter season maize crop is exposed to cold stress in the month of January. In Haryana we may get very good grain yield during *rabi* season but there is always risk of cold/frost damage. The growth of the maize crop is inhibited when exposed for an extended period of time to very low temperatures because it is susceptible to low temperature stress. Considering the facts for getting good yield in *rabi* maize we should have cold tolerant hybrids. Therefore, the primary goal of this study was to assess the ability of the maize inbred lines to withstand cold temperatures in field conditions during the winter. Under field conditions, the tolerance/resistance of 200 inbred lines to low temperature stress was assessed. The relationship of weather fluctuations were studied on crop growth and cold stress parameters. Climate data collected throughout the trial period revealed that the minimum temperature in January was less than 10°C for more than a month and occasionally fell as low as 3°C. Observations were recorded in field for yellowing of leaves, drying of leaves (1 to 9 scales) at two stages. The first date of observations was immediately after severe cold *i.e* 10th January 2018 while observing the recovery of the maize plants on a second date was done when the temperature had somewhat risen *i.e* on 30th January 2018. The data on yellowing and drying of leaves was recorded on scale 1 (no yellowing/drying) to scale 9 (high yellowing/drying). Similarly, the plant growth was recorded on scale 1 (poor plant growth) to scale 9 (excellent plant growth). Recordings were then taken as percentage index for yellowing of leaves and plant growth to calculate percentage recovery for both the traits. The highest rating of yellowing of leaves was taken towards more yellowing and lowest rating of plant growth was taken towards poor growth because both the scales are opposite. Transformation was done by Percentage index for yellowing of leaf and plant growth. The findings showed that there was a lot of genetic variation for the tolerance/sensitivity-controlling characteristics. Sixty inbred lines demonstrated minimal leaf yellowing and healthy plant development in the presence of persistent cold stress. Thirty six inbred lines were found moderately tolerant and rest of them was susceptible to cold/frost at less than 10°C. Among the resistant source inbred lines, the lines with the higher recovery of more than 50 % for yellowing of leaves as well as plant growth of more than 20 % respectively, among the selected resistant/ tolerant inbred lines includes HKI 1352-2 and HKI 1348-6-2 of white maize, HKI 766, HKI 463 and HKI 1160 of normal maize and HKI PC 4B of popcorn. The inbred lines HKI 164-7-6 (0, 23.00), HKI 170 (1+2) (0, 41.02) and HKI PC 11 (0, 34.78) were least affected

by the cold stress indicated that did not possess impact of cold stress even in the adverse or suboptimal temperature as well as showed faster plant growth during growth stage II. Hence, the majority of the resistant inbred lines that displayed low leaf yellowing scores and good plant growth may therefore be used for growing in winter season and also be employed in development of hybrids that are cold-tolerant.

Keywords: Cold stress, growth stage, inbred lines, maize, tolerant

Effect of Organic Manures and Their Different Levels on Bulb Characters of Tuberose Cv. Prajwal

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ABSTRACT

The world elite society is giving emphasize on utilization of organic wastes, farm yard manure, compost, vermicompost and poultry manure as the most effective measure to save the environment to some extent as these are excellent sources of organic matter as well as primary plant nutrients. Organic manures decrease soil salinity, improve the soil structure along with increasing organic matter, water and air permeability in soil. The present research was conducted to study the effect of organic manures and their different levels on bulb characters in tuberose (*Polianthes tuberosa* L.)" cv. Prajwal at Deen Dayal Upadhyay Centre of Excellence for Organic Farming, Chaudhary Charan Singh Haryana Agricultural University, Hisar during 2020-21. In this experiment, three organic manures *viz*., FYM, vermicompost and poultry manure were taken along with their five levels *viz*., control (0 Kg/m^2), 2 Kg/m^2, 3 Kg/m^2, 4 Kg/m^2 and 5 Kg/m^2. This experiment comprised of fifteen treatments which was laid out in split plot design with three replications. The plot size was kept 1.5 m x 1.5 m with spacing 30 cm x 30 cm between row to row and plant to plant. Uniform bulbs of cv. Prajwal were taken for planting.

The results of experiment revealed that among the different organic manures, vermicompost gave best results over poultry manure and FYM. Maximum values in terms of number of bulbs per clump (20.13), diameter of bulb (2.80 cm) and weight of bulb (30.35 g) were recorded with the application of vermicompost while minimum values in terms of number of bulbs per clump (17.27), diameter of bulb (2.65 cm) and weight of bulb (25.56 g) were recorded in FYM. Among different levels of organic manures, maximum values with respect to number of bulbs per clump (21.61), diameter of bulb (2.88 cm) and weight of bulb (34.38 g) were observed when organic manures were applied at the rate 4kg/m^2 while minimum values with respect to number of bulbs per clump (13.28), diameter of bulb (2.41 cm) and weight of bulb (17.30 g) were recorded in control (0 Kg/m^2).

Keywords: Tuberose, FYM, vermicompost, poultry manure, bulb characters

Study of Clay Mineral Threshold Level: A Way towards Optimal Nutrient Availability

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ABSTRACT

Potassic clay minerals are clay minerals that contain significant amounts of potassium. These minerals play an important role in nutrient availability and sustainable crop production, as

potassium is an essential nutrient for plant growth and development. The release and fixation of potassium from potassic clay minerals are important factors that determine the availability of potassium to plants. The release of potassium from potassic clay minerals is important because it contributes to the available pool of potassium in the soil, which is crucial for plant growth and development. The rate of potassium release depends on various factors such as soil pH, temperature, moisture, and microbial activity. Moreover, potassium fixation occurs when potassium ions are adsorbed onto the surfaces of clay minerals and become unavailable for plant uptake. Fixation of potassium can limit the potassium availability to plants and can affect crop production. Therefore, it is important to maintain a balance between potassium release and fixation thresholds in order to ensure sustainable crop production. A study was undertaken to study the thresholds levels under rice-wheat cropping system in a Typic Haplustepts at Bihar Agricultural College, Sabour with the objective to find out fixation and release threshold level of K in different nutrient management options. Long-term permanent plot experiment under rice-wheat cropping system was targeted under this study consisting of control (no fertilizer), 50% RDF both in rice and wheat , 75% RDF in rice and wheat, 100% RDF in rice and wheat, 50% RDF in rice and wheat + 50% N supplied through FYM, 75% through RDF in rice and wheat and 25% N supplied through FYM, 75% RDF in rice and wheat and 25% N supplied through wheat straw, 75% RDF in rice and wheat and 25% N supplied through green manure and farmer's practices. Fixation threshold levels (FTL) varied among the treatments. Maximum FTL was observed in T5 (182.32 mg kg^{-1}) followed by T7 (178.01 mg kg^{-1}). Release threshold level (RTLs) varied among treatments. T1 recorded minimum RTLs (35.88 mg kg^{-1}) whereas maximum was observed in T5 (74.82 mg kg^{-1}).

Keywords: Potassium, Clay mineral, Thresholds levels, Release, Fixation

Impact of Climatic Vagaries on Strawberry Production

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ABSTRACT

Strawberry is a leading cash crop of the Mahabaleshwar and adjoining area in Maharashtra. Strawberry being an attractive and delicious fruit fetches premium price in market. It is also a short duration fruit crop which can complete its commercial lifecycle in 5 to 6 months. Currently, more than 3000 acre area is under strawberry cultivation in Maharashtra which contributes to about 58 % share in Indian strawberry production.

But in recent years due to climatic vagaries losses occurred in terms of quantity and quality. Climatic events such as extended rainfall, unseasonal rainfall, cold wave and frequent hailstorms have hampered the strawberry production. Due to extended rainfall loss of costly planting material occurs due to root rot and crown rot. This leads to necessity for replanting or gap filling. Unseasonal rainfall creates favourable conditions for disease development. On the other hand cold wave in 2018-19 rabbi season has destroyed the entire crop around Venna river bank. Hailstorms occurring towards end of season have wiped out nearly 10 percent of the fruits during rabbi season of 2022-23. This has lead to economic losses to strawberry growers.

To avoid these losses recommendations and suggestions on planting time, bed height and well in advance weather advisory has been extended to the farmers. Further research on crop covers and other measures for climate resilient strawberry production has to be strengthened.

Keywords: Strawberry, climate change

Mutation of *Trichoderma asperellum* for Improving Production of Antifungal Metabolites and its Efficacy against Soil Borne Plant Pathogens

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ABSTRACT
An antagonistic ability of a biocontrol agent was determined by its physiological state, so that change in physiological or genetical conditions could alter the antagonism. Mutation is one of the finest ways to do so. Gamma irradiation and chemical mutagen (EMS) were used for improving production of antifungal metabolites and biological proficiency of the *Trichoderma asperellum* against soil borne pathogen. While conducting experiment, ten days sporulated mother culture of *Trichoderma asperellum* was irradiated with cobalt – 60 gamma radiation @ 41.6 gray/min. In chemical mutation, conidial suspension of *T. asperellum* was treated with Ethyl Methane Sulphonate (EMS) The mutants were checked for their stability up to 6th generation. Maximum chitinase enzyme units/mg of protein i.e. 0.70 was recorded in mutant TaMG 3. Mother culture TaMC contain only 0.39 chitinase enzyme units/mg of protein. Among the mutants TaMG 3 also recorded highest per cent growth inhibition of *Sclerotium rolfsii*, *Rhizoctonia bataticola*and *Fusarium oxysporum*i.e. 67.33, 63.27 and 67.92 per cent respectively. The mother culture TaMC exhibited only 53.86, 49.05 and 60.29 per cent growth inhibition. Hence present study proved that mutagenesis is the efficient tool for improving the production of antifungal metabolites and bio-efficiency of *Trichoderma asperellum.*

Study of *Trichoderma asperellum* Mutants for Fungicide Compatibility

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ABSTRACT
Compatibility of Trichoderma with chemical fungicides will make them highly suitable for exploitation in future within framework of IDM programme. Identified mother culture of *Trichoderma asperellum*was obtained from Department of Plant Pathology, Dr. PDKV, Akola and it was subjected to chemical mutagenesis with ethyl methyl sulphonate (EMS) and hydroxyl amine (HA) @ 200µl/ml and physical mutagenesis with gamma radiation (cobalt 60) @ 250 gry and ultraviolet (UV) rays @ 254 nm wavelength. The time durations for all treatments were 30, 45, 60 and 75 minutes. After mutagenesis 16 mutants were tested for its stability up to seven generation. An experiment on tolerance of *T. asperellum*mutants and mother culture with chemical fungicides *viz.*, chlorothalonil 50% WP @ 0.25 per cent, carbendazim 50 per cent WP @ 0.1 per cent, azoxystrobin 23 per cent SC @ 0.1 per cent,propiconazole 25 per cent EC @0.1 per cent, thiophanate Methyl 70 per cent WP @ 0.25 per cent and carboxin 37.5% + thiram 37.5% @ 0.25 per cent, was conducted *in vitro*. The observations were recorded at seven DAI and all mutants and mother culture of *T. asperellum*showed intolerance with tested fungicides except azoxystrobin 23 per cent SC @ 0.1 per cent.

Keywords: Mutagenesis, fungicides, chlorothalonil, carbendazim, propiconazole,thiophanate methyl, carboxin, thiram and azoxystrobin.

Screening of Maize Inbreds for Resistance against Maize Diseases

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ABSTRACT
Maize (*Zea mays* L.) is one of the most important cereal crop in India and world ranking third after wheat and rice. It acts as a staple food in diets of millions of individuals and has highest yield potential among the cereals. The major maize producing states of India are Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Uttar Pradesh and parts of Haryana, Jammu-Kashmir and North-eastern states. Among various disease causing pathogens including fungi, bacteria, nematodes and viruses, maydis leaf blight (MLB) caused by *Bipolaris maydis* and banded leaf and sheath blight (BLSB) incited by *Rhizoctonia solani*f. sp. *sasakii* are economically important diseases of *kharif* maize that may occur in moderate to severe form in different parts of the country and are becoming widespread and destructive in maize growing regions. The lack of resistant sources is one of the bottlenecks in maize disease management, particularly in respect to BLSB disease. A screening experiment was conducted on *kharif* maize during 2017-21 at CCS HAU Regional Research Station, Karnal, Haryana, India under artificial epiphytotic conditions in order to devise resistant genotypes against MLB and BLSB of maize. Out of two hundred and forty station inbreds screened during *kharif* 2017-21, twelve inbreds*viz.*, HKI-193-2, HKI 1128, HKI 1344, HKI-288-2, HKI 295, HKI 1126, HKI-161, HKI-163, HKI-193-1, HKI-193-2, HKI-488-1RG and HKI 1664 were found resistant, however 17 of them *viz.*, HKI 164D-3-3, HKI-488T, HKI 1105, HKI 323, PC-8-3, HKI-194-7, MBR-139, HKI-1354-7, HKI-191-2-5, HKI-335, HKI-488, HKI-1345, HKI-1042-NP 19-ER-1, HKI-1352, HKI1354-2, HKI-1664 and HKI-L-287 exhibited moderately resistant reaction against MLB and BLSB diseases. The resistant genotypes identified can also be used to explore the nature of resistance and governing genes. The resistant sources are the backbone of resistance breeding programme and identifying new resistant sources are a prerequisite for success of such programmes to develop resistant hybrids for farming community.
Keywords: Banded leaf and sheath blight, inbreds, maize, maydis leaf blight, resistance

Screening of Maize Hybrids against Maydis Leaf Blight & Banded Leaf and Sheath Blight Diseases of Maize

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ABSTRACT
Maize (*Zea mays* L.) is a year-round miracle C_4 crop having high importance in world's agricultural economy and has the highest yield potential among cereals that makes it suitable for ensuring food and nutritional security. It is industrially important year-round crop being extensively used as food, animal feed and poultry in addition to ethanol and biofuel production due to expansion of maize based industries. A total of 112 diseases have been reported from maize crop across the globe out of which 65 have been reported in India. Maydis leaf blight (MLB) and

banded leaf and sheath blight (BLSB) diseases of maize are the serious impediment to maize production in India that may cause yield reduction of 41 % and 39.1 %, respectively in susceptible genotypes. In severe cases, the yield losses may reach up to 100 % making these diseases as major constraints in *kharif* maize. Keeping in view their present status, a screening experiment was conducted under artificial inoculation conditions at CCS HAU Regional Research Station, Karnal, Haryana, India during *kharif* 2017-21 in order to screen 113 single cross hybrids of maize against MLB and BLSB to identify the disease resistant sources for better harvest. Amongst the screened genotypes, 16 hybrids *viz.*, HKI 193-1 × L 287, HQPM-1, HQPM-4, HQPM-5, HM8, HM 11, HKI 327T × HKI L287, HKI 193-2 × HKI L287, HKI 1664 × HKI 193-2, HKI 295 × HKI 323, HKI 295 × L287, HKI 659-3 × L287, HKI 193-2 × HKI 163, HQPM 28, HQPM 29 and HQPM 30 exhibited resistant reaction against MLB and BLSB while 20 hybrids *viz.*, HQPM-7, HKI 1128 × HKI L287, HKI 193-1 × HKI L287, HKI 1042 × HKI 193-2, HKI 488T-3 × HKI 161, HKI 288-2 × HKI 323, HKI 1040-7 × HKI 1105, HKI 327T × HKI L 287, HKI 169 × HKI L 287, HKI 327T × HKI 193-2, HKI 1043 × HKI 193-1, HKI 295 × HKI 1126, HKI 1040-7 × HKI 659-3, HKI 164-7-4 × HKI 193-2, HKI-1354-7 × HKI-1344, HKI-1105 × IMR 307, HKI-161 x L287, HKI-193-1 × HKI-163, HPC 3 and HPC 4 were found moderately resistant against both diseases. The resistant sources are able to drastically reduce the inputs of farming community and have tremendous scope to increase grain yield. The resistant hybrids identified over five years of screening may act as important role in various breeding programmes and can play key role to increase farmer's income.

Keywords: Banded leaf and sheath blight, maize, maydis leaf blight, screening, Zea mays

Water Requirement of Turfgrass under Wastewater Irrigation

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ABSTRACT

An investigation on turfgrass *(Cynodondactylon*L *var.* selection-1) planted under two planting methods (with or without sub-soil plastic mulch) and three wastewater irrigation schedules (75%, 100% and 125% of ETc) were investigated continuously for 3 years (2013-16) at WTC farm of ICAR-Indian Agricultural Research Institute, New Delhi, India. The main objective of the study was to estimate the optimum water requirement of wastewater irrigated turfgrass using soil-water balance method as compared to water requirement of turfgrass calculated by CROPWAT Model. Experiment was laid-out in randomized block design with three replications. Results indicated that turfgrass water requirement was observed minimum as 927 mm in the treatment plots where wastewater irrigation was scheduled at 125% $ET_c$with sub-soil porous plastic mulch and maximum as 1267 mm in the treatment plots of wastewater irrigation scheduled at 75% ET_c without sub-soil porous plastic mulch. Calculated reference evapotranspiration (ET_0) and actual evapotranspiration (ET_{turf}) or turfgrass water requirement (CWR_{turf}) were estimated as 1077 mm and 915.5 mm, respectively. Based on quality ratings, planting method and water requirement of turfgrass, the best treatment was found as wastewater irrigation scheduled at 125% $ET_c$with sub-soil porous plastic mulch which was associated with higher turf quality/colour. Hence, a water requirement of 927 mm may be considered as most appropriate for turfgrass under Indian climatic conditions.

Keywords: Evapotranspiration, irrigation, plastic mulch, soil-water balance, turfgrass

Role of Biofertilizers in Organic Farming

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ABSTRACT

Increasing population level on a near stabilized agricultural land places a heavy burden on the soil particularly its nutrient supplying power. Intensive agriculture with the use of chemical fertilizers in large amount has no doubt resulted in manifold increase in the productivity of farm commodities but the adverse effect of these chemicals are clearly visible on soil structure, micro flora, quality of water, food and fodder. Organic farming has emerged as the answer to bring sustainability to agriculture and environment. Need of more intensive and economic agriculture production led to wide use of high dose of chemical fertilizers but insufficient use of organic led to negative result, decrease in fertility and soil structure. So there is need to study the role of biofertilizers in organic farming. Biofertilizer are the active products containing selective strains of microorganisms which can contribute nutrients to plants through microbial activity. Totally harmless, pollution free and low-cost renewable agricultural inputs. They improve properties of soil, soil tilth and soil health. Biofertilizer act as antagonists and suppress the incidence of soil borne plant pathogens and thus, help in the bio-control of diseases. They help to get yield of crops by making the soil rich with nutrients and useful microorganisms necessary for the growth of the plants. Nitrogen Fixing Bacteria- *Rhizobium*, *Azotobacter* and *Azospirillum.* Phosphate solubilizing bacteria- *Bacillus* spp. and *Pseudomonas* spp. Biofertilizers being essential components of organic farming to play a vital role in maintaining long term soil fertility and sustainability by fixing atmospheric nitrogen, mobilizing fixed nutrients in the soil and make available form to plants. Combined application of the biofertilizers along with organic sources gave favourable effect on the growth, productivity, quality and nutrient uptake of crops. Biofertilizers with different organic sources also increase the gross return, net return and B: C ratio of the crops.

Impact of Climate Change on Fruit Fly

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ABSTRACT

Climate change is the main concern of mankind in 21st century. It alters the patterns of growth, flowering and fruiting capabilities of many horticultural plants. It also results in the expansion of geographic distribution of pests, increase their number of generations, alter interspecific interaction and increase risk of invasion by migratory pests. Further-more it increases the intensity of certain physiological disorder. All of these results into the decrease in yield of crops. As a result of climate change, the potential global range for *B. dorsalis* is projected to extend further polewards as cold stress boundaries recede.According to studies, presently absolute unsuitable areas of Indian sub-continent are projected to be slightly suitable for *B. correcta* by 2070 due to increase in temperature coupled with decrease in cold stress. It was estimated that faster accumulation of degree days would make possible for occurrence of one or two additional generations with shortened mean life cycle (5 to 7 days less) in near and distant future climate change periods.

Due to impact of climate change, an increase trend in the fruit fly population has been observed. So, it is important to manage fruit fly population below threshold level using different integrated management strategies. Agro Eco-System Analyses based IPM practices are recommended by NIPHM to manage fruit fly, which include field sanitation, destroying hibernating pupae by exposing them to sun and birds, harvesting at proper stage, bagging of fruits, use of cue-lure traps & male annihilation technique and spray of tobacco leaf extracts & neem based botanical insecticides. Growing resistant varieties and natural enemies conservation can also be employed in integrated management. Farmers generally prefer chemical insecticides but it gives only short-term control and it also leads to biomagnification and environment pollution. Instead, they should go for the integrated approach which is eco-friendly and also gives long term management.

Revolutionizing Farming through Sustainable Technologies: A Review

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ABSTRACT
Agriculture has been an essential element of human civilization since the earliest days of history. The evolution of farming practices has been shaped by changing social, economic, and environmental factors. However, due to the increasing global population and demand for food, traditional farming practices are no longer sustainable or efficient, leading to a noticeable shift towards green farming practices as people have become more concerned about their health and the environment. The development and adoption of green technologies have become increasingly important as the world faces the challenges of climate change, environmental degradation, and population growth. Green technologies for sustainable agriculture involve using practices that are environmentally sound, economically viable, and socially responsible. These technologies incorporate the use of innovative approaches to agricultural production that reduce the environmental impact of farming practices while also increasing efficiency and profitability. This includes minimizing the use of non-renewable resources, reducing greenhouse gas emissions, protecting soil health and biodiversity, and promoting fair working conditions for farmers and farm workers. However, the successful adoption of these technologies requires knowledge, skills, and resources, including education and training, technical assistance, and financial support. The review of literature has lead to the conclusion that by prioritizing sustainable practices, green farming represents a promising solution to the challenges facing modern agriculture and society at large. Through this approach, we can ensure that our food systems remain healthy and resilient for generations to come.
Keywords: Agriculture, sustainable, technologies, climate change.

Increasing the Yield of Marigold (*Tagetes erecta* L.) Production through Pinching Technology

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ABSTRACT

Marigold (*Tagetes erecta* L.) is one of the most important flower crop which belongs to the family Asteraceae and is native to South and Central America particularly Mexico. It a flower of common man and is extensively used as loose flowers for making of garlands, religious purpose and social gatherings. Pinching is the process of removal of apical bud along with few leaves. It involves pinching out the top growth of the plants with the thumb and forefinger, which encourages the plant to branch out to produce a bushy growth and thereby producing more number of flowers, ultimately increasing flower and seed yield. It however delays the flowering but boosts the flower production. Thus, an on-farm trial was conducted at seven different locations under the supervision of Krishi Vigyan Kendra, Vaishali for two consecutive years on var Ladoo Genda which comprised of three levels of pinching i.e., no pinching, early and double pinching at 30 – 40 days after transplanting (DAT) and late and double pinching at 40 – 60 DAT. The seedlings were transplanted in main field at a spacing of 60 cm X 60 cm. The data revealed that plant height (67.30 cm), number of branches (42.33) number of flowers per plant (35.37), diameter of stem (1.38 cm), highest B:C ratio (2.9:1) with maximum flower yield (57.5 tons per ha) and net return (2.06 lac/ ha) was found to be maximum with early and double pinching at 30 & 40 DAT. Therefore, early and double pinching at 30 & 40 DAT can be recommended for the farmers of Vaishali district of Bihar.

Keywords: marigold, pinching, on farm trail, Vaishali

Land in Peril: The Joint Threats of Land Degradation and Climate Change

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ABSTRACT

Degradation is a point of evolution which leads to a reduction of resource potential. Land degradation occurs when there is a decline in the soil's productivity resulting from changes in nutrient status, soil organic matter, structural attributes, and concentrations of electrolytes and toxic chemicals. This poses a significant threat to soil conservation and can lead to soil erosion, salinization, alkalinity, acidity, organic carbon losses, nutrient imbalances, and pollution or contamination by toxic substances. The issue affects more than 100 countries leading to a decline in crop productivity, causing huge economic losses and endangering farmers' livelihoods and food security. It is estimated that land degradation could cause a decline in global food production over the next several years leading to an increase in world food prices. Erosion by water is the most common form of land degradation worldwide and is usually linked to agricultural activity, particularly with annual cropping systems. Indiscriminate use of fertilizers in agricultural soils and irrigation of crops with untreated industrial effluents also pose health hazards to animals and humans by adding heavy metals. Soil degradation should be recognized as one of the most pressing problems facing humanity, alongside climate change. Therefore, solutions must be developed and implemented that address both issues simultaneously while considering the complexity of multiple pressures induced by the globalization process, climate change, climate extremes, and the critical issues regarding future energy and water supplies.

Keywords: Productivity, degradation, climate change, food security.

Assessment of Potability of Collected Water Samples from Different Sources of Drinking Water of Bahadurpur Block of Darbhanga District

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ABSTRACT
The suitability of 10 borewells' water quality located in the Ahiapatti and Ahmad Sujawal; two villages of Bahadurpur block (Darbhanga) were assessed for drinking purposes based on various water quality parameters. There was the use of a standard method for the analysis of borewell water samples. According to the assessment and analysis of collected drinking water samples from Ahiapatti; the pH was in the range of 6.1-7.6, DO 3.3-4.9, EC 180-240, TDS 210-240, level of P(ppm) was 1.271-3.104, Fe(ppm) 4.207-10.616, nitrate(mg/l) was 7-8. Similarly, the data of the Drinking water samples of Ahmad Sujawal was analyzed as the pH range 6.9-7.5, DO 3.5-4.7, EC 196-256, TDS 213-244, P(ppm) 1.273-3.101, Fe(ppm) 5.108-9.712, Nitrate(mg/l) 7-9. The main purpose of this study was to ascertain the quality of water for drinking from selected sites of water sources.
Keywords: Water quality, Potability Ph, EC, DO, TDS.

Effect of Organic Source of Nutrients on Yield and Number of Seeds per Fruit of Guava

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ABSTRACT
The present investigation entitled "Effect of organic source of nutrients on yield and number of seeds per fruit of guava (*Psidium guajava* L.)" was carried out at PG lab of the Department of Horticulture, CCS Haryana Agricultural University, Hisar during rainy and winter season of 2020. Guava productivity has begun to decline due to the overuse of chemical fertilisers, pesticides, and insecticides in the field. As a result, there is a need to develop an alternative sustainable farming system that is both economically viable and environmentally sound. The answer to the problem is the organic farming, which was practiced by farmers in ancient times. In this experiment, various organic sources (FYM, vermicompost, poultry manure and jeevamrit) along with various biofertilizers (Azotobacter and PSB) combinations were evaluated to study their effect on yield parameters like fruit breadth and average fruit weight of two years old guava cv. VNR bihi in completely randomized design. It is concluded that 80% replacement of nitrogen through FYM + 20% replacement of nitrogen through poultry manure + Azotobacter + Phosphate Solubilizing Bacteria resulted in maximum yield in both rainy and winter season. This might be attributed to continuous supply of nutrients, the higher concentration of soil microorganisms, more friable and porous soil due to the application of poultry manure and biofertilizers. While minimum number of seeds per fruit was obtained with control.
Keywords: Azotobacter, Phosphate Solubilizing Bacteria (PSB), poultry manure, Psidium guajava, VNR bihi.

Determination of Economic Threshold Level for Shoot Bug, *Peregrinus maidis* (Ashmead) in *Rabi* Sorghum

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ABSTRACT

The sorghum is as an important *rabi* crop in Northern dry zone of Karnataka being severely attacked by shoot bug, *Peregrinus maidis* (Ashmead) which is now being immerge as a key pest. The studies carried with *rabi* sorghum variety M 35-1 with treatments comprising of seven different action thresholds (5, 10, 15 and 20 shoot bug nymphs per plant), cage control (with no shoot bug infestation), complete or calendar-based sprays and untreated control during *rabi* 2019-2020. Overall, cage control followed by release of 5 bugs/ plant recorded lower population of shoot bug (0.00) and higher yield (2245 kg/ha). Whereas, untreated control and release of 20 shoot bugs / plant recorded higher multiplication of shoot bugs (21.74 & 17.44, respectively) and lowest yield (1677 & 1601 kg/ha, respectively). ETs were calculated based on realization and cost benefit ratio. Shoot bug infestation with 5 bugs per plant did not affected yield and contracted maximum profit. Hence, the 5 shoot bug nymphs per plant would be the operative ETL in economic term.

Keywords: Economic threshold level, Shoot bug, *P. maidis*, Net realisation, B:C ratio, Sorghum shoot bug.

Biochemical Profiling of Jamun (*Syzygiumcuminii* Skeels.) Genotypes in Karnataka

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ABSTRACT

Jamun (*Syzygiumcuminii* Skeels.) is an underutilized fruit crop with array of medicinal properties and distributed throughout India. Fourteen genotypes were characterized for bio-chemical attributes of jamun genotypes during 2017-2020 at Department of Postharvest Technology, College of Horticulture, Bengaluru. Different jamun genotypes recorded variation in fruit characters. It was evaluated to find the variation between fruit and seed for bio-chemical parameters in all the genotypes recorded for the study. The fruit biochemical parameters revealed that total soluble solids of 15.93^{o} B, ascorbic acid of 37.16 mg 100g^{-1}, total phenolic content of 700.30 mg GAE 100g^{-1} and antioxidant inhibition of 54.33 per cent was observed in GKVK-1. Higher anthocyanin content of 75.68 mg 100g^{-1} was found in K-45.The biochemical parameters of seeds revealed ascorbic acid and total antioxidant capacity of 3.44 mg 100g^{-1} and 71.76 per cent in GKVK-1, total phenolic content of 903.74 mg GAE 100g^{-1} in Sl. No. 58.

Keywords: Jamun, bio-chemical parameters, total soluble solids, anthocyanins, antioxidant capacity, total phenolic content

Effect of Altitude on Soil Properties of Subalpine Grasslands in Manang District of Nepal

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ABSTRACT

Grassland, covering major land area of earth, is one of the important resources which support the livelihoods of 1 billion people (Kemp et al., 2013). But these grasslands are under heavy grazing pressures and have deteriorated to a large extent (Roy et al., 2019). The ecological restoration of degraded lands has a great significance in countries where their deterioration process covers large periods of time. This study was conducted in Manang district (28° 27' to 28° 54' N latitude and 83°49' to 83°34' E longitude), the north-central part of Nepal. It lies in the trans-Himalayan region characterized by semi-arid cold desert condition like the Tibetan Plateau and receives little of the monsoon rain from the southeast and the south west Soil physical and chemical propersites play an important role in terrestrial carbon and nutrient cycling. During the growing seasons of 2017, the effect of altitude gradient on soil properties of grasslands were examined on the south-western slope of Manang district in Nepal. The changes of soil physical and chemical properties at a depth of 0-10 10-20 and 20-30 cm were examined in three altitudinal ranges (lower, middle and higher). For this study altitudes were selected, from 2500 to 4000 m. Soil bulk density was found in increasing order with increasing soil depth and soil properties such as soil pH, soil organic matter (SOM), nitrogen (N), available phosphorous (AP) and available potassium (AK) were found in decreasing order with increasing soil depth. Soil pH, soil organic matter, nitrogen and silt content (%) were significantly higher at lower altitude zone (2500 to 3000 m) than at upper and middle altitude zones. It was found that there was significant negative correlation between altitude with SOM, N and silt contents.

Keywords: Altitude, Correlation, Grassland, Soil properties, Subalpine

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Genome-Wide Association Mapping in Maize for Different Traits Evaluated under Heat Stress Environment

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ABSTRACT

Heat stress had profound impact on maize yield. There is a need to dissect this complex trait and identify favorable alleles for developing heat tolerant hybrids. In the present investigation, 274 tropical maize inbred lines were genotyped using 3,45,132 SNP markers called from GBS platform were used for genome wide association study. The inbred lines were crossed with two

testers, CL02450 and CML451, the testcrosses were phenotyped under two heat stress zones for grain yield and important secondary traits. The genome wide LD decay $r^2 = 0.1$ was 15.6 kb and $r^2 = 0.2$ was 5.3 kb was observed across the genome. Principal components analysis stratified genotypes based on pedigree information into four subpopulations. The mixed linear model (MLM) approach consisting of kinship and population structure was used to control the false positive association. The significant marker trait associations were found for the traits under heat stress . Most of the marker trait associations were test cross specific and location specific due to high influence of environment. Under heat stress, the SNP marker S2_211770877 present on chromosome 2 was strongly associated with grain yield, across the locations. This marker was associated with the gene GRMZM2G169087 which encodes amidase 1 protein, an important auxin synthesizing enzyme necessary for vascular tissue development. Similarly, two markers S6_116334089 and S6_118141046 present on chromosome 6 which were at a distance of 2.2 Mb apart associated with ASI and GY respectively. This study revealed the preliminary understanding of the tolerance mechanism of tropical maize lines under heat stress.

Keywords: Heat stress, tropical maize, genotyping by sequencing, single nucleotide polymorphism and genome-wide association studies.

Characterization of Rice Genotypes with Differential Tolerance to Salinity at the Germination Stage Using Morpho-Physiological Indicators

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ABSTRACT

Salinity is among the most severe environmental stress conditions that negatively affects productivity of salt-sensitive rice. Since, germination is the most crucial phase in the life-cycle of a plant, the present study was carried out to study the morpho-physiological traits that are associated with salinity stress. Evaluation of tolerance in contrasting rice genotypes was assessed on the basis of specific morpho-physiological parameters including radicle emergence, seedling vigour index, mean germination time, radicle and plumule growth and seedling water uptake.

Our findings revealed that the mean germination time (MGT) and seedling vigour index (SVI) can be used as a fast-screening procedure to test seedling performance under salt stress conditions. Salt sensitive genotype showed higher MGT and lower SVI, confirming that these indices are good indicators of poor germination response. Salt-tolerant genotypes was shown to be inhibited to a lesser extent in alpha-amylase activity in spite of high concentrations of imposed NaCl stress, that correlated with better regulation of water-uptake and increased accumulation of total soluble sugar content. Increased total phenols and flavonoids showed correlation with higher Total Antioxidant Capacity in salt tolerant genotypes underlying the significance of seed phenolic compounds in early germination response in NaCl stress conditions. In conclusion, the determination of early seedling response may be utilized as a useful strategy to uncover genetic variation in rice germplasm to salinity stress.

Keywords: *Oryza sativa* L., alpha-amylase activity, Total Soluble Sugars, Seed pheno

Studies on Sterile Insect Technique (SIT) for the Suppression of *Marucavitrata* (Fabricius) (Lepidoptera: Crambidae) on Pigeon pea.

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ABSTRACT
Studies were conducted to assess the impact of gamma irradiation doses on reproductive behaviourof spotted pod borer *Marucavitrata* (F.), one of key pest of Pigeon pea in northern Karnataka. Studies on the mating competitiveness of the spotted pod borer *Marucavitrata* (F.), where males irradiated as unmated adults and it was evaluated from the egg hatch resulting when irradiated males were confined in various ratios with untreated pairs of *M. vitrata*. The data indicated that males treated with a sterilizing dose of (150 Gy) at 5:l:l and 10:1:1 ratio (TM:NM:NF) recorded 27.74 and 13.02 per cent egg hatch, respectively when compared to control where it was 86.38 per cent. Calculated competitiveness values for 5:1:1 and 10:1:1 ratios were 1.01 and 1.08 indicates that at these ratios sterile males were sexually competitive with normal male for the female. These 5:1:1 and 10:1:1 mating competitiveness ratios showed lower incidence of *M. vitrata*on pigeon pea under shade house condition. Further studies on field efficacy of gamma irradiated male *M. vitrata*(150 Gy) indicated that combined effect of gamma irradiation and spraying of multinemor at 0.15 per cent induced more remarkable effects as compared to irradiated moth release or multinemor 0.15 per cent each of them alone. Mating frequency and mating success studies revealed that *M. vitrata*female has got single mating system and mate only once even when more males are available. Operational and intrinsic ratio of *M. vitrata* indicates female biased sex ratio. Over all results indicated that SIT can be incoprated as one of the tool in IPM against *Marucavitrata* suppression.
Keywords: Mating competitiveness, Sterile insect technique, Mating frequency,Mating success

Hairy Root Culture for Secondary Metabolite Production

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ABSTRACT
“Hairy Root Culture research” in plant biotechnology has commenced an understanding of the cause of “hairy root syndrome”. Elucidation of the relevant mechanism of *A. rhizogenes* infection and its feasibility for establishment and exploration has increased in research dimensions for both basic and applied research. Plant-based molecular farming involves the use of the whole plant or cultured plant cells or organs for the production of pharmaceutically important and commercially viable protein in large quantities by expressing the gene that codes for specific protein. The production of protein molecules with human therapeutic applications through HRC (Hairy Root Culture)s is gaining importance as a result of increased market requirements. Most of these proteins include vaccines, antibodies, serum-derived proteins, growth hormones, and cytokines. Because it is a plantbased system, HRC is a low-cost, safe, and easy to handle system for foreign protein expression, as compared to yeast, bacterial, or animal systems. Overall, the therapeutic reservoir generated through HRC cultures provides a pool of therapeutic metabolites effective against severe or chronic diseases such as cancer, diabetes, hypertension, malaria, neuroprotection,

and cardiocerebrovascular disease. Furthermore, the suppression of undesired metabolic routes through RNAi or other suppression strategies or the overexpression of pathway genes or related TFs need to deal with higher precision. Thus, the cumulative overall lead in terms of identifying and enriching therapeutic SM lead metabolite production through HRCs will be effectively performed in industrial setups to cure severe human diseases.

Keywords: HRC, Neuroprotection, Cardiocerebrovascular.

Productivity Enhancement of Sesame (*Sesamum indicum* l.) Through Frontline Demonstration Technologies under *Rainfed* Condition of Shahdol District (M.P.)

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ABSTRACT

Sesame (*Sesamum indicum* L.) is called as queen of oilseeds crops by virtue of its excellent oil quality. It is having the highest oil content (46-64%) and dietary energy (6355 k cal/kg). Its oil unlike other fats is highly stable and does not develop rancidity leading to loss of flavor and vitamin. Majority of sesame is grown as a *kharif* crop under rainfed conditions in central and southern part of the country including Madhya Pradesh, Utter Pradesh, Andhra Pradesh, Rajasthan, Gujarat, Maharashtra, Orissa, Karnataka and Tamil Nadu. The crop is tolerant to drought, but not to water logging. This probably indicates a great opportunity for a higher increase in sesame productivity in India. In India, sesame is grown in 1784 lakh ha with an annual production of 850 M tonne and productivity of 486 kg ha^{-1} (www.indiastatcom, 2015-16). India is the largest producer of Sesame in the world. In M.P., sesame is grown in 424788 ha and productivity of 475 kg ha^{-1}. The main reason for low productivity of sesame is use of low yielding varieties (local), low yield might be due to damage occurs by pests and diseases, insufficient weed control or no control, poor soil fertility and imbalanced nutrition, lack of mechanization (not cultivated by farmers due to seed shattering when not sufficient and unrealized genetic potential. Keeping this in view, frontline demonstrations on Sesame have been conducted to demonstrate the production potential and economic benefits of latest improved technologies at farmer's field. The 75 frontline demonstration have been conducted in 75 different farmer's locations at farmer's field in the villages of Pathra, Chatha, Amraha, Bhamraha, Kathotia, Madwa, Lamro, Pachadi, Majhgawa, Giriva, Sabo, Jarwahi, Jalditola, Balabahara, Nougai, Bhatiya and DholkuShahdol district of Madhya Pradesh. The FLDs have been conducted by Krishi Vigyan Kendra, Shahdol in *kharif* season during 2021 to 2022 in rained to semi-irrigated condition on light to medium soil under Mustard/ Wheat-sesame crop rotation. The improved technologies resulted higher mean net income of Rs. 22459/ha with a yield of 524 kg/ha during 2021-22 and Rs.31289/ha with a yield of 610 kg/ ha respectively during 2022-23.

Interaction between Mycorrhizal and Medicinal Plants towards Enhancement of Secondary Metabolites

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ABSTRACT

Arbuscular mycorrhizae fungi (AMF) are symbiotic relations between plants and fungi, it has a long history of more than 400 million years. AMF mycelium colonizes the plant root system

forming structures like root hairs which are considered as functional site for absorbing nutrient from soil and transfer them into the plant root. AMF increase nutrients uptake from soil as well as improving disease resistance against many pathogens. Medicinal plants are used across the world as primary form of therapy in the all known traditional medical systems which considered safer, cheaper and effective compared with chemicals ones. These plants metabolites are classified as primary metabolites and secondary metabolites, these secondary metabolites are subdivided in three major classes: alkaloids, terpenoids, and phenolics. They contain numerous phytochemicals with beneficial therapeutic as well as preventive effects. AMF inoculation on medicinal plants decreased the infection of bacterial and fungal pathogens, in addition to that The AMF–medicinal plants interaction causes chemical and biological changes lead to change in the secondary metabolite concentrations. In this review, we have summarized the effect of different arbuscular mycorrhizae fungi on increasing or decreasing the secondary metabolites of some medicinal plants and it was discussed about the secondary metabolites pathways involved in AMF–medicinal plants interaction.

Keywords: Interaction, mycorrhizal, medicinal, towards, enhancement

Combating Climate Change through Integrating Local Knowledge Practices
(A case study of Annapurna Conservation Area, Nepal)

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The Annapurna Conservation Area (ACA) is Nepal's first and the largest protected area holding multi ethnic cultures, multi-linguistic groups and globally significant biodiversity. ACA has allowed local resident to live within the area as well as own their private property and maintain their traditional rights and access to the use of natural resources which is a unique feature compare to any other protected area of world.Climate change has become one of the major challenge and threat to the biodiversity conservation and people's livelihood in Annapurna region.

The study was undertaken in ACA region with the objective of exploring the local people's knowledge in coping and combating the climate change impacts. Data were collected mainly through key informants, focus group discussion and field visit. Collected data were analyzed using Statistical Package for the Social Sciences (SPSS v.16) software. Local communities have been found practicing the unique and effective methods over decades to combat climate change in some region of study area but people of some region are still struggling to get over of climate change impacts. The study aims to support the government through integrating the local knowledge practices in policy, rules regulation formation, conserve the natural resources of Annapurna region for the benefit of present and future. Combating climate change through integrating the local knowledge is mandate to promote conservation and prosperity of the Annapurna region, its resources and its peoples. Recognizing and documenting the knowledge, expertise of local communities is only be the solutions to combat the climate change and likely to be effective and sustainable over the long term.

Keywords: Annapurna climate change, combat, conservation, livelihood

An Approach to Develop a Bio-Based Nematicide for Sustainable Management of Root Knot Disease

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ABSTRACT
Purpureocilliumlilacinum (Thom) Samson is a ubiquitous fungus (Family-Ophiocordycipitaceae). This fungus has potential applications in agriculture as a biocontrol agent. Here we evaluated the efficacy of *P. lilacinum* against a root-knot nematode, *Meloidogyne incognita*. We performed an in vitro experiment in which the direct effects of *P. lilacinum*on the second-stage juvenile survival and egg hatching of *M. incognita* were tested at different exposure times. The results showed that *P. lilacinum*significantly reduced the rates of egg hatching and juvenile survival in a dose-dependent manner. Microscopic observation suggested that *P. lilacinum*directly penetrated the eggs. Treatment with *P. lilacinum*resulted in significant enhancements in eggplant growth, photosynthetic pigments, chlorophyll, and carotenoids. *P. lilacinum*can be used as a plant growth-promoting fungus and a biocontrol nematicide for disease management of root-knot nematodes infecting eggplants.
Keywords: *Meloidogyne incognita, Solanum melongena, Purpureocilliumlilacinum*

Conservation and Exploration of Wild Relatives: They have Immense Capacity to Tolerate the Changing Climatic Condition

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ABSTRACT
Plants are subjected to a wide range of environmental stresses which reduces and limits the productivity of agricultural crops. Two types of environmental stresses are encountered to plants which can be categorized as (1) Abiotic stress and (2) Biotic stress. So, it's a big challenge for modern breeders to create such variety that have immense potential to cop up with the changing climatic condition. We all know that wild forms and wild relatives of different crop species have developed more adaptation to the changing environment by developing a lot of mechanism to tolerate the changing climatic condition. But due to incorporation of modernization and improved cultivation, the wild forms or wild relatives of different plant species are at the position of endangered. Even in some crop a lot of wild relatives or wild forms are extinct. Hence, it requires to conserve the wild forms of different plant species and also it requires to explore the potential of different plant species in different crops by understanding the mechanism by which they tolerate the changing climatic conditions. Utilizing the wild forms of different species we can transfer the stress tolerance capacity to the improved varieties, even we can develop improved varieties that

can tolerate changing climatic conditions. By understanding the mechanism of crop tolerance we can improve the mechanism in the cultivated varieties as well. This helps in creation of those varieties that have the potential to tolerate the changing climatic condition, help farmers to maintain their socio economic condition even under stress condition and also helps in maintaining the global food production, which is foremost requirement for the increasing population.
Keywords: Immense, Endangered, Modernization, Mechanism and Foremost.

Impact of Climate Change on Insect Pests and Diseases and their Management

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ABSTRACT
Climate change, an emerging global concern have serious threats in every aspect of agriculture. It is possibly the most significant global change that has attracted the attention of scientific community all over the world. The effect of climate change on agriculture or more precisely diseases and insect pests of agricultural crops is multidimensional. Magnitude of this impact could vary with the type of species and their growth patterns, the climate change has direct role on stratospheric ozone depletion which has direct impact on biodiversity loss, physiology and morphology of plants and ecosystem balance and finally resulting in desertification and also indirect effect on soil fertility. Climate change is threatening global food production via pest related losses of food crops. Each additional degree of temperature rise could cause yield losses from insect pests to increase by a further 10-25%. Moreover, Insects are poikilothermic as climate change progresses, the damages due to insect pests is increases because of direct effect of changes in temperature, precipitation, and carbon dioxide levels which could result the increase in number of diseases and insect pest population due to out breaks of insects, increased number of generations and development of resistant biotypes, migration, change in biodiversity, species extinction, change in host shift and the nutritional value of some foods also change due to elevated atmospheric CO_2 (increase in carbohydrates but decreased protein and vitamins). World over research effort on effect of climate change on pests and diseases of crops is inadequate there is not much work being done in India to fight almost all insect pests or agricultural diseases. However, at the genomic level, advances in technologies for the high-throughput analysis of gene expression have made it possible to check discriminating responses to different biotic, abiotic stresses and potential trade-offs in responses. For diagnosis of diseases and pests, the improvement of extension and research personnel's for adapting the new pest scenarios under future climates are essential for achieving good crop yields gain weather forecast and area-wide weather networks are becoming more prevalent for cli climate change .Now, the challenge is to bring continuous improvement in productivity, profitability, stability and sustainability of major farming systems, wherein scientific management of plant pests are pivotal. Thus, Future crop protection research and guidance in India must take into account changing climatic conditions for pest control.
Keywords: Climate change, Carbon dioxide, Impacts, Insect pests, Natural enemies, Temperature, plant pests, management, disease scenario.

Land Suitability Analysis for Finger Millet in Banka Block, Bihar using Remote Sensing and GIS Technique

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ABSTRACT
Land sustainably supports to make of precise decisions on the optimum use of landresourcesthroughthe evaluation ofpertinentinformationabouttheopportunitiesandconstraints for land use. Such a study aids in the development of crop management and otheragricultural support service providers. In this situation, it is essential for agricultural land useplanning to evaluate the geographical distribution of suitable places where crops may becultivated or not. Keeping this background in concern, a present study entitled "Land suitabilityanalysis of Finger millet in Banka Block, Bihar" was done using remote sensing and GIStechniques to analyze the land suitability for Finger millet in the area of interest. To fulfill these objectives, satellite image data were downloaded from the USGS earth explorer of Landsat 8 (rabi season, 2022) and Carto DEM toanalyzetheagriculturallandusepatternandtopographicalfeatures. For ground truthing surface soil and soil profile investigation were carried out toassessthephysical-chemical analysis, and finally, all the thematic data were overlayered to assess the landsuitability for finger millet in different Land Mapping Units (LMUs). Results revealed thatsoilreaction rangesfound tobe acidic to neutral(5.90 to7.12) and ECwas found tobenormal (varied from 0.02 to 0.13 dSm^{-1}) which comes under almost non-saline in nature in allpanchayats. However, the organic carbon in soils was found to be low and varies from (0.20 to0.41%), ESP(2.84 to6.43%),CEC(6.68-22.20 cmol(p+)/kg),andBS(65 to74.25%).Interms of land suitability class, all the LMUs were found to be marginally suitable (S3), while in terms ofpotential suitability, LMU1, LMU3, LMU4, and LMU5 were found to be highly suitable (S1) forfingermillet.
Keywords: Landsuitability,landmappingunit,LANDSAT8,USGS

Long Term Effect of Integrated Nutrient Management on Finger Millet (*Eleusine coracana* G.) Growth, Yield, Root Biomass and its Carbon Mineralization

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ABSTRACT
A field experiment on "Long term effect of integrated nutrient management on finger millet (*Eleusine corocana* G) growth, yield, root biomass and its carbon mineralization" was conducted at AICRPDA, GKVK, UAS, Bengaluru, during *kharif* 2018 with 8 treatments, replicated thrice laid out in RCBD. The growth and yield parameters of finger millet like plant height (96.53 cm), number of tillers per hill (7.60), number of ear heads per hill (7.37), number of fingers per ear head (6.61), test weight (3.56 g), total dry matter production (82.67g per hill), grain yield (20.96 q ha^{-1}) and straw yield (25.40 q ha^{-1}) were higher with the application of FYM @ 10 t ha^{-1} + 100% RDF. Similarly, higher root length (27.40 cm), root volume (99.33 mL), root biomass (11.37 q ha^{-1}) and stubble biomass (1.58 q ha^{-1}) was recorded in FYM @ 10 t ha^{-1} + 100 % RDF. Higher amount of cumulative rate of CO_2 (mg CO_2 /g C) evolution from roots (49.68 mg CO_2/g C) and stubbles (58.48 mg CO_2/g C) at 98th day of incubation was recorded in the treatment receiving FYM @ 10 t ha^{-1} + 100% RDF. Higher soil available N (345.35 kg ha^{-1}), P_2O_5 (66.58 kg ha^{-1}).

K_2O (136 kg ha^{-1})exch- Ca (4.30 cmol (p^+) kg^{-1}), exch -Mg (3.16 cmol (p^+) kg^{-1}), S (16.20 mg kg^{-1}), Zn (1.38 mg kg^{-1}), Fe (19.46 mg kg^{-1}), Cu (1.12 mg kg^{-1}), Mn (18.53 mg kg^{-1}) with application of FYM @ 10 t ha^{-1} + 100% RDF.

Relative Susceptibility of Pomegranate Verities to of Invasive Shor Hole Borer (*Euwallaceafornicatus*) and its Management

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ABSTRACT

Pomegranate (Punica granatum) is an important fruit crop grown in many parts of the world. It is highly susceptible to infestation by the shot hole borer, a pest that causes serious damage to the tree and reduces yield. The present study aimed to evaluate the susceptibility of different pomegranate varieties to shot hole borer infestation and to test the efficacy of different insecticides in controlling the pest. The study recorded the incidence of shot hole borer infestation in six different pomegranate varieties at 15 days intervals. The results showed that the level of susceptibility varied among the different varieties. At the first observation, the level of susceptibility was highest in Arakta, followed by Ganesh, Mridula, S. Bahgawa, G-137, and Bahgawa in ascending order. However, in the second observation, the level of susceptibility was highest in Ganesh, followed by Arakta, Mridula, S. Bahgawa, Bhagawa, and G-137 in ascending order. The average per cent infestation in the first and second observations was 40.79% and 47.56%, respectively. To manage the shot hole borer infestation, an experiment was conducted to evaluate the bioefficacy of eight different insecticides at two doses (1 and 2 ml/l water) through the drenching method. The results showed that treatment T7, which involved the use of Emamectin benzoate 3%+ Thiamethoxam 12% WG + Propiconazole 25% EC at 2 g+ 2m/l, gave the best recovery of pomegranate plants, with 98.25% of plants recovering at the higher dose. The next best treatment was T1, which involved the use of Emamectin benzoate 5% SG+ Propiconazole 25% EC at 2g+ 2 ml/l, with 97.5% of plants recovering at the higher dose. The standard check treatment, T8, which involved the use of Chlorpyriphos 20% E + Propiconazole at 2 ml+ 2 ml/l, gave a lower plant recovery of 67.25% at the higher dose. The lowest plant recovery of 30.0% and 35.25% was recorded in treatment T5, which involved the use of Afidopyrofen 50 g/L DC + Propiconazole 25% EC at 2 ml+ 2 ml/l. The control treatment showed no plant recovery. The results of the study suggest that the use of Emamectin benzoate 5% SG+ Propiconazole 25% EC can be effective in controlling shot hole borer infestation in pomegranate trees. The results also highlight the importance of regular monitoring and early detection of infestations to prevent damage to the trees and reduce yield losses. In conclusion, the study found that different pomegranate varieties have differential susceptibility to shot hole borer infestation. The bioefficacy experiment showed that treatments T7 and T1 were the most effective in managing the pest, with the use of Emamectin benzoate 5% SG and Propiconazole 25% EC at higher doses resulting in the best recovery of pomegranate plants. The study underscores the need for integrated pest management strategies that combine regular monitoring, early detection, and appropriate use of insecticides to prevent damage to pomegranate trees and ensure optimal yield.

Keywords: Pomegranate, shot hole borer, Susceptibility, Bioefficacy Drenching method

Evaluation of Physio-Biochemical Modifications of Different Packaging Materilas and Storage Conditions in Groundnut Seeds (*Arachis hypogaea*L.)

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ABSTRACT

Groundnut seed is a poor storer. The ability to store seeds after harvest without compromising their quality is essential to successful seed production. Moreover, sustaining groundnut seed for long-term use, particularly for yield improvement, remains a significant challenge. The studies have been conducted to assess the physiological and biochemical modifications in the groundnut seeds stored in various packaging materilas and storage conditions for 18 months. The studys findings showed that seeds stored in cold storage conditions and packaged in vacuum packed bag maintained the highest seed quality parameters than seeds stored in ambient conditions and packed in gunny bag at 18 months of storage period, including the germination (89.61 and 35.66 %), mobilization efficiency (17.97 and 10.41 %), seedling dry weight (682 and 361 mg), moisture content (6.61 and 9.91 %), dehydrogenase activity (1.46 and 1.01 OD values) and lipase activity (0.325 and 0.676 milliequivalent free fatty acid /min/g). With the increased storage period, germination percentage, mobilization efficiency, seedling dry weight, catalase and dehydrogenase activity decreased while moisture content and liase activity were increased. In order to maintain seed viability for a longer period of time, it is concluded that cold storage condition and vacuum packed bag can be used to store groundnut seeds up to 18 months of storage.

Keywords: Seed storage, seed quality, mobilization efficiency

Influence of Different Organic Mulches on Soil Moisture Conservation in Maize (Zea Mays L.) in Alfisols of Eastern Dry Zone of Karnataka

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ABSTRACT

A field experiment was conducted at Department of Soil and Water Engineering, College of Agricultural Engineering, University of Agricultural Sciences, Gandhi Krishi Vignana Kendra, Bangalore during *kharif* 2019 to study the influence of different organic mulches on soil moisture conservation in *Alfisols* of eastern dry zone of Karnataka. The experiment consists seven treatments viz, Mulching with paddy straw, Mulching with saw dust, Mulching with grass, Mulching with news paper, Mulching with dry leaves, dust mulching and No mulch (control) which were replicated thrice and laid out in Randomized Complete Block Design. The study revealed that the soil moisture status at 0-15 cm and 15-30 cm depth at 30, 37, 44, 51, 58, 65, 72, 79, 86, 93 and 100 days after sowing (DAS) respectively. Maize crop was sown as a test crop with dry leaves mulching treatment resulted in significantly higher soil moisture content at 15 cm depth (24.07, 25.13, 18.73, 18.90, 24.07, 22.13, 21.70, 21.23, 21.00, 20.73, 20.10 per cent) at 30, 37, 44, 51, 58, 65, 72, 79, 86, 93 and 100 DAS respectively compare to other treatments. The similar trend of soil moisture at 15-30 cm depth recorded as (24.83, 27.48, 21.07, 20.87, 24.83, 23.40, 22.90, 22.57, 22.10, 21.80 and 21.17 per cent at 30, 37, 44, 51, 58, 65, 72, 79, 86, 93 and 100 DAS respectively.

Keywords: Organic mulches, dust mulch, Soil moisture content, dry leaves mulching, paper mulch.

Effect of Carbon Sequestration on Modern Agriculture

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ABSTRACT
One potential positive effect of carbon sequestration on modern agriculture is that it can help improve soil health and fertility. By sequestering carbon in the soil, it can increase the amount of organic matter, which can improve soil structure, water holding capacity, and nutrient availability. This can lead to increased crop yields and better plant growth. Additionally, carbon sequestration can help mitigate the effects of climate change on agriculture. By reducing the amount of carbon dioxide in the atmosphere, it can help reduce the frequency and severity of extreme weather events such as droughts and floods, which can have a significant impact on crop production. However, there are also potential negative effects of carbon sequestration on modern agriculture. One concern is that some carbon sequestration practices, such as planting trees or using bioenergy with carbon capture and storage, could compete with land currently used for agriculture, potentially reducing the amount of land available for food production. Furthermore, some carbon sequestration practices, such as no-till farming or reduced tillage, can require significant changes in farming practices and may initially reduce crop yields. Additionally, there may be costs associated with implementing these practices, which could make them financially unfeasible for some farmers. Overall, while carbon sequestration has the potential to benefit modern agriculture, careful consideration and planning are needed to ensure that it is implemented in a way that maximizes benefits while minimizing any potential negative impacts.
Key word: carbon sequestration, bioenergy, no-till, water holding capacity

Development of Ready-to-Cook pasta from Kodo Millet

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ABSTRACT
To meet consumer demands, the modern food sector is looking for food products with high nutritional value and exceptional taste. Kodo millet is rich source of antioxidants and phenolic compounds like vanillic acid, gallic acid, these properties in food satisfy consumer's needs. A cold extruded products were developed using kodo millet flour (100 %,90%, 80 %, 70 % and 60 %) and wheat flour (10%, 20%,30 % and 40%). The blend was cold extruded at optimized extrusion conditions and the resultant pasta products were assessed for their sensory and cooking characteristics. Pasta incorporated with 60 percent of kodo millet flour with 40% percent of wheat flour had optimum cooking characteristics and adjudged as best compared to other levels of incorporation. The cooking studies of optimized product showed that cooking time of 4.00 minute,

swelling power of 1.76 g/g and solid loss was found to be 8.30 per cent. The optimized product found to has 81.98 per cent of carbohydrate, 9.92 per cent of crude protein, 4.27 per cent of moisture, 2.26 per cent of crude fat, 1.93 per cent of crude fibre and 1.57 per cent of ash content. Formulation of such ready to cook product add variation to the diet and could be one of the ways for balancing nutrient deficiency in individuals.

Keywords: Kodo millet, Swelling power, Cooking time, Pasta

Development of Ready-to-Cook vermicelli from Red Rice

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ABSTRACT

The demand for food products with high nutritional value and great taste are increasing day by day to meet theneed of human beings. Red rice with better composition of micronutrients and anti-oxidants properties is one such food to satisfy consumer's needs. A cold extrudated products were developed using red rice flour (100 %,90%, 80 %, 70 % ,60%) and wheat flour (10%, 20%,30 % and 40%). The blend was cold extruded at optimized extrusion conditions and the resultant vermicelli products were assessed for their sensory and cooking characteristics. Vermicelli incorporated with 60 percent of red rice flour with 40% percent of wheat flour had optimum sensory characteristics and adjudged as best compared to other levels of incorporation. The cooking studies of optimized product showed that cooking time of 8.50 minute, swelling power of 1.78 g/g and solid loss was found to be 21.00 per cent. The optimized product found to has 79.43 per cent of carbohydrate, 10.15 per cent of crude protein, 7.21 per cent of moisture, 1.52 per cent of crude fat, 1.93 per cent of crude fibre and 1.69 per cent of ash content. The development of such food products will diversify diets and may help those who are nutrient deficient in some way.

Keywords: Vermicelli, Cold extrusion, Solid loss, Crude protein

Nutraceutical Effects of Bacopa Monneri (Brahmi)

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ABSTRACT

Brahmi is a well proven herb of many medicinal properties. All the parts of the plant can be used as medicine. Brahmi leaves are a powerhouse of valuable alkaloids and triterpene saponins that can stimulate brain chemicals for sharper thinking, memory and learning.. Understanding the bioactive chemicals present in herbal plants, their capacity to strengthen the immune system, and

the safety of the end products is necessary for the processing of brahmi. It has been observed that the extracts of brahmi plants can be a helpful component in the creation of herbal beverages that contain the phenolics as well as Vit C as antioxidant. Without the addition of chemicals like sweeteners, artificial flavours, or colours, they can be utilised as a base to create beverages with bioactive qualities and sufficient the organoleptic properties for the consumer to enjoy. The ayurvedic herbs have the greatest potential for benefiting the population, particularly those who live in countries where poverty and bad health are prevalent. Bacopa monniera is well known for its memory enhancing property in traditional Indian system of medicine. Cognitive-enhancing and neuromodulatory property of brahmi herbal drink, a nutraceutical product from Bacopa monniera extract. The development and use of brahmi in functional meals will benefit not only the general public's nutritional status, but also people suffering from degenerative diseases. Brahmi can be consumed as a vegetable and the leaf powder can be dried in a dryer and stored for several months without refrigeration. The dried brahmi leaf is ground into a powder that may be added to any dish to assist boost the nutritional value of the cuisine.

Keywords: Brahmi, Bacopa monnieri, RTS, beverages, saponins, nutraceutical effects

Genetic Variability and Diversity Studies for Yield and Quality Traits in Tomato (*Solanum lycopersicum*L.)

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ABSTRACT

As the information, on the nature and magnitude of variability for yield and quality traits in tomato, in order to generate information regarding the extent of genetic variability, heritability and genetic gain in germplasm pool owing to genetic and non-genetic causes, is an important basic pre-requisite for starting any systematic breeding programme to identify superior lines or varieties. Thus, this investigation was undertaken in involving 200 genotypes tomato during 2015 to 2017 at the experimental farm of the Department of Vegetable Science, College of Horticulture, Bengaluru, Karnataka, to elicit information on "Genetic variability and diversity for yield and quality traits in tomato. Hence, high estimates of genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability and genetic advance over mean (GAM) were recorded for number of locules per fruit, pericarp thickness, number of fruits per plant, average fruit weight total soluble solids and fruit firmness and yield per plant. The results indicated the existence of sufficient variability in genetic stock studied and the traits were governed by additive genes. Hence, there is ample scope for improving these characters based on direct selection. On the basis of genetic distance, these genotypes were grouped in to 8 clusters. Cluster-I topped in having maximum of 177 genotypes followed by cluster-II having 17 genotypes while remaining clusters cluster III, IV and V, VI, VII, VIII included one genotype each. Clustering was mainly due to either geographical locations or due to genotype. The maximum intra-cluster distance was observed in Cluster-II followed by Clusters-I which were identified genetically divergent. The maximum inter-cluster distance was noticed between Cluster-VII and Cluster-VIII showed maximum inter cluster distance followed by that between cluster-V and cluster-VIII. Among 13 characters included for D^2 analysis, Number of fruits per plant contributed maximum to divergence followed by plant height and have a major role in improvement of fruit

yield in tomato. Therefore, crossing between genotypes belonging to Cluster- I and II as well as between Cluster- VII and III are expected to give maximum heterosis. The choice of parents for hybridization depends on genetic diversity of parents. Precise information on the nature and degree of genetic divergence would help the plant breeder in choosing the selective parents for hybridization.

Keywords: Variability, Heritability, Genetic gain, Yield, Genetic divergence, Clusters and Genotypes, Tomato.

Mulberry Based Integrated Cropping System: An Ideal Approach for Effective Utilization of Land Resources in Sericulture

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ABSTRACT

Mulberry (*Morus* spp.) is an important economic plant cultivated commercially for rearing Lepidopteran larvae of silkworm *Bombyx mori* L. and additionally for it's by product utilization. Owing to its wide adaptability to varied agro-climatic conditions, it can be easily cultivated and maintained as bush, dwarf and tree plantations. In current experiment an attempt has been made to formulate suitable design and layout for practicing integrated cropping or mixed cropping under different planting system of mulberry cultivation namely; pit, row and paired row system. Pit system was followed for one year old mulberry sapling with dimensions of 90 x 90 cm, row system with 60 x 90cm and paired row system with 90 + 150 x 60 cm. Three separate blocks were formulated for each system of the area of 15 x 10 feet (length x width). For the first block with pit system of plantation, boundaries were utilized for planting vegetables as intercrops along with mulberry saplings. Funnel, fenugreek and potato were grown on the side boundaries of the first blocks. Garlic and onion was grown as intercrop for second and third block having row and paired row system respectively. This is inspite of the fact that unlike other plants, mulberry provides two harvests of leaf annually. This is due to the fact that its annual growth cycle is such that it remains without foliage most of the time thereby causing least interception of solar light for the crops that can be grown underneath. From the current experiment, results have been drawn showing significant production of seasonal vegetables and mulberry leaf from each block. Moreover, the harvested vegetables and mulberry leaves showed good qualitative features too. This therefore provides an ideal choice of growing mulberry and seasonal vegetables simultaneously for effective land and resource utilization ensuring round the year cash flow to farmers. The current experiment emphasizes how the integration of mulberry and seasonal vegetables can help in improving productivity per unit area through effective land utilization and resource management.

Keywords: mulberry, sericulture, integrated, plantation, resource, utilization

Impact of Spiruliina on Commercial Cocoon Characters of Silkworm *Bombyx mori* L.

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ABSTRACT

Silkworm *Bombyx mori* L. is well known beneficial economic monophagous insect, feeding only on mulberry leaf. The current study was carried out to determine the impact of Spiruliina on cocoon parameters like cocoon weight, shell weight, shell ratio percentage etc. As nutrition plays significant role in growth and development of silkworm larvae. The Spiruliina (blue green algae) supplemented mulberry leaves were fed to larvae as considering its beneficial features such as high protein source for ensuring production of improved quality cocoons. Four different concentrations of 50, 100, 150 and 200 ppm were supplemented along with mulberry leaf as a feed to 5th instars double hybrid FC1 x FC2 and the effect of Spiruliina was determined on cocoon characters. Results showed that the concentration of 200 ppm showed significant acceleration in cocoon parameters of the treated group when compared to the control without any supplementation. Thus, the results depicted augmentation of Spiruliina along with mulberry leaf to gain positive results for increasing the overall productivity in sericulture.

Keywords: Sericulture, silkworm, mulberry, Spiruliina, protein, cocoon

Synthesis, *In Silico* Anticancer Activity and *In Vitro* Antibacterial and Antifungal Activity of Isoniazid Derivatives

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ABSTRACT

Isoniazid (INH) is a potent frontline drug tuberculosis, but due to development of resistance against the INH, it has limited scope as a drug of choice for TB. Many efforts have been done by medicinal chemists to develop potent ant-TB drug but an efficient drug has not been developed since long time. Many attempts have been made to introduce lipophilic moieties in INH structure to enhance its permeability into bacterial cells. In many cases new hybrid molecule demonstrates biological activity of both pharmacophores present in it. In thrust to synthesize new antimicrobial agents INH was modified by dithiocarbamate moiety which is a pharmacophore with wide range of biological activities. We herein report synthesis, antibacterial and anti-fungal activities of 12 new hybrid molecules. Molecules were characterised by FT-IR, NMR and mass spectrometry techniques. The compounds were screened *in vitro* for their antibacterial and antifungal potential. New molecules demonstrated low to moderate antibacterial and antifungal activities. Hybrid molecules were also screened *in silico* for anticancer activity. Compounds demonstrated good *in silico* anticancer activity, in terms of binding affinity ΔG with Cell division protein kinase 2 which is well known target of anticancer drugs.

Keywords: Cell division protein kinase 2, antifungal, antibacterial, anticancer, dithiocarbamate

Biotic and Abiotic Stress Management under Climate Change in Sericulture

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ABSTRACT
Climate change threatens sustainable agriculture with its rapid and unpredictable consequences, making it more challenging for agricultural researchers and farmers to adjust to biotic and abiotic stress challenges. The combined impacts of climate, including temperature, precipitation, humidity, and other factors including soil moisture, atmospheric CO_2, and tropospheric ozone (O_3), will determine the potential influence of global climate change on plant-pest populations. Variations in sericulture productivity can be caused by either direct consequences of these factors at the plant level or repercussions at the system level, such as variations in insect pest prevalence. In addition to the physiological response of the impacted mulberry plant, silkworm rearing, and post-cocoon technology, as well as variations in the frequency of droughts or floods, all these factors determine how vulnerable raw silk production is to climate change. A number of researchers in the field of sericulture predicted that climate change would have a major impact on the productivity of silk, which has a direct impact on the Indian economy, was predicted by a number of researchers in the field of sericulture. The development of genotypes suited for various agro-climatic situations is essential for ensuring the long-term sustainability of the sericulture sector amid global climatic change and the impending scarcity of land and water. Transgenic revolution, tissue culture, transcriptomics, proteomics, and metabolomics in mulberry will generate advanced biotechnological cultivation technologies that will improve sericulture industry's economy and the quality of life of those engaged in sericulture practices.
Keywords: Climate change, Abiotic, Biotic, Stress, Mulberry, Biotechnological, Sericulture

Environmental Importance of Mulberry: A Review
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ABSTRACT
Mulberry is a woody, deciduous tree that is economically important. It is regarded as a distinctive plant on the planet due to its widespread geological distribution across continents, ability to be cultivated in various forms, multiple uses of leaf foliage and positive impact in environmental safety approaches such as ecorestoration of degraded lands, bioremediation of polluted sites, water conservation, soil erosion prevention, and enhancement of air quality through carbon sequestration. Mulberry has a robust root system. Mulberry root systems can significantly improve soil shear strength and anti-erosive capacity. Mulberry plantations are extremely effective in suppressing sand storms and conserving water and soil.This paper reviews the environmental importance of mulberry.
Keywords: Mulberry, environment; carbon sequestration; heavy metals; soil erosion

Studies on Surface Sterilization on Nodal Explants of *Dendrocalamushamiltonii*
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ABSTRACT
During In-vitro studies, there was an investigation into the effect of the use of different surface sterilizing agents on nodal explants of *Dendrocalamushamiltonii*. Surface sterilization is the most

vital step during the preparation of healthy and viable explants for the micropropagation technique. The collection of explants was done from CPTs, that were highly exposed to microbial contaminants. Most contaminants such as bacteria and fungi are discarded by surface sterilization with the help of appropriate sterilizing agents. There was the use of $HgCl_2$ and NaOCl, and Ca $(OCl)_2$ a sterilizing agent during in-vitro culture. The leaf sheath covering the nodal segments containing axillary buds (1.5-2.00cm) was carefully removed and cleaned with 70% ethanol using sterilized cotton. These segments were pre-treated with 0.5% Bavistin as fungicides for 15 min. After pre-treatment segments were rinsed with savlon and fresh running tap water at least three times. Further surface sterilization of explants was done under a laminar airflow cabinet with different treatments of $HgCl_2$ and Ca $(OCl)_2$ at different concentrations. There were two methods of surface sterilization that were used under a laminar airflow cabinet, (a) the explants were treated with 0.1% $HgCl_2$ solution for 10,15, and 20 minutes. It was thoroughly washed with sterile distilled water. It was then 30sec.dip within 70% ethanol and again rinsed in sterile distilled water. (b) the explants were treated for 10, 15, and 2o min with Ca $(OCl)_2$ with a few drops of tween-20. After this treatment, explants were washed with sterile distilled water, and they were then given a 30 sec. dip in 70% ethanol and again rinsed in sterile distilled water. After this sterilizing agent were used for the satisfactory result of the aseptic culture, viability, and bud break sterilization with 0.1% $HgCl_2$ for 20 min and 30min continuous rinsing showed 68.4% Aseptic buds and Ca $(OCl)_2$ (10min.) and similarly rinsing for 3min. showed 67.11% Bud-break.

Keywords: Surface sterilization, D. hamiltonii, $HgCl_2$, bud-break

Depiction of Nitrogen use Efficiency and Biotic and Abiotic Stresses in Fingermillet (*Eleusine Corocona L.*) Utilizing Conventional and Biotechnological Tools in Current Era of Climate Change

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ABSTRACT

Fingermillet (*Eleusine Corocona L.*) Belongs to family graminae is one of the oldest indigenous domesticated tropical cereals in Africa and India. It has high nutritional value, short life cycle, low fertilizer requirement as well as it is tolerant to several biotic and abiotic stress which makes it a good choice for cultivation in arid and semi-arid region especially for small farmers. India has vast germplasm collection of finger millet which provides immense opportunity to study the mechanism behind the biotic and abiotic stresses in finger millet. It has high nitrogen use efficiency (NUE) which was mainly due to presence of certain transcriptional factors such as Dof-1 associated with protein content. The structure and polyphenol content as well as phytoalexins present in finger millet provide resistance to several diseases and pest. Biotechnological tools will provide deep information about the mechanism behind it and will also help in development of several molecular markers for further crop improvement programme in the era of climate change.

Yield Losses Due to Stem fly, *Melanagromyzasojae*in Soybean

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ABSTRACT
Field experiment were conducted during *kharif* 2017 and kharif2018 at the farm of All India Coordinated Research Project on Soybean, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (Maharashtra) to assess the yield losses due to stemfly in soybean. The soybean variety JS 335 was sown with spacing 45 cm x 5 cm in 100 sq. m area, out of which 5m x 5m area was fully protected from insect's damage by using chemical insecticides. From this protected area, ten healthy plants (without insect damage) were selected and tagged. These plants were harvested separately and observations on number of pods / plant, number of seeds / plant and weight of seeds / plant were recorded. Average of 10 plants for these parameters were used for calculating reduction in number of pods / plant, reduction in number of seeds/plant and the yield loss. About 100 plants were dissected to measure stem tunneling and plant height. It was grouped in to up to 10 per cent, 11-20 per cent, 21-30 per cent, 31-40 per cent and 41-50 per cent stem tunneling. Also, number of pods/plant, number of seeds / plant and weight of seeds / plant were recorded on individual plant basis in each category. Observations on stemfly infested plants were recorded at physiological maturity stage of the crop. At 41 to 50 per cent stem tunneling, the losses caused in number of pods/plant, number of seeds/ plant and weight of seeds/ plant were increased to the tune of 48.15, 55.11 and 56.32 during both the year. More yield losses recorded in number of pods, number of seeds and weight of seeds at 41 to 50 per cent stem tunneling caused by stemfly as compared to 10 to 40 per cent stem tunneling.
Keywords: Yield losses, Stem fly, *Melanagromyzasojae,* Soybean

Impact of Technological Interventions of Cluster Frontline Demonstrations (CFLD) Pulses on Yield Enhancement of Chickpea (*Cicer arietinum* L.) in Tribal District of Mandla, Madhya Pradesh

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ABSTRACT
The study was carried out by Krishi Vigyan Mandla district of Madhya Pradesh to know the yield gaps between improved package and practices under cluster front line demonstration (CFLD pulses) and farmer's practice (FP) of Chickpea (Cicer arietinum L.) crop variety JG14 under rainfed condition. Cluster Front Line Demonstration on Chickpea were conducted on farmer's fields during Rabi season of two sequential years i.e. 2018-2019 and 2019-2020 under National Food Security Mission (NFSM), Govt. of India to demonstrate the impact of enriched agro-techniques on production and economic benefits under rainfed conditions. CFLD's were conducted in 30 ha and 20 ha area for two years with active involvement of 125 farmers and scientific staff of KVK. According to analysis of data the highest grain yield was obtained in demonstrated plots with an average of 13.74 q/ha as compared to local check with an average of 8.15 q/ha. An average mean of extension gap, technology gap and technology index were calculated as 5.60 q/ha, 6.35q/ha, 31.75 percent, respectively. Adoption of improved package of practices in Chickpea cultivation recorded average higher B:C ratio (3.07) as compared to Farmers Practice (1.93) during the period of study. Thus, the productivity of Chickpea could be increased with the adoption of recommended improved package of practices. The study resulted in satisfying the farming community for higher productivity and returns.
Keywords: Chickpea, front line demonstration, technology gap, impact, yield, technology index

Seasonal Occurrence of Melon Fruit fly *Bactroceracucurbitae* (Coq.) and Natural Enemy Associated with it on Host Bitter Gourd

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ABSTRACT
The experiment was conducted at College of Agriculture, Vasantrao Naik Marathawada Krishi VidhyapeethParbhani. Fruit fly was the major pest of bitter gourd in damaging fruits. It cause bitter gourd fruit damage range from 15.65 to 59.33 per cent in *rainy* season whereas, 28.99 to 61.14 per cent in *summer* season. Per cent fruit infestation was significant and positively correlated with relative humidity (*rainy* season r = 0.87 and *summer* season r = 0.77) and rainfall (*rainy* season, r = 0.71) of weather factors whereas, non-significantly and positively correlated with other weather parameters like maximum temperature, minimum temperature, wind velocity, Evaporation and sunshine hours during both seasons. It shows that percent fruit infestation both on number basis and weight basis showed significant and positive correlation with number of maggots per fruit (r = 0.838 and r = 0.857 respectively,) during rainy season and summer season (r = 0.682 and r = 0.905 respectively). The recorded melon fruit fly natural enemy during *rainy* season 2021 was larval- pupal parasitoid *Psyttaliafletcheri* (Silvestri). The larval pupal parasitoid shows highest 16 per cent parasitism against melon fruit fly.
Keywords: Melon fruit fly, Parasitoid, Bitter gourd, Natural enemies *etc,*

Seasonal Incidence of Major Insect Pests of Brinjal in Relation to Weather Parameters

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ABSTRACT
An experiment seasonal incidence of major insect pests of brinjal in relation to weather parameters was conducted during *kharif* 2021-22 Agricultural Research Farm, Department of Entomology, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S.) Seasonal incidence of aphids on brinjal ranged from aphids during 46th to 5th standard meteorological week during 2021-22. The aphid population variation observed from 8.60 (46th SMW) to 7.80 (5th SMW) aphids / 3 leaves. Peak incidence of aphid recorded (12.00 aphids /3 leaves) at 47th SMW. The population of jassids ranged from 46th SMW (9.27 jassids/3 leaves) to 5th SMW (6.40 jassids/3 leaves). The peak incidence of 10.40 jassids /3 leaves (46th SMW). The population of whitefly on brinjal was ranged from 12.53 (46th SMW) to 3.87 (5th SMW) whiteflies/3 leaves plant. Highest population of whitefly 12.53 whitefly during 46th SMW. The infestation was ranged from 46th SMW (9.13%) to 5th SMW (4.82%). The peak incidence of shoot borer was observed during 46th SMW i.e. 9.13 per cent. The infection of *L. orbonalis* on brinjal was ranged

from 46th SMW (8.27%) to 5th SMW (9.67%). The peak incidence of fruit borer was observed during 52th SMW (29.13%).

Keywords: Weather Parameters, brinjal, SMW, jassids, *Leucinodes orbonalis*

Impact of Weather Parameters on Safflower Aphid and its Natural Enemies

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ABSTRACT

The investigation entitled "Studies on host plant resistance against safflower aphid(*Uroleuconcompositae*Theobald)wascarriedoutattheDepartmentofAgriculturalEntomology,VNMKV,Parbhani,duringrabi2021-22. Seasonal incidence studyrevealed that, firstincidenceof *Uroleuconcompositae*(Theobald) was observed during the 51st MW (5 aphids/5cm apical twig/plant).The aphidpopulationincreasedgradually andreachedpeakreadingof 234aphids/5cm apical twig/plant during 5th standard meteorological week. Thereafter, gradual decrease in the populationofaphidandshowedfluctuationinresponsetoweatherparametersviz.,maximumtemperature, minimum temperature, morning relative humidity, evening relative humidity,rainfallandbrightsunshinehours.Correlationbetweenaphidpopulationandweatherparameters indicated that maximum and minimum temperature had negatively significantcorrelation and positive non-significant correlation with morning relative humidity, eveningrelative humidity,rainfallandbrightsunshinehours.

During the population dynamics study, incidence of lady bird beetle started about 21daysaftergerminationrecorded0.33ladybirdbeetle/5cmtwig/plantduring1stmeteorological week it gradually increases upto 5th standard meteorological week recordedpeak of 4 lady bird beetle/5cm twig/plant when the corresponding weather parameters i.e.maximumtemperature,minimumtemperature,morningrelativehumidityandevening relative humidity were 30°C, 8°C, 83% and 19% respectively. Lady bird beetle had negativesignificant correlation with low temperature and positive non-significant relation with relativehumidity,rainfallandbrightsunshine hours.

Incaseof *Chrysopa*incidencestartedabout21daysaftergerminationrecorded0.1*Chrysopa*/5cm twig/plant during 1st meteorological week it gradually increases up to 4threcorded peak of 2 *Chrysopa*/5cm twig/plant when the corresponding weather parameters i.e.maximumtemperature,minimumtemperature,morningrelativehumidityandeveningrelative humidity were 26.80°C, 9.9°C,78% and 34% respectively. *Chrysopa*had negativelysignificant correlation with maximum and minimum temperature and positive non-significantcorrelationwithrelativehumidity,rainfallandbrightsunshinehours.

Keywords: weather parameters, *Uroleuconcompositae,* safflower, Natural enemies

Screening of Plant Morphological Characteristics of Safflower against Safflower Aphid

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ABSTRACT

The investigation entitled "Studies on host plant resistance against safflower aphid (*Uroleuconcompositae*Theobald) was carriedoutatthe DepartmentofAgriculturalEntomology, VNMKV, Parbhani, duringrabi 2021-22. In screening studies, 15 safflower genotypes were screened againstthe safflower aphid underfieldconditions. Basedonfoliagedryinggrade,aphidpopulation,plantmorphological characters and yield contributing characters it is observed that the safflowergenotype entries having more spines, green, thin and waxy leaves, thin capitula, small sizedseeds sheltered less aphid population than genotype entries of non-spiny, erect plant type,leathery leaves with succulent stems. Considering the all plant morphological characters morespinygenotypesviz.,SSF-682,SSF-695,SSF-714,SSF-704,SSF-734wereobservedresistanceagainstsafflowerаphidcomparedtonationalcheckA-1.Mostlytheplantmorphologyplayscrucialroleintheaphidresistancemechanism.

Keywords: *Uroleuconcompositae,* safflower aphid, capitula, genotypes

Per cent Infestation of Stem fly, *Melanagromyzasojae*on Soybean in Marathwada Region of Maharashtra under Changing Climate

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ABSTRACT
The severity of stem fly is becoming a major concern to soybean growing farmers. Keeping this in view scientific survey of stem fly, *Melanagromyzasojae*per centinfestation on soybean was carried out during 2022-23, in eight major soybean growing districts (*viz.*Parbhani, Nanded, Hingoli, Osmanabad, Aurangabad, Jalna, Latur and Beed) of Marathwada region of Maharashtra state under Crop Pests Surveillance and Advisory Project (CROPSAP) by using ICT tools and given 1,824 ETL based advisories were issued twice in a week to monitor the stem fly infestation. On the basis of district wise roving survey of soybean the results revealed that the per cent infestation of stem fly was noticed in all districts of Marathwada region and it was ranged from 0.00% to 0.53%. The maximum per cent infestation was recorded in Osmanabad district (0.53%) followed by Aurangabad district (0.23%). The peak activity was recorded in Osmanabad district (4.54%) during 37th SMW. ETL crossed by stem fly in 30 villages of eight districts of Marathwada regions *Viz*., Aurangabad (02), Jalna (03), Latur (06), Nanded (03), Osmanabad (16). On the basis of roving survey data revealed that the stem fly infestation start after germination and it was gradually increased and reached peak in September moth in most of the districts of Marathwada region of Maharashtra.

Keywords: Soybean, roving survey, stem fly, *Melanagromyzasojae*, per cent, ETL, Marathwada,

Morphometric Study of Melon Fruit fly *Bactroceracucurbitae* (Coq.) on Host Bitter Gourd

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ABSTRACT
Biological studies on melon fruit fly, *Bactroceracucurbitae* were conducted at Department of Entomology laboratory, VNMKV Parbhani Maharashtra. To study the morpho metric features of melon fruit fly on host bitter gourd during *rainy* season 2021. The research revealed that the freshly laid eggs of melon fruit fly were pure white in color and elliptical in shape. The mean length and breadth of egg was 0.735±0.057 mm and 0.153±0.017 mm, respectively. Maggots passed through three instars to attain pupal stage. The first, second and third instar maggot measured on an average 1.44±0.03, 5.02±0.40 and 8.13±0.95 mm in length and 0.25±0.02, 0.47±0.09 and 1.41±0.20 mm in breadth, respectively. The average length and breadth of pupa was 4.81±0.84 mm and 2.19±0.13 mm, respectively. The average length and breadth of female was 8.54±0.43 mm and 2.49±0.11 mm, respectively, whereas, the male measured 7.07±0.55 mm in length and 2.42±0.16 mm in breadth indicating that females being larger in size than males.
Keywords: Melon fruit fly, Bitter gourd, *Bactroceracucurbitae*, Biology, Morphometric etc.,

Impact of Weather on Infestation of Major Insect Pests and Disease of Sweet orange in Chatrapati Shambhaji Nagar and Jalna District in Marathwada Region of Maharashtra During 2022-23

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ABSTRACT
Investigations on Infestation of Major Insect Pests on Pomegranate In ChatrapatiShambhajinagar District were carried out under field condition during 2022-23 at ChatrapatiShambhajinagar Districts of Maharashtra, Keeping this in view scientific survey of infestation of major insect pests and diseases of Pomegranate was carried out during the year 2022-23, the major Sweet orange growing ChatrapatiShambhajinagar and Jalna districts in Marathwada region of Maharashtra under Horticulture Crop Pest Surveillance, Advisory and Management Project (HORTSAP) by using ICT tools and given ETL based advisories were issued twice in a week to monitor the major insect pests and diseases of Sweet orange. In ChatrapatiShambhajinagar District, Sweet Orange fruit Crops blackfly population (0.20) was constant though out the years. The population of Citrus Psylla, fruit sucking moth and leaf minor was observed in the 37th to 41st Standard Meteorological Weeks. The highest fruit infestation of Mites was observed above Economic Threshold Level (1.64) among all pests in the 3rd SMW and average population of mites was observed in (0.21) in ChatrapatiShambhajinagar district. The Maximum villages of ETL was observed in Paithan Talukas of ChatrapatiShambhajinagardistrict, The fruit infestation of mite crossed ETL during August to till dates during 2022-23. The maximum phytopthora infestation was recorded in 35th SMW is (0.29) and negligible population was recorded in Thrips, Whitefly and Bark eating caterpillars during the throughout the seasons. In Jalna District, the highest fruit infestation of Mites was observed above Economic Threshold Level (0.80) during 29th MW among all Pests. The maximum phytopthora infestation was recorded above Economic Threshold Level (1.08) in 41st SMW in Jalna district and bark eating caterpillar was recorded maximum damage (1.75) in 29th SMW. There was no Economic Threshold Level of Pests found Except Mite and Phytopthora disease.
Keywords: Sweet Orange, Thrips, Psylla, HORTSAP, ETL

Value Enrichment and Nutritional Augmentation of Wonder Food Mushroom

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ABSTRACT

The nutritional value of mushrooms has been recognised throughout food history as one of the most significant and beneficial to human health. The cuisine is more well-liked globally because to its extensive nutritious enrichment and distinct taste. Edible mushrooms have high protein, fibre, vitamin, and mineral content, and low-fat levels, which contribute to their nutritional value. They also include a number of bioactive substances, which allows them to exert positive effects at various levels. Polysaccharides, proteins, fats, minerals, glycosides, alkaloids, volatile oils, terpenoids, tocopherols, phenolics, flavonoids, carotenoids, folates, lectins, enzymes, ascorbic acid, and organic acids are just a few of the molecules of mushrooms that have been known to be bioactive and are present in fruit bodies, cultured mycelium, and broth. Among the impacts of bioactive properties include immunomodulating, antitumor, anti-hypercholesterolemia, antibacterial, antifungal, anti-inflammatory, antiviral, anti-diabetic, and cardiovascular health-promoting effects. Researchers studied into the mushroom's ability to bioaccumulate different nutrients that had been enhanced with important elements by fungi, and they found a high absorption rate. Selenium (Se) and lithium (Li) nutritional enrichment is found to be a significant milestone for value addition in this food because it plays an essential part in the biosynthesis of selenoproteins and selenoenzymes, such as thioredoxin reductase, glutathione peroxidase, selenoprotein, and iodothyronine deiodinase, respectively. Thus, the development of high-value products like mushrooms cookies and mushroom by products such as powder, soup, and beverages etc. might aid in the sustainable economic empowerment of landless or small farmers, unemployed youth, rural women, and self-help groups.

Keywords: Nutritional value, mushroom, value addition

Biological and Biotechnological Interventions for the Management of the Citrus Nematode Infesting Fruit Crops

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ABSTRACT

One of the most popular fruit crops and a significant horticulture traded commodity in the globe is citrus. Oranges account for 55% of all citrus production worldwide, followed by 25 percent mandarins, 13 percent lemons, and 7 percent grapefruits. One of the main reasons restricting citrus production globally is plant parasitic nematode infection. Since citrus crops become perennial, they nourish and encourage nematode population growth throughout the year around. There are many plant nematodes associated with the citrus rhizosphere, however, only a small number of species affect the trees. *Tylenchulussemipenetrans, Pratylenchuscoffeae, Radopholuscitrophilus,* and *Meloidogyne indica* are among the groups of plant parasitic nematodes that significantly reduce citrus crop yields worldwide. In places of the world where citrus is grown, *T. semipenetrans*, one of the main nematodes that parasitize plants, significantly reduce yields in the world where citrus is grown. Citrus is slowly declining as a result of it, and it is also responsible

for other complexities like citrus dieback. The age and health of the tree, the nematode population density, and the root stock's vulnerability all have a role in how much damage a nematode infection causes. The management of plant parasitic nematodes in citrus can be done alternatively by using biological control because of its lower toxicity to the environment, specificity of the target, and safety for non-target organisms. Even though various bacteria, mites, and fungi have been employed to reduce *T. semipenetrans* population in citrus, a dedication to the creation of high-quality products, extension programs, and industrial partnerships will help to promote the widespread use of biological control agents.

Keywords: Nematode; Biological control, Citrus, Management

Paradigm of Landscape Gardening in Mitigating the effects of Climate Change

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ABSTRACT

Earth is warming up each year and rise in temperature will have its effects on the earth's inhabitants. Pollution of air, water and soil is another problem not just in cities, but also in the areas where urbanization has not taken its toll yet. Land-use change, management practices, pollution and human demography shifts are all drivers of climate change either directly or indirectly. The average temperature of the earth has increased by around 1.5^{o} C during the 21st century and is expected to rise from 1.5 to 6.4^{o}C by the year 2100. Pollution, global warming, rise in the sea level, extinction of species, depletion of ozone layer, soil erosion, etc. are some of the commonly heard problems of the environment due to the changing climate and they all seem to be interrelated. The IPCC's 6th Assessment report notes all human-induced consequences on climate change. Therefore, landscape gardening is one of the major solutions to these problems. It involves the total environment of an area and then shaping it using different living and non-living components of nature. Thus, it is both an art and science of the establishment of a ground in such a way that it gives an effect of a natural landscape. They are virtually a retreat for the public from the harsh strains and stresses of public life. Some plants like *Ficus benghalensis, Alstoniascholaris*are tolerant to dust and smoke and can therefore be for avenue purpose on roads and highways. With the changing climate, trees resistant to wind like *Peltophorumferrugineum*and drought resistant plants like *Casuariaequisetifolia s*hould be planted and hardy shrubs like *Acalypha, Bougainvillea, Cassia sps.* etc. are gaining more popularity. The planning should therefore be done keeping in view the long-term effects of climate change because of global warming since landscaping may be best long-term investment in reducing heating and cooling costs while also bringing other improvements to the community.

Keywords: Climate change, landscape, Gardening, IPCC

Role of Government Policies in Reducing Carbon Foot Print in India

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ABSTRACT

India's per capita CO_2 emission are nearly 1.9 tonnes per annum which is 40 % less than global average and about one-fourth of that of China. Study reveals that India is the 3rd largest emitter of CO_2 in the world after China and the US, with estimated annual emissions of about 2.6 gigatonne per annum (gtpa). The Government of India has committed to reducing CO2 emissions by 50% by 2050 and reaching net zero by 2070.

Climate change and global warming issue is burning issue worldwide. Reducing carbon foot print by increasing solar plant is one solution. Making net zero and maintaining global temperature within 1.5 degrees along with the growth of industrialization is not possible without the removal of excess CO2 from the atmosphere through Direct Air Capture (DAC). With technological innovation and focused policy interventions, CCUS through DAC applications is also expected to have a role in the net-zero transition journey.

In the present paper, a study is carried out towards Govt initiative in Maharashtra state in terms of installation of solar PV plants in last 10 years and its impact on carbon foot print. There is growth in renewable energy capacities every year. Carbon emission calculation reveals the significant reduction in CO_2 emission. Also there is need of awareness in private public sector for use of more and more renewable energy sources. For increasing private sector participation, supportive incentive based policy framework will play major role in reducing carbon foot print in India and towards global contribution. Growth of renewable power capacity and Carbon capture utilization and storage (CCUS) is key to ensuring sustainable development and growth in India in the years to come.

Studies on Post Harvest Application of Different Chemicals on Spoilage of Sapota Cv. Kalipatti

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ABSTRACT

The study was carried out at the Department of Horticulture, College of Agriculture, (Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani), Maharashtra, India during 2020-2021 at PG laboratory. The investigation shows the effect of different chemicals on spoilage of Sapota cv. Kalipatti. Sapota fruits need sufficient post-harvest treatment because they are climacteric in order to stay fresh. After being harvested, sapota fruits grow quickly and become softer as a result of an abrupt rise in the activity of many oxidative enzymes. A number of compounds, such as calcium chloride, potassium permanganate, salicylic acid, and kinetin, have been used to delay ripening, decrease losses, and restrict the growth and spread of microbes by minimising shriveling. The study material comprised of nine treatments which were $CaCl_2$ 4 % and $CaCl_2$ 2 %, $CaCl_2$ 1 % for 5 minutes, GA_3 200 ppm , GA_3 150 ppm GA_3 100 ppmfor 5 minutes and BA 150 ppm, BA 75 ppm , BA 50 ppm for 5 minutes. Treated and untreatedfruits were packed in card board cartoons of 30× 30 ×30 cm size with 6 vents each of 3 cmdiameter equally on opposite sides and stored in PG laboratory. The experiment was framed inCompletely Randomized Design with nine treatments and a control. The fruits were subjected tovariousquantitative and qualitative analysisonat3^{rd},6^{th},9^{th}and12^{th}daysofstorage period.Whereasphysical parameters like spoilage was recorded minimum in fruit when treated with $CaCl_2$ 4 % i.e. (0,0,0,4.32,34.31%) during 3^{rd},6^{th},9^{th}and12^{th}daysofstorage period.

Keywords: Sapota, storage period, shelf life, quantitative and qualitative analysis.

Study of He-Ne Laser Irradiation Treatment to Study the Seed Viability of Soybean Seeds

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ABSTRACT
By means of determining the germination percentage, crop growth, Chlorophyll content, attributing characters the effects of bio stimulation were explored to study the shelf life of Soybean seeds. The irradiation treatment of the seeds with laser light indicate the effects of bio stimulation. Germination tests were carried out on MAUS-158, KDS-726 Verity of Soybean at varying time period for the study of seed viability of Soybean seeds. Germination capacity, seed vigor, electrical conductivity were tested. The results showed that He-Ne Laser irradiation could significantly affect the final germination percentage and seed viability of Soybean seeds.
Keywords: Seed bio stimulation, laser diode, soybean seeds, electrical conductivity, photons

Isolation of Entomopathogenic Nematodes from Soil Using Different Bait Insects

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ABSTRACT
Entomopathogenic nematodes (EPNs) are effective biological control agents against a variety of insect pests and are currently used as biopesticides for controlling several economically important insect pests worldwide. The effective use of EPNs as a biopesticide, therefore, depends on the isolation of native species, as they are adapted to the prevalent environment and climatic conditions of that particular area. Isolation of EPNs from the soil by insect-baiting technique and mainly great wax moth, *Galleria mellonella* used as bait insect. Due to the high cost spent and technical difficulties on *G.mellonella* production to find out alternate insects for use to isolate the EPNs from the soil. Hence present study to isolate the EPNs from soil using different insects like fall armyworm, *Spodoptera frugiperda*(Smith)(Lepidoptera: Noctuidae), tobacco cutworm, *Spodoptera litura* (Fabricius) (Lepidoptera: Noctuidae), gram pod borer, *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuidae), great wax moth, *Galleria mellonella* (L.) (Lepidoptera: Pyralidae), rice moth, *Corcyra cephalonica*(Stainton) (Lepidoptera: Pyralidae) as bait insect. Results showed that *G. mellonella* followed by *C. cephalonica*and *S.liteura* was the best host for the isolation of EPNs whereas *S. frugiperda* was the least preferred host to isolate the EPNs. The information generated from the present study may open the prospects for using bait insects to isolate EPNs which use in biological control programs against insect pests.
Keywords: Diversity, entomopathogenic nematodes, Isolation, biological control, Insect

Isolation and Identification of Entomopathogenic Nematodes and their Biocontrol Potential Against Lepidopteran Insect Pests

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ABSTRACT
Entomopathogenic nematodes (EPNs) have great potential in reducing pest population and with little manipulation, their role can be enhanced. To improve upon their biocontrol potential is to isolate native virulent EPN which can tolerate local climatic conditions and in this way, several biocontrol successes have been achieved in many parts of the world. Hence, survey and collected soil samples from different locations of district Bullendshahr of western Uttar Pradesh. EPNs were isolated by insect-baiting technique. Isolated EPNs were identified based on morphological and molecular characterization with the help of and also tested their biocontrol potentials against fall armyworm, *Spodoptera frugiperda* (Smith), tobacco cutworm, *Spodoptera litura* (Fabricius), gram pod borer, *Helicoverpa armigera* (Hubner), great wax moth, *Galleria mellonella* (L.) and rice moth, *Corcyra cephalonica* (Stainton). Out of 101 soil samples baited out, only five samples were found to be positive for entomopathogenic nematodes. Morphological and sequencing of the internal transcribed spacer (ITS) region and D2 D3 indicated that the isolates obtained belong to three species to the genus *Steinernema* and two to *Oscheius*. Infectivity results showed that all tested EPNs were found pathogenic against tested insect pests but time and percent mortality was varied. The information generated from the present study may open the prospects for using EPNs in the biological control programs against insect pests in these areas because indigenous EPNs are adapted to the local environmental conditions and are natural regulators of insect populations.
Keywords: Entomopathogenic nematodes, Efficacy, biological control, Lepidopteran

Determination of Lc 50 and Behavioral Changes in *Channastriata* (Bloch, 1793), Exposed to Chlorpyrifos

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ABSTRACT
Chemical control is the most widespread method for repressing pest populations in agriculture and public health. Pesticides and their residues reach aquatic ecosystems through different routes including spray drift, agricultural runoff and ground water leaching and affect aquatic biota even at low levels. After reaching into the aquatic systems, this pesticide might show high toxicity to a number of non-target species of freshwater fauna (fish, invertebrates, primary producers, etc.) at sub-lethal levels even at low concentrations which damage the population dynamics, complex food-web and food web energetics. A major part of the world's food is being supplied from fish source, so, it is essential to protect fisheries and for environmental conservation.Chlorpyrifos (0,0-diethyl-0-(3,5,6-trichoro-2-pyridyl)-phosphorothioate) is a widely used organophosphate pesticide in India. Chlorpyrifos is the highly toxic organophosphorus compound to fish. Keeping this in view, therefore, in this study an attempt has been made to determine median lethal concentration (LC_{50}) of Chlorpyrifos to *Channastriata* (Bloch, 1793), and to assess the behavioral effects of pesticide on the fish using static bioassays.*Channastriata* is a commonly available native **species of** fresh water **snakeheads fish**. For the present experiment, live fishes of more or less similar length and weight were collected from the local market. After formal quarantine treatment, fishes were acclimatized in the laboratory condition for two weeks.Water was changes daily to remove the faecal matter and waste metabolite of fish during acclimatization. The fishes were fed daily with minced fish and goat liver. The physico-chemical parameters (pH, temperature, dissolved oxygen) of test water were measured daily. Ten fishes were exposed to different concentrations of 1.5, 2.5, 3.5, 4.5 and 5.5 mg/L of Chlorpyrifos. Exposed fishes were observed daily and dead

fishes were removed immediately. Fishes were not given food during exposure period. The mortality and behavioral changes were observed on daily base. The 96 hr LC_{50} value of Chlorpyrifos, determined from the mortality data by using Finney's probit analysis, was found to be 4.512 mg/L for *Channa striata*. On exposure, behavioral changes indicate that this pesticide is toxic to *Channa striata*.

Keywords: Chlorpyrifos, acute toxicity (96 hr LC_{50}), *Channa striata*, behavioral changes

Development and Evaluation of Four-Row Vegetable Crops Seeder for Hilly Region.

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ABSTRACT

The study was directed to utilize the engineering properties of selected vegetable crops to conceptualize and develop a vegetable seeder. The engineering properties were measured in terms of size (mm), shape, sphericity (%) and bulk density (kg/m^3) to select the design parameters of individual components of vegetable seeder. The vegetable seeder comprised of seed hoppers, metering discs, main frame, handle, ground wheel, furrow openers and covering device. It was fabricated from GI pipes. The seed hoppers were provided to feed and store the seeds to be picked up by the metering discs and were made from MS sheet. The diameter of the hopper was kept 0.09 m, height 0.11 m with a capability to hold 6.75 - kg seeds over 0.03 m^3 volume. The diameter of the metering disc was decided on the basis of average seed length, width and thickness. It was fixed at 5 mm. The Tri-axial dimensions of coriander, chilli and radish were measured and it was observed as the length, width and thickness varied from 4.2 – 4.6 mm, 3.5 – 3.8 mm, 3.2 – 3.6 mm with an average value of 4.42±0.1 mm, 3.96±0.3 mm and 3.36±0.7 mm for coriander seeds. The bulk density of Coriander seeds varied from 225.06 – 225.8 kg m^{-3} with average value of 225.01 kg m^{-3}. In case of chilli and radish, the average bulk density was 351.05 kg^{-3} and 692.45 kg m^{-3}, respectively. The weight of the vegetable seeder was measured as 9.5 kilogram. The operational cost of the four-row manual vegetable seeder was calculated to be Rs. 83.7 per hour. The benefit-cost ratio, break-even point, and payback period for the developed vegetable seeder was found to be 1.30, 0.015 ha and 33.94 h, respectively. The overall performance of the manual vegetable seeder was found satisfactory for the small and marginal farmers of the hilly region.

Keywords: Seeder, Coriander, Chilli, Radish, small and marginal, hilly region.

Need Based Innovative Agricultural Extension and its Impact in Rainfed Areas of Marathwada Region

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ABSTRACT

The major crops of the Marathwada region of Maharashtra are soybean, redgram, cotton, gram while to some extend horticultural crops like papaya, banana, tomato and chilliect. For harvesting good yield with low cost of production, various technologies viz., nutrient management , weed

management, pest management water management, mechanization have been recommended by the Vasantrao Naik Marathwada Agricultural Unuversity, Parbhani, other SAUs and ICAR centres at regional and national level. These technologies must have to reach at farmers level in right time and by right way. In this regards, agricultural extension services are run by the Vasantrao Naik Marathwada Agricultural University, Parbhani, other SAUs with the formation of Regional Agricultural Extension Education Centres (RAEEC) and KVks. Regional Agricultural Extension Education Centres (RAEEC) under Directorate of Extension Education, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani are established at Ambajogai, Latur, Aurangabad and Parbhani to disseminate the agricultural technology among the farmers of Marathwada region comprising eight district. RAEEC Ambajogai is working for Beed and Osmanabad, RAEEC Latur for Latur and Nanded, RAEEC Parbhani for Parbhani and Hingoli while RAEEC Aurangabad for Aurangabad and Jalana districts. These extension centres are actively involved in disseminating the technologies at farmers level. RAEEC developed system to pass need based message in time up to 60000 farmers of each district with collaborative work with Agriculture department. Need based message is going to pass up to farmers level through the system channel i.e. from scientists – SMS /extension agronomist – DSAO – Taluka Agriculture Officer –Mandal Agriculture Officer – Agriculture Supervisor – Agrilture Assistant – Farmer through conducting Monthly district field visits, workshop, trainings and electronic social media. This system is supporting the farmers for taking timely decision and increasing profitability under changing climate. On farmers field expression of various insect pest damage and plant diseases may be different than their typical expressions under study. Manny times single approach of management may not be sufficient to manage them, hence technological interventions should be made to manage the insect pests and diseases though integrated approach This articles includes integrated management strategies to manage biotic and abiotic stress on farmers field, concluding with a brief outline of future directions which might lead to the integration of described methods in a system-based approach for more effective management of biotic and abiotic stress.

Keyword: Agricultural extension, Rainfed, Biotic stress and Abiotic stress

Management of Forest Economics

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ABSTRACT

Forestry as a sector, cannot be secluded from the segments that drive all economic activity. The economic principles that run forest management, form the backdrop of various breakthroughs in the field. A chain of enhanced value- added processes that explain entrepreneurial habits is taking us forward into a new perspective of forest production. Forests, in their totality, bring us tremendous benefits and forest economics provides a key insight on how sustainable forests can be best used and managed. (Environ. Resour. Econom.). Forests furnish social, cultural, economic and environmental benefits, and the 21st century must understand and accept the challenge of protecting and managing the earth's forests and simultaneously, growing economically. The understanding of a few fundamental concepts of economic theories and their relevance to forestry such as economic efficiency, markets, opportunity costs, incentives, marginal analysis,

management intensity, optimal rotation age, implications of property rights and international trades utilizes the need to comprehend the fragments of forest economics. Management of forest economics deals with the choices about how forests are managed and used, how other factors of production such as labor and capital are used in forest production, utilization and conservation , and what and how much forest products are produced and marketed. Applications of economics can be also used to analyze forest and environmental problems- why they occur and what can be done about them. Assessing effects of management of forest economics encourages the growth of forests and the environment at large. (J. Environ. Econom. Management). Site quality alteration is also a benefit of the same.

Keywords: Economic principles, forest production, forest economics, management.

Forest Economics and Policies

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ABSTRACT

Sometimes, putting a number on something is really useful, as it allows us to demonstrate, in a quite understandable way, the importance of it. This is what Forest economics teaches us. Forest economics provides essential information that helps forest policy decision making at both the sectoral level and at the forest level. Traditionally, forest economics was concerned exclusively with the process of timber production. Today, however, its scope has expanded to take account of the multi-functional role that forests have in delivering not only economic benefits to society but also environmental, social and cultural benefits. Forest resources are assessed, including wood, fiber, multiple forest products, and nontimber forest resource services. The policy and management issues that are important in forestry and forest economic decisions are generally discussed, including timber production, smallholder management, forestry research, land tenure, environmental policies from other natural resource sectors that can affect forest management, nontimber multiple use values, and deforestation and sustainable forest management. Economic tools are both available and appropriate for the analysis of a wide range of forest policy problems. Sectors of the economy can substantially change forests and forestland management; non-timber multiple use values; and deforestation, timber famine or its counter, sustainable forest management. The certainty of significant change occurring in both the production and the consumption of the products coming from the forests creates great hazard in an attempt to specify research needs and programs in a rigid fashion far into the future. Forest policy makers, scientists, and the public are increasingly concerned about deforestation and its negative consequences such as climate change, biodiversity loss, reduced timber supply, flooding, soil degradation and siltation. This has led economists to greatly stretch their efforts to frame their questions of why, when, where and how much forest is converted to other land uses.

Keywords: forest economics, environmental policies, forestland management, forest policy.

Identification of Plant Growth Stages for Root Nodule Evaluation in Chickpea (*Cicer arietinum* L.)

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ABSTRACT
The present study aimed to evaluate the nodulation potential and yield parameters of 30 chickpea genotypes, along with three checks (Sabour Chana-2, PG 186, and Pusa 256), under natural field conditions using a randomized block design with three replications. Nodule assessment was conducted at four different stages: pre-flowering (45 days), flowering (65 days), podding (95 days), and maturation (105 days). The results revealed that a significantly high number of nodules were observed during the flowering and podding stages, ranging from 2.25 nodules per plant at pre-flowering to 26.5 nodules per plant at podding. The maximum number of nodules was observed on primary roots during the pre-flowering stage, but later shifted to secondary roots in the later stages. All root nodules were found to be effective and fertile (pink color) until the podding stage, after which the color changed to blackish brown and they waned. Seed yield showed a positive and significant correlation with several nodulation parameters, including the number of secondary root nodules per plant, number of effective root nodules, chlorophyll content, dry weight of root nodules per plant, number of nodules per plant, number of pods per plant, and harvesting index. Based on the findings, several genotypes including BRHT-8, Sabour Chana-2, BRHT-12, JG-218, ICC-67, BRHT-1, and BRHT-6 exhibited considerably high nodulation and seed yield. The results suggest that root nodules play a significant role in enhancing seed yield by improving soil fertility through atmospheric nitrogen fixation in chickpea genotypes. The identification of highly responsive chickpea genotypes towards root nodulation could be useful for breeders in selecting desirable parents for breeding programs aimed at improving chickpea productivity.
Keywords: Chickpea, Root nodules, Correlation, Genetic variability.

An Insight into the Endophytic Fungi Isolated from a Rare Plant, *Elaeagnus angustifolia* L.
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ABSTRACT
Endophytes are defined as the micro-organisms that live inside the healthy tissues of the host plants. They are found to exist in all the plant species since their origin. The ability of these microbial endophytes to enter and thrive well in different tissues of the host plant makes them unique to be studied. They are reported from different host plants growing in different parts of the world with different geographical locations. The plants growing in the extreme habitats are reported to contain some unique and new species of endophytes. During the current investigation, healthy plant samples healthy samples of different parts of a medicinal plant, *Elaeagnus angustifolia* L. were collected in aseptic paper bags from Kargil district of Ladakh union territory. The isolation was done within 48 hours of sampling. The plant samples were surface sterilized to remove epiphytes by using 70% ethanol, 2-5% sodium hypochlorite and sterilized distilled water The surface sterilized plant segments were then cut into small pieces with the help of sterilized blade and then put on the petriplates containing nutrient medium supplemented with streptomycin (an anti-bacterial agent). 150 isolates have been recovered form 280 segments of different plant parts. The isolates were identified by using cultural, morphological and molecular analysis of the isolate. The relevance of present study is to unravel the diversity of fungal endophytes which are expected to produce unique variety of secondary metabolites with significant bioactive potential.
Keywords: Diversity, *Elaeagnus angustifolia*, Endophytes, Ladakh,

Effect of Different Seed Bio Priming Treatments on Incidence of *Fusarium Moniliforme*, Seed Germination and Seedling Vigour Index Of Maize.

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ABSTRACT
Maize is important cereal crop but also used as vegetable, fodder and industrial crop. Important devasting diseases are co incidentally seed borne and caused by many fungi. Seed priming improves crop yield and also production against seed or soil borne diseases. The fungi isolated *viz*. *Fusarium moniliformae*, *Aspergillus niger*, *Aspergillus flavus*, and *Rhizoctonia bataticola*,were with maize seeds and among all seed borne fungi *F. moniliformae* was observed as pre dominant fungi in maize, which reduced germination percentages and were also responsible for lowering seedling vigour index. Standardization of soaking periods (8, 12, 16, 24 hrs), the hydropriming with 12 hrs was found most effective on basis of seed quality characters, which maximum germination percentage (88%), speed of germination (8.5), seedling length (30.20 cm), vigour index (2666.6), least seed rot (8.53%) and seedling infection (11.33%) were recorded. Seed priming hours tested with different bioagents for management of *Fusarium moniliformae* and improvement in seed quality characters, priming with *T. harzianum* @ 20% and *T. asperellum* @ 20% for 12 hrs, found most effective in both *in vitro* and *in vivo.*
Keywords: Maize, *Fusarium moniliformae,* Bio priming, seed rot, stalk rot

Physical and Thermo-Chemical Characteristics of Napier Grass for Biochar Production

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ABSTRACT
This study investigated the production of biochar from Napier grass via pyrolysis under different conditions, including temperatures ranging from 400 to 700 °C and residence times ranging from 30 to 120 minutes. The resulting biochar samples were characterized using a range of analytical techniques, including proximate analysis, ultimate analysis, Fourier transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (SEM), and thermogravimetric analysis (TGA). The results showed that biochar produced from Napier grass contained a high proportion of carbon, with low levels of hydrogen and oxygen. The FTIR and XRD analyses indicated the presence of functional groups such as carboxyl, hydroxyl, and phenolic groups, as well as the formation of crystalline phases of SiO2 and Al2O3. The SEM images showed the presence of a porous structure in the biochar, with a high surface area. The TGA analysis revealed that the biochar had good thermal stability, with minimal weight loss up to 500 °C. Overall, this study demonstrates the potential of Napier grass as a sustainable feedstock for the production of biochar with desirable physical and chemical properties, which could have potential applications in environmental remediation and agriculture.
Keywords: Pyrolysis, Characterization, Production efficiency, Temperature range,

Characterization of Lines for High Sugar and Yield Stability in Sugarcane

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ABSTRACT
Sugarcane (*Saccharum officinarum* L.) is a wonderful trans-seasonal cash crop of Poaceae family. This long duration multiproduct cropcontributedabout 7% towards export gains from agri-products and energy needs during 2020-2021 in Indian scenario. The sugar industry is one of the largest agro-industry being a reliable source of food, fuel, fodders and fiber along with being tagged as an energy crop. Out of all available sources, crystal and powdered sugar is sweetener of mass preference. In Odisha, it is grown in 40.84 thousand hectare with a production of around 29lakh tonnes. A thumb rule for smooth running of sugar factories includes scheduling of sugarcane lines as early and mid-late maturity category in 2:3 ratio. A dire need arises to disseminate the high sugar yielderbreeding lines for Odisha to enhance sugarcane productivity. The present study focused on the characterization of lines for high sugar and yield stability in sugarcane was undertaken with a set of forty-six lines of sugarcane (including check) which were planted in the same pattern at Sugarcane Research Station, Nayagarh of OUAT to assess the variance at phenotypic and genotypic levels, heritability and genetic advance,correlations between pair of characters, direct and indirect effects of the traits on yield and stability of performance of the best genotypes buffering stably in different growing situations.
Keywords: Sugarcane, sugar, energy, variance, heritability, correlation, stability

Optimization of Peeling Process Parameters for Mother (*Colocasia esculenta* var. *antiquorum*) Corms

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ABSTRACT
The goal of this study was to optimize the machine parameters of a commercially available tuber peeler for the peeling of mother corms to obtain maximum yield with minimum loss using the response surface methodology (RSM) technique. The process was conducted with three different variables such as rotating disc speed (350, 450 and 550 rpm), peeling duration (1, 2 and 3 min) and batch load (1, 1.5 and 2 kg) for responses such as peeling efficiency (η_p), material loss (ML) and peeling effectiveness (PE). Using the central composite rotatable design (CCRD) method, a quadratic model was suggested to correlate the independent parameters with the responses. The findings indicated that the variations in peeling process parameters, such as disc speed, peeling duration, and batch load affected the peeling performance. Analysis of variance (ANOVA) was performed to check the statistical suitability of the developed model, which showed good agreement between the experimental data and data predicted by the model. Rotating disc speed of 423.1 rpm, peeling duration of 1.36 minand 1.78 kg of batch load were found to be the optimum condition for mother corm peeling. The corresponding peeling efficiency, peeling effectiveness and material loss were 84.19 %, 77.31 % and 8.44 %. respectively. Therefore, this study indicated that the process can be efficiently utilised for the processing of mother corms at commercial level.
Keywords: CCRD, Abrasive type peeler, Peeling efficiency, Material loss, Peeling effectiveness, Batch load.

Optimization of Operational Parameters of Groundnut Digging Blades by using RSM Techniques under Test Soil Bin

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ABSTRACT
A power tiller operated groundnut harvester was designed and developed in the Dept. of Farm Machinery and Power Engineering, CAET, OUAT, Bhubaneshwar during 2021–22. The objective of this study is to optimize the operational parameters of the groundnut digging blades (V–blade and straight blade) of a power tiller operated groundnut harvester by using the RSM techniques under test soil bin. The effects of independent parameters i.e., soil moisture content (6.0–9.0, 9.0–12.0, 12.0–15.0%), rake angle (15, 20, 25°) and forward speed (0.28, 0.35, 0.42 m/s) on draft requirement (kgf) was studied with two different types of blade geometries. To correlate the independent parameters with the dependent parameters, the central composite rotatable design (CCRD) method with a quadratic model was used. The findings indicated that the variations in soil moisture content, rake angle and forward speed affected the draft requirement. To assess the statistical significance of the model, an analysis of variance (ANOVA) was performed, which showed good agreement between the experimental data and data predicted by the model. The soil moisture content of 12.0–15.0%, rake angle of 15° and V–blade geometry was found to be the optimum for power tiller operated groundnut harvester with the 157.10 kgf draft.
Keywords: Groundnut harvester, soil moisture content, rake angle, forward speed, draft requirement

Simulation of Long-Term Spatiotemporal Soil Moisture Variation in the Lower Mahanadi River Basin using Hydrological Modeling

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ABSTRACT
Soil moisture is recognized as most essential climatic variable and it has a great impact on many environmental processes such as hydrological, ecological climatological, geomorphological, and other natural processes. The main aim of the present study is to analyze the spatiotemporal soil moisture variation using Soil and Water Assessment Tool (SWAT) model in the Lower Mahanadi river basin and to compare the model's simulated soil moisture content (SMC) with the observed soil moisture content by European Centre for Medium-Range Weather Forecasts (ECMWF). The model was calibrated and validated using stream discharge data for the period from 2005 to 2012 and 2013 to 2020, respectively. The model's performance was evaluated using R^2 and NSE values and found to be 0.80 and 0.74 during calibration and 0.79 and 0.80 during validation, respectively. The average annual SMC for whole Lower Mahanadi basin for sixteen year (2005-2020) was found to be 11.31 cm/m. The lowest average annual SMC was calculated for barren lands, whereas the highest values occur in deciduous forest. Further, the average annual soil moisture was calculated for agricultural lands was 11.57 cm/m, barren land for 9.45 cm/m, deciduous forest for

13.08 cm/m, and waste land for 12.39 cm/m, respectively. Further, the SMC in eastern part of the basin was lower than other regions because of presence of rice fallow lands which left fallow after harvesting of *kharif* rice during the winter season. Further, the comparison of SMC was analyzed by statistical parameter such as R^2 (0.76) and NSE (0.53) which showed a good agreement between observed and simulated soil moisture content. The overall result showed that the SWAT was the effective tool for spatiotemporal simulation of soil moisture.

Synthesis and Characterization of Silver Nanoparticles from Different Plant Leaves Extracts

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ABSTRACT
The synthesis of silver nanoparticles (AgNPs) from plant extracts and their applications in targeting specific tissues and pathogenic microorganisms have attracted many researchers. The purpose of this study is to synthesize and characterize silver nanoparticles from different medicinal plant leaves extracts and to test their antibacterial activity against some common bacteria. In this context, The experiment was laid out in factorial randomized block design (FRBD) with 65 treatment combinations (13 different plants extracts and 5 different concentration of silver nitrate viz. 1 mM, 2 mM, 3 mM, 4 mM and 5 mM). 1 ml of each plant extract was added to the 9 ml of different concentration of Silver nitrate solution. Formation of silver nanoparticles was primarily confirmed by color change followed by UV-VIS spectrophotometer. Among all the 65 treatments, 13 were found positive for synthesis of silver nanoparticles in different concentration of Silver nitrate. The results revealed that green synthesis Silver nanoparticles were successfully synthesized from different plant extracts. The significant results were obtained from Rantulas followed by Bamboo and Vad at 1 min, 2min and 2 min respectively. This study clearly indicate that green synthesis silver nanoparticle by using different plant extract is eco friendly, cost effective and easily possible.
Keywords: *Nanoparticle, Plant Extract, Silver nitrate, UV-VIS spectrophotometer*

Effect of Desiccation Tolerance on Seed Quality in Pigeonpea (*Cajanus cajan*L.)

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ABSTRACT
The laboratory experiment was conducted during 2020-21 having 7 treatments with 3 replication planned with CRD design. Four varieties of pigeonpea namely GRG 811, TS-3R, GRG 152 and Maruti were exposed to desiccation and rehydration treatments in laboratory. For desiccation treatments seeds were exposed to different days of desiccation for 3, 5 and 7 days respectively. For rehydration treatments seeds were exposed to desiccation for 3, 5, 7 days and rehydrated for one day in petriplate respectively. Results revealed that treatment control *i.e.*, no desiccation treatment (T_1) showed significantly highest Seed germination at first count (34.77 %), seed germination at

final count (87.08 %) shoot length (17.35 cm), seedling vigour index -I (3032), whereas (T_5)desiccation treatment for 3 days + rehydration treatment for one day in petriplate showed significantly highest root length (17.84 cm),seedling dry weight (12.22 mg) and speed of germination (18.98) in the variety TS-3R, followed by GRG 811. lowest was observed in T_4 (desiccation treatment for 7 days) pertaining to Maruti variety.

Keywords: Pigeonpea, Desiccation, Rehydration, TS-3R

Montoring of Desiccation Tolerance of Pigeonpea Varieties through Analysis of Cell Cycle Activity

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ABSTRACT

Pigeonpea is the second most important pulses crop after chickpea in India and rank fifth in the world after soybean. The initial rain is often followed by several weeks of dry period leading to desiccation and death of germinated seeds. The identification of genetic types displaying increased seedling survival after desiccation as well as unravelling the molecular mechanisms underlying seedling survival after desiccation in pigeonpea would be of great advantage in dryland farming. The laboratory experiment was conducted during 2020-21 having 7 treatments with 3 replication planned with CRD design. Four varieties of pigeonpea namely GRG 811, TS-3R, GRG 152 and Maruti were exposed to desiccation and rehydration treatments in laboratory. For desiccation treatments seeds were exposed to different days of desiccation for 3, 5 and 7 days respectively. For rehydration treatments seeds were exposed to desiccation for 3, 5, 7 days and rehydrated for one day in petriplate respectively. This experiment was conducted to study the effect of desiccation on survival percentage of seedlings possessing different radicle length among radicle lengths ranging from <3mm and 3-5 mm (short) and >5 mm (long), seedlings with radicle length of 3-5 mm have 90 percent chances of survival and as the radicle length is increased over 5 mm, the seedlings displayed a substantial reduction in survival (< 50 %). Highest difference of drying rate of 2.4 g and 3.67 g was achieved in V_2 of short and long radicles respectively. The inspection of mitotic figures after desiccation revealed a significant increase in metaphases in short radicles from 60 percent in hydrated seedlings to more than 80 percent in desiccated seedlings. No significant change in metaphases was observed in hydrated and desiccated long radicles.

Keywords: Desiccation, Rehydration, Metaphase, Drying rate, Radicle length

Impact of Front-Line Demonstration on Yield and Economic of Barely in Bundelkhand Region

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ABSTRACT
Barely (*Hordeum valgare L.*) is one of the most crop of ancient world agriculture and used one of the first domesticated cereals. It is fifth largest cereals crops after maize, wheat, rice and soybean in the world. It was seven percentage of the global cereals production. The crop is considered of poor man crop and better adaptable to problematic soils with marginal lands. The main useful of incorporating barely in diets now days is due to high potential benefits. It is a lowering of blood cholesterol with b-Glucans and glycemic index. The front line demonstration on Barely was conducted by Krishi Vigyan Kendra, Tikamgarh during the years 2021-22 to 2022-23 in six adopted villages of Tikamgarh and Jatara block in Tikamgarh district. Prevailing farmers' practices were two treatments viz., farmer practices and recommended practices. The demonstrated variety used DWRB 137; it is variety very potential in Bundelkhand region. The average two year data observed that an average yield of demonstrated plot was obtained 42.05 q/ha over control (32.4 q/ha) with an additional yield of 10.1 q/ha and the increase average Barely productivity by 57.42 per cent.The average technology gap and index were found to be 5.4 and 43.00 per cent. The extension gap ranged between 8.95 q to 9.85 q/ha indicating the need to educate the farmers through various extension approaches for the adoption of improved technologies. The results revealed that among the variety treatment evidenced its superiority through yield parameters like 50% flowering, seed per spikelet's and days to maturity and 1000 seed weight and seed yield / kg.
Keywords: Barely, foods, economies, yield parameters.

Bunch Stalk Feeding of Urea in Banana *Musa* (AAA group) 'Grand Naine'
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ABSTRACT
Even straightforward methods like male bud trimming and bagging, sleeving, and covering are gaining relevance in banana bunch management. In tissue culture plants of the 'Grand Naine' banana variety with uniform-sized bunches, the effect of urea feeding at the cut bunch stalk end of the rachis was investigated. A preliminary urea dose standardization research revealed the superiority of applying 30 g of urea to two-week-old bunches. In the primary bunch stalk feeding experiment, it was also discovered that applying 30 g of urea to the cut stalk end at two or four weeks after the bunch had fully emerged produced the highest yield and other top-tier yield characteristics. Bunch weight, finger weight, length and grade of 'D' finger and filling index are the yield parameters mostly affected by the bunch stalk feeding.
Keywords: Grand Naine, Bunch feeding, Urea, Yield

Role of Horticulture in Eradication of World Hunger
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ABSTRACT
India's ranking in Global Hunger Index 2021 is 101 out of 116 countries. With a score 27.5, India has level of hunger that is "Serious. Conflicts, climate variability and economic slowdowns and

downturns – all exacerbated by the underlying causes of poverty and very high and persistent levels of inequality. In addition, millions of people around the world suffer from food insecurity and different forms of malnutrition because they cannot afford the cost of healthy diets (FAO, 2021). From a synthesized understanding of this knowledge, updates and additional analyses have to generate to create a holistic view of the combined effect of these drivers, both on each other and on food systems, and how they negatively affect food security and nutrition around the world.
Due to lack of knowledge regarding the value of fruits and vegetables in diets, many people suffered from nutrient deficiencies. The natural vegetation in tribal communities is rich in biodiversity but not fully used. As a result, there is a significant disparity between optimal use of natural nutrition sources, such as underutilized crops, and health. India is facing the problems of hidden hunger, nutrient and micronutrient deficiencies, poverty, and unemployment. The wise and proper utilization of underutilized horticultural crops can prove to be a promising solution after realizing their health and employment potential. The underutilized crops can be a rich and easily available source of major and minor nutrients in sufficient amounts to prevent and cure deficiency disorders. They are the source of ayurvedic medicine because of having therapeutic properties. It is also established fact that seasonal, locally available, and cheap fruits and vegetables can also keep the population healthy and nutritionally secure rather than costly off-season ones.

Assessment of Determinants of Farm Level Adaptation to Climate Change in South Gujarat

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ABSTRACT
The adoption of practices and technologies for adaptation to climate change and variability is crucial for the farmers to cope with the changing climate scenario and reduce agricultural losses due to unreliable and erratic rainfall patterns (Ndamani and Watanabe, 2015). The aim of the present study was to assessment Determinants of farm level adaptation to climate change in South Gujarat. The study was conducted in all the seven districts of south Gujarat. The data were collected through survey method by conducting personal interviews of 1200 farm house household of 164 villages falling under 41 talukas. The commonly used econometric approach used in an adaptation decision study involving Multinomial Logit and Multinomial probit models. A cross sectional household survey from 2016-17 to 2018-19 conducted in South Gujarat. The result revealed that the univariate probit models can be viewed as a restrictive version of the multivariate probit model with all off-diagonal error correlations set to zeros (that is,P_{ij}=0 fori>j) (Lin et al., 2005; Belderbos et al.,2004). A likelihood ratio test based on the log-likelihood values of the multivariate and univariate models indicates significant joint correlations, x^2 (17) =35.087; probability >x^2= 0.0000 justifying the estimation of the multivariate probit that considers different adaptation options as opposed to separate univariate probit models and consequently, the unsuitability of aggregating them into one adaptation or no adaptation variable. The socio-economic characteristics of farmers' variables that are statistically significant included the age of household-head which exhibited a negative relationship in influencing the decision on adoption of the farm diversification and modern methods of irrigation, while the change in variety, mechanization, manipulation of agronomic practices was positive but not significant. The change in sowing dates was found positive and significant, showing that the sowing date is influenced by

the age of household-head. The negative relationship suggests that the younger farmers have longer planning horizons and are more likely to adopt compared to their older counterparts, possibly for being innovative and keen to try new technology and methods to improve agriculture.
Keywords: Climate Change, Adaptation determinants, Multinomial Probit, Multinomial Logit

Impact of High Density Planting and Weed Management Practices on Growth and Yield of *Bt.* Cotton. (*Gossypium hirsutum*L.)

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ABSTRACT
The present investigation "Impact of high density planting and weed management practice on growth and yield of *Bt* cotton. (*Gossypium hirsutum*L.)" was undertaken during *Kharif* season of 2020-21 and 2021-22 on clayey soil at experimental farm, AICRP on Integrated Farming Systems, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S.) The soil of the experimental plot was clayey in texture, low in available nitrogen , medium in available phosphorus() and high in available potassium() and slightly alkaline in reaction. The experiment was laid out in split plot design with three planting densities that is S_1-120 cm x 45 cm (18518 plants ha^{-1}), S_2- 80 cm x 60 cm(20833 plants ha^{-1}) and S_3- 90 cm x 45 cm (24691plants ha^{-1}) and four weed management practices that is W_1 - Stale seed bed technique + PoE Pyrithiobac Sodium 10% EC @ 62.5 g ha^{-1} + Quizolfop-ethyl 5% EC @ 50 g ha^{-1} + Straw mulching, W_2 - Stale seed bed technique +PoE Glufosinate ammonium 13.5% SL @ 0.7 kg ha^{-1} + Hand weeding, W_3 - Weed Free and W_4 - Weedy Check. Recommended fertilizers dose of 120:60:60 NPK kg ha^{-1} was applied and biometricobservations on growth parameters, yield attributes and yield were recorded.
The *Bt.* cotton was sown by dibbling method on 05-07-2020 and 02-07-2021 during year 2020-2021 and 2021-2022, respectively Study revealed that the plant spacing of 120 cm x 45 cm recorded significantly increased growth attributes *i.e.* number of functional leaves, leaf area (dm^2), dry matter per plant (g), number of monopodial and number of sympodial branches per plant and yield contributing characters *i.e.* number of picked bolls per plant, boll weight (g), seed cotton yield per plant (g) as compared to plant spacing of 80 cm x 60 cmand 90 cm x 45 cm. The significantly taller plants were recorded with plant spacing of 90 cm x 45 cm as compared to other plant spacing's. Similarly maximum seed cotton yield (2076 kg ha^{-1}), stalk yield (4060 kg ha^{-1}), biological yield (6107 kg ha^{-1}), gross monetary returns (₹ 172681), net monetary returns (₹ 96331) and benefit to cost ratio (2.26) was recorded with plant spacing of 90 cm x 45 cm than plant spacing's of 80 cm x 60 cm and 120 cm x 45 cm. Plant densities did not evident any significant impact on cotton quality parameters. The growth parameters were influenced by various treatments of weed management practices. The growth parameters like plant height, numbers of monopodial and sympodial branches $plant^{-1}$, numbers of functional leaves $plant^{-1}$, leaf area $plant^{-1}$ and total dry matter accumulation $plant^{-1}$ were significantly higher in weed free (W_3) than other treatments andhowever, it was at par with the Stale seed bed technique + PoE Pyrithiobac Sodium 10% EC @ 62.5 g ha^{-1} + Quizolfop-ethyl 5% EC @ 50 g ha^{-1} + Straw mulching (W_1). Similar results were obtained in case of yield attributes like numbers of picked bolls $plant^{-1}$, and seed cotton yield $plant^{-1}$ were significantly higher in weed free (W_3).The weed free (W_3) recorded higher seed cotton yield (2336 kg ha^{-1}), stalk yield (4244 kg ha^{-1}) and biological yields (6580 kg ha^{-1}) than other treatments andhowever, it was at par with Stale seed bed technique + PoE

Pyrithiobac Sodium 10% EC @ 62.5 g ha^{-1} + Quizolfop-ethyl 5% EC @ 50 g ha^{-1} + Straw mulching(W_1). Boll weight was not influenced by weed management practices. Also, significantly higher gross monetary returns (₹193427), net monetary returns (₹108122) and benefit to cost ratio (2.26) was found in weed free (W_3) treatment. Post-harvest parameters such as ginning percentage, seed index and lint index, as well as fiber quality parameters like staple length, bundle length, fiber fineness, oil percentage and uniformity ratio were not significantly influenced by planting density and weed management practices during both years of the study.

Keywords: Planting densities, herbicides, stale seed bed. weed density, weed index.

Effect of Lead Nitrate on Germinating Characteristics of Rice (*Oryza sativa* L.)

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ABSTRACT

The worrisome condition of lead contamination in Southeast Asia had threatened the food and nutritional security of the ever-increasing human population, prompting the current inquiry. Five rice cultivars—HUR 1304, HUR 36, HUR 3022, HUR 1309, and HUR 109—were used in the current lab experiment, which included three levels of lead nitrate—control, 2 mM, and 4 mM—and three replications. In both the presence and absence of lead nitrate, the impact of lead nitrate on germination indicators, morpho-physiological, and biochemical parameters of seedlings was studied. According to the findings, the control had the highest levels of germination (%), radicle length, plumule length, dry matter seedling^{-1}, number of leaves seedling^{-1}, chlorophyll content, carotenoids, membrane stability index, and super oxide dismutase. Alpha amylose, total soluble sugar, soluble protein, catalase, and ascorbate peroxidase were all significantly greater in L2 (Pb (NO3)2 @ 4 mM) than they were in the control group. HUR 1304 stood out among the genotypes with longer radicle and plumule lengths. Nevertheless, during the course of the experiment, HUR 109 demonstrated noticeably higher sucrose, total soluble protein, catalase, and ascorbate peroxidase levels. All wheat cultivars with higher lead nitrate concentrations showed a decrease in germination percentage

Keywords: Lead nitrate, cultivars, ascorbate peroxidase, chlorophyll and morpho-physiological.

Effect of Crop Covers on Growth Yield and Quality of Green Chilli

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ABSTRACT

The experiment was conducted at the Instructional Farm, Department of Vegetable Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, to investigate the effect of different colors of crop covers on the growth yield and quality of chilli. The experiment was laid down in randomized block design with five treatments: T_1 - Standard package of practices without cover; T_2 – Absolute control without cover; T_3 - 17 GSM blue crop cover; T_4 - 17 GSM white crop cover; T_5 - 17 GSM red crop cover and was replicated three times. The need of the study was to reduce the incidence of sucking pests, minimize the excessive application of harmful pesticides, and enhance the quantity as well as the quality of green chilli production. The maximum plant height at 45 DAT

was recorded in treatment T3 (37.53 cm). Maximum number of primary branches (11.09), maximum leaf area (33.69 cm sq.), minimum days required to 50% flowering (46.68 DAT), maximum chlorophyll index (89.30), average number of fruits per plant (416.67), average fruit girth (4.78 cm), average fruit weight (6.12 g), maximum fruit yield per plant (2.58 kg), maximum yield per hectare (474.11 q) and minimum thrips and white flies population per three leaves (7.49) and (5.32) respectively were observed in treatment T_5.Significantly maximum benefit cost ratio (3.48) was observed in treatment T_4. From the above experiment, it was concluded that the treatment T_4 (17 GSM white color crop cover) was superior among all the treatments under Vidarbha climatic conditions.

Keywords: Chilli. crop covers, growth, yield and quality.

Studies on *In Vitro* Mutagenesis of Banana Cv. Grand naine

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ABSTRACT

The present investigation on banana cv. Grand Naine was carried out at, Tissue Culture Project unit and Instructional cum research farm of Department of Horticulture, VNMKV, Parbhani with an objectives to standardize the dose of gamma irradiation for production of *in vitro* raised banana plantlets. The shoot tips were to ^{60}Co gamma rays doses ranging from 0, 10, 20, 30, 40, 50 and 60 Gy @ 20 Gy/min. at BARC, Mumbai. The irradiated explants were sub-cultured (M_1V_0) onto shoot proliferation medium upto M_1V_4 generation and then transferred for rooting media to obtain rooted plantlets. Analysis of data was done by using Completely Randomized Design (CRD). The significance of different treatment under field conditions was analyzed using Randomized Block Design. Survival per cent and regeneration of shoot tip cultures was recorded 100 % and 94.41%, respectively in control treatment while 33.33% and 30.50%, respectively in treatment of 60 Gy. Days required for greening was required comparatively more in higher doses of irradiations i.e. 12.2 days in treatment of 60 Gy than control (3.9 days).The probit value ofLD_{50} value for Grand Naine is 42.56 Gy by using gamma irradiations. There was gradual decrease in multiplication ratios of *in vitro* shoot tip cultures of banana from M_1V_1 to M_1V_4generation..The maximum number of shoots per explants (3.90), number of leaves per shoot (4.60) and average shoot length (5.65 cm) and minimum numbers of days (10.24 days) for first leaf emergence were recorded in the treatment control over rest of the treatment under study. Significantly minimum number of shoots per explants (1.0), number of leaves per shoot (2.4) and average shoot length (2.77 cm) and maximum numbers of days for first leaf emergence (23.05 days) were recorded in the treatment applied with 60 Gy gamma irradiations followed by the treatment T_6. Regarding root characters, significantly maximum per cent rooting (100), length of primary root (6.2 cm), and number of roots per shoot (8.1) and minimum days for first root initiation (3.10 days) and days for complete rooting (21.45 days) were recorded in shoot tip cultures applied with 0 Gy gamma irradiationwhich was found statistically superior over rest of the treatments of irradiations under investigation. The treatment of 60 Gyrecorded significantly minimum per cent rooting (85.33 %), length of primary root (2.92 cm), and number of roots per shoot (2.9) and maximum days for first root initiation (27.8 days) and days for complete rooting (53.58 days).

Field Performance of Gamma Irradiated Banana Plantlets

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ABSTRACT

In present the shoot tip of banana cv. Grand Naine were established on MS medium containing 2 mg/l BAP were exposed to ^{60}Co gamma rays doses ranging from 0, 10, 20, 30, 40, 50 and 60 Gy @ 20 Gy/min. at BARC, Mumbai. Analysis of data for field conditions was analyzed using Randomized Block Design. In field conditions, the treatment control recorded maximum plant height (189.99 cm), stem girth (72.80 cm), number of suckers (4.46), number of leaves (21.8), leaf area (11.8 m^2) and leaf area index (8.75) over rest of the treatments under study. While the treatment T_7 recorded less plant height (163 cm), stem girth (56.57 cm), number of suckers (2.9), number of leaves (17.6), leaf area (7.8 m^2) and leaf area index (6.0). The results on shooting, bunch and finger characters showed that the treatment 0 Gy irradiation recorded significantly minimum days for flowering (209.9 days), days to fruit maturity from flowering (97.86 days) and crop duration (308.53 days) while bunch attributes *viz.*, bunch length (63.35 cm), number of hands per bunch (9.83), number of fingers per hand (16.1), number of fingers per bunch (155.26) and bunch weight (22.7 kg) of banana and finger attributes *viz.*, finger length (23.7 cm), finger girth (14.68 cm) and fingers weight (133.41g) of banana was recorded more as compared to remaining treatments of gamma irradiations under study. Regarding quality attributes, the control treatment recorded significantly maximum total soluble solids (23.5 %), total sugar (23.25 %) and reducing sugar (17.65 %) over rest of treatments under study while, the treatment applied with 60 Gy recorded less total soluble solids (20.91 %), total sugar (20.6 %) and reducing sugar (16.29 %). The acidity and non-reducing sugar differed non-significantly. Per cent disease incidence of cucumber mosaic virus and banana streak virus showed non-significant differences as affected by irradiations. The total mutation spectrum of irradiated plants was 14.22 % and showed predominance of plant stature type of mutant (31.34 %) with maximum mutation frequency (42.84 %), mutagenic effectiveness (0.12 Mp/kR) in treatment of 40 Gy. Maximum variability for various quantitative and quality parameters in field conditions were recorded in treatment applied with 40 Gy. Total 07 useful putative mutants (03 early maturing and 04 dwarf type) were selected at harvest from the wide range of M_IV_4 generation of gamma rays induced putative mutants population of Grand Naine for their performance and further utilization.

Effect of Gamma Irradiation on Banana Plantlets at Hardening

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In present investigation shoot tips were established on MS medium containing 2 mg/l BAP were exposed to ^{60}Co gamma rays doses ranging from 0, 10, 20, 30, 40, 50 and 60 Gy @ 20 Gy/min. at BARC, Mumbai. The irradiated explants were sub-cultured (M_1V_0) onto shoot proliferation medium (MS medium containing 2mg/l BAP). Further sub-culturing was performed at an interval of 30 days upto M_1V_4 generation and then transferred for rooting media (1/2 strength MS medium supplemented with 2 mg/l IBA and 3g/l activated charcoal) to obtain rooted plantlets. After four weeks in primary hardening, the plantlets were transferred to polybags containing 1:1 mixture of soil and farmyard manure and hardened for eight weeks in the green house. Analysis of data for laboratory and morphological characters in hardening process was analyzed by using Completely

Randomized Design (CRD). During hardening stage of M_1V_4 generation of banana plantlets revealed significant differences with maximum (16.8 cm) plantlet height, number of leaves (5.95), leaf length (17.60 cm), leaf breadth (11.8 cm), leaf area (23.71 cm^2), stem diameter (13.5 mm), number of roots (11.8) and chlorophyll content (48.95 Spad units) were recorded in the treatment control over rest of the treatments of irradiations under study. However, the treatment consisting of 60 Gy recorded minimum plantlet height (8.1 cm), number of leaves (3.43), leaf length (6.27 cm), leaf breadth (4.1 cm), leaf area (159.31 cm^2), stem diameter (7.9 mm),number of roots (3.8) and chlorophyll content (37 Spad units) followed by the treatment of 50 Gy. The total mutation spectrum of irradiated plants was 18.25% and showed predominance of dwarf shoot (74.41%) with maximum mutation frequency percent (54.74), mutagenic effectiveness (0.15 Mp/kR) in treatment of 40 Gy.

Studies on Floral Biology of Different Cultivars of Sweet Orange (*Citrus sinensis* (L.) Osbeck) under Marathwada Condition

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ABSTRACT
The present investigation entitled "Studies on performance of different cultivars of sweet orange (*Citrus sinensis* (L.) Osbeck) under Marathwada condition" was carried out at the instructional field of College of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The objective was to study the performance of different cultivars of sweet orange under marathwada condition and to study the floral biology and physicochemical characters of different cultivars of sweet orange. Experiment was laid out in Randomized Block Design (RBD) with nine treatments and three replications. Treatment comprimised of nine varieties viz. Washington Navel, Katol Gold, Pineapple, Sathgudi, Nucellar, Malta Blood Red, Jaffa, Valencia Late and Hamlin.Floral biology parameters viz. duration of flowering, flowering and fruiting habits, mode and time of anthesis, time of anther dehiscence and receptivity of stigma differed significantly in all the varieties under study. Nucellar variety recorded more duration of flowering (26.70 days) along with highest terminal flowering (40.20%). On other hand variety Hamlin recorded highest axillary shoots (47.50%) while mixed shoots (33.93%) was recorded in Sathgudi. Minimum duration of flowering (18.40 days) was recorded in Washington Navel. Lowest terminal shooting (24.50%), axillary shooting (27.42%) and mixed shooting (21.30%) were recorded in Valencia Late, Sathgudi and Katol Gold, respectively.Maximum mode and time of anthesis and time of anther dehiscence in all nine varieties was found between 10.00 am to 12.00 noon and variety Nucellar recorded maximum values for above characters. The percentage of fruit set was recorded maximum at 1 day before anthesis, on the day of anthesis and 1 day after anthesis in all the sweet orange varieties and maximum in Nucellar.

Effect of Foliar Application of Chemicals on Flowering And Yield of Pomegranate

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ABSTRACT
Present investigation was carried out at farmers field during the year 2020-21 in Randomized Block Design with eleven treatments and three replications. The experiment consisted of eleven treatment combinations viz.,T_1- Cycocel 1500 ppm+0.2% $ZnSO_4$+0.2% boric acid,T_2-Cycocel

2000 ppm+0.2% $ZnSO_4$+0.2% boric acid, T_3- Nitrobenzene 5ml/lit+0.2% $ZnSO_4$+0.2% boric acid, T_4- Nitrobenzene 7.5ml/lit+0.2% $ZnSO_4$+0.2% boric acid, T_5-Salicylic acid 100 ppm +0.2% $ZnSO_4$+0.2% boric acid, T_6- Salicylic acid 200 ppm+0.2% $ZnSO_4$+0.2% boric acid, T_7-Ethrel 2%+0.2% $ZnSO_4$+0.2% boric acid, T_8-Ethrel 3%+0.2% $ZnSO_4$+0.2% boric acid, T_9-Potassium nitrate 2%+0.2% $ZnSO_4$+0.2% boric acid,T_{10}-Potassium nitrate 3%+0.2%$ZnSO_4$+0.2% boric acid,T_{11}- control. The treatments were imposed through foliar application which was sprayed three times. The result obtained for flowering, yield and quality attributes had significantly influenced due to foliar application of different chemicals over control. Flowering parameters viz. less number of male flowers (45.1) was recorded in treatment T_8 while maximum number of hermaphrodite flower (185.20), total number of flower (234.89), less number of days taken from flowering to fruit set (25.27 days), less number of days taken from flowering to harvest (173.2) days was recorded in treatment applied with Cycocel 2000 ppm+0.2% $ZnSO_4$+0.2% boric acid, while more fruit set % (51.53) was recorded in treatment consisting of Salicylic acid 200 ppm + 0.2% $ZnSO_4$+0.2% boric acid. With regards to fruit parameters viz. maximum fruit length (10.37 cm), fruit diameter (8.76 cm), fruit volume (316.16 ml), fruit weight (295.90 g), number of arils per fruit (597.62),aril weight per fruit(225.01 g) and aril recovery (76.04 %) was recorded in treatment Potassium nitrate 3%+0.2%$ZnSO_4$ +0.2 % Boric acid. Treatment control where no sprays were given recorded minimum values for above fruit parameters. The yield parameters viz., maximum total number of fruits per plant at fruit set (91.99), more fruit retention (77.12%), number of fruits retained per plant at harvest (70.94), yield per plant (19.28 kg), yield per hectare (9.64 t/ha), was obtained in the treatment applied with Salicylic acid 200 ppm+0.2% $ZnSO_4$+0.2% Boric acid. Treatment control where no sprays were given recorded minimum values for above yield parameters.

Effect of Foliar Application of Chemicals on Quality and Economics of Pomegranate (*Punica granatum* l.) in Hasta Bahar

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ABSTRACT

Present experiment was carried out at farmers field during the year 2020-21 in Randomized Block Design with eleven treatments and three replications. The experiment consisted of eleven treatment combinations viz.,T_1- Cycocel 1500 ppm+0.2% $ZnSO_4$+0.2% boric acid,T_2-Cycocel 2000 ppm+0.2% $ZnSO_4$+0.2% boric acid, T_3- Nitrobenzene 5ml/lit+0.2% $ZnSO_4$+0.2% boric acid, T_4- Nitrobenzene 7.5ml/lit+0.2% $ZnSO_4$+0.2% boric acid, T_5-Salicylic acid 100 ppm +0.2% $ZnSO_4$+0.2% boric acid, T_6- Salicylic acid 200 ppm+0.2% $ZnSO_4$+0.2% boric acid, T_7-Ethrel 2%+0.2% $ZnSO_4$+0.2% boric acid, T_8-Ethrel 3%+0.2% $ZnSO_4$+0.2% boric acid, T_9-Potassium nitrate 2%+0.2% $ZnSO_4$+0.2% boric acid,T_{10}-Potassium nitrate 3%+0.2%$ZnSO_4$+0.2% boric acid,T_{11}- control. The treatments were imposed through foliar application which was sprayed three times. Regarding quality parameters viz.,Total soluble solids (15.8 %), reducing sugar (10.71 %), non-reducing sugar (2.57 %), total sugar (13.28 %), total soluble solids (14.21 %) and minimum titrable acidity (0.29%), of pomegranate fruit were recorded by treatment Potassium nitrate 3%+0.2% $ZnSO_4$+0.2% Boric acid. The economics of pomegranate cultivation revealed that gross return (Rs. 5,78,400), net return (Rs. 4,12,550) and B:Cratio (3.48) was recorded higher in treatment T_6 (Salicylic acid 200ppm+0.2% $ZnSO_4$+0.2% Boric acid) among treatments in present study. The minimum gross income (Rs. 3,02,400), net return (Rs. 1,51,400) and B:C ratio (2.00)

were under the treatment control. Hence, it can be concluded that, for getting higher yield and better quality of guava fruits with higher monetary returns and B:C ratio, the pomegranate trees should be foliar fertilized with Salicylic acid 200 ppm+0.2% $ZnSO_4$+0.2% Boric acid with three sprays.

Effect of Combination of Different Forms of Potassium and Micronutrients on Fruit Yield of Guava (*Psidium guajava* L.)

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ABSTRACT
An investigation was carried out at the experimental orchard at BSP farm, Department of Horticulture, College of Agriculture Parbhani during the year 2019-20.The field experiment was laid out in Randomized Block Design with thirteen treatments and three replications. The experiment consisted of thirteen treatment combinations viz.,T_1- KH_2PO_4 at 1% + $FeSO_4$ at 0.5%, T_2- KH_2PO_4 at 1.5% + $FeSO_4$ at 0.5%, T_3 - KH_2PO_4 at 1% + $ZnSO_4$ at 0.5%, T_4 - KH_2PO_4 at 1.5% + $ZnSO_4$ at 0.5%, T_5 - K_2SO_4 at 1% + $FeSO_4$ at 0.5%, T_6 - K_2SO_4 at 1.5% at + $FeSO_4$ at 0.5%, T_7- K_2SO_4 at 1% + $ZnSO_4$ at 0.5%, T_8-K_2SO_4 at 1.5% + $ZnSO_4$ at 0.5%,T_9-KNO_3 at 1% +$FeSO_4$ at 0.5%,T_{10}-KNO_3 at 1.5% + $FeSO_4$ at 0.5%,T_{11}-KNO_3 at 1% + $ZnSO_4$ at 0.5%,T_{12}-KNO_3 at 1.5% + $ZnSO_4$ at 0.5% and T_{13}- control through foliar application which was sprayed two times after fruit set at 15 days interval. The results revealed that the physical parameters viz. maximum fruit weight (246.3 g), fruit volume (220.6 ml), fruit length (7.86 cm) and fruit diameter (8.06 cm) was recorded in treatment T_{12}i.e.,KNO_3 at 1.5% + $ZnSO_4$ at 0.5%. The minimum values of fruit weight (195 g), fruit volume (170.04 ml), fruit length (6.00 cm) and fruit diameter (6.40 cm) were recorded in treatment T_{13} (control). The yield parameters viz., maximum number of fruits per tree (160.33), fruit retention (80.60 %), yield per tree (39.4 kg), yield per hectare (10.95 Mt per ha) and minimum fruit drop (19.84 %) was recorded by treatment applied with nitrate form of potassium at 1.5% combined with zinc sulphate at 0.5% in guava cv. Sardar. While the minimum number of fruits per tree (132.66), fruit retention (66.33 %), yield per tree (25.8 kg), yield per hectare (7.17 Mt per ha) and maximum fruit drop (33.67 %) was recorded by treatment control where no sprays were given. Hence, it can be concluded that, for getting higher yield of guava fruits, the guava trees should be foliar fertilized with KNO_3 at 1.5 % + $ZnSO_4$ at 0.5% with two sprays at fifteen days interval after fruit set.

Effect of Combination of Different Forms of Potassium and Micronutrients on Post-Harvest Quality of Guava (*Psidium guajava* L.)

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ABSTRACT
An investigation was carried out at the experimental orchard at BSP farm, Department of Horticulture, College of Agriculture Parbhani during the year 2019-20.The field experiment was laid out in Randomized Block Design with thirteen treatments and three replications. The experiment consisted of thirteen treatment combinations viz.,T_1- KH_2PO_4 at 1% + $FeSO_4$ at 0.5%, T_2- KH_2PO_4 at 1.5% + $FeSO_4$ at 0.5%, T_3 - KH_2PO_4 at 1% + $ZnSO_4$ at 0.5%, T_4 - KH_2PO_4 at 1.5% + $ZnSO_4$ at 0.5%, T_5 - K_2SO_4 at 1% + $FeSO_4$ at 0.5%, T_6 - K_2SO_4 at 1.5% at + $FeSO_4$ at 0.5%, T_7-

K_2SO_4 at 1% + $ZnSO_4$ at 0.5%, T_8-K_2SO_4 at 1.5% + $ZnSO_4$ at 0.5%,T_9-KNO_3 at 1% +$FeSO_4$ at 0.5%,T_{10}-KNO_3 at 1.5% + $FeSO_4$ at 0.5%,T_{11}-KNO_3 at 1% + $ZnSO_4$ at 0.5%,T_{12}-KNO_3 at 1.5% + $ZnSO_4$ at 0.5% and T_{13}- control through foliar application which was sprayed two times after fruit set at 15 days interval. The post-harvest quality parameters viz., maximum weight of pulp (244 g), reducing sugar (4.75 %), non-reducing sugar (4.40 %), total sugar (9.15 %), total soluble solids (14.21 %), ascorbic acid (139.66 mg/100g) and minimum seed weight per fruit (2.30 g), acidity (0.36 %) of guava fruit were recorded by treatment T_{12}i.e.,KNO_3 at 1.5% + $ZnSO_4$ at 0.5%. More shelf life (8.4 days) and minimum physiological loss in weight (11.77 %), fruit decay (24.7 %) during at ambient storage was also recorded under above treatment. However, minimum weight of pulp (188.96 g), reducing sugar (3.20 %), non reducing sugar (2.50 %), total sugar (5.78 %), total soluble solids (10.9 %), ascorbic acid content (102.26 mg/100g), shelf life (5.50 days) and maximum seed weight per fruit (2.89 g),acidity (0.58 %), physiological loss in weight (15.1 %), fruit decay (54.4 %) of guava fruit during ambient storage was recorded in treatment T_{13} (control). The economics of guava cultivation under the influence of various treatments of foliar application of different forms of potassium combined with different micronutrients showed a wide range of variation in cost of cultivation, monetary returns and benefit: cost ratio. The highest benefit: cost ratio (4.01) was recorded by treatment T_{12} i.e., KNO_3 at 1.5% + $ZnSO_4$ at 0.5% which have net monetary returns (Rs.328884.8). However, the lowest benefit: cost ratio (2.74) was recorded in T_{13} (control) with net monetary returns of (Rs.182800). Hence, it can be concluded that, for getting better quality of guava fruits with higher monetary returns and B: C ratio, the guava trees should be foliar fertilized with KNO_3 at 1.5 % + $ZnSO_4$ at 0.5% with two sprays at fifteen days interval after fruit set.

Real –Time Sensors for Application of Variable-Rate Spraying in Agriculture

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ABSTRACT

An increase in the world population triggers the rise of needs to meet the demands in agricultural production. The use of pesticides is inevitable for high efficiency in agricultural production. Chemical application of nutrients and pesticides is one of the most important and most hazardous agricultural operations. To improve the chemical efficacy, reduce chemical and labor costs, minimize labor hazards and reduce the harmful environmental damage, variable rate spray technology can be used. The sensor is used in variable rate spray technology to detect the target and its geometrical structural features. The control unit adjusts the spraying rate of the spraying device in real-time and the spraying amount is adjusted in real-time according to the geometrical structure of the plant. Due to changes in the entire canopy and the density of leaf, all parts of the canopy require precise spraying. The target detection systems have been developed using advanced methods such as laser scanning (LIDAR) and computer vision scanning systems or more simply ultrasound, infrared, and photo electric sensor systems. These sensors systems sense the plant canopy position and canopy features like shape, leaf density and distance from the spraying unit. Based on the information gathered by the sensing system control unit determine the position and quantity of chemical to be sprayed on the target. This system reduces the losses due deposition on the ground and loss in the air due to off-target spraying during the spraying operation as

compared to that of conventional spraying unite like conventional air blast sprayer, direct air jet sprayer and air assisted boom sprayers. This system controls the wastage of chemicals and environmental pollution caused by the chemicals.

Keywords: *Canopy features; Infra red; LIDAR; Machine Vision; Ultrasonic; Variable rate;*

Performance Evaluation of Bullock Drawan Planter for Millet Crop

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ABSTRACT

A study was carried out on performance evaluation of bullock drawn planter for millet crop at College of Agricultural Engineering, Raichur during the year 2020-21. The bullock drawn planter was tested for foxtail millet seeds at research farm, UAS, Raichur. Stationary seed plate with agitator shaft was used for seed metering. Test rig was used for millets to evaluate the performance of seed metering in laboratory at 3 different speed ratio levels (1.0, 1.5 and 2.0) and 3 number of cells size (3, 4 and 5 mm) with 3 levels of seed plate angle (0º, 15º and 30º). The selected dependent variables were uniformity co-efficient, missing index, multiple index and quality of feed index. Uniformity co-efficient was maximum in case of 0° seed plate angle and 5.0 mm cell size at speed ratio of 1.5. Missing index was maximum in case of seed plate angle of 30° and 3.0 mm cell size at speed ratio of 2.0. Multiple index was maximum in seed plate inclination angle of 30º and 5 mm cell size at speed ratio of 1.0. Maximum quality of feed index obtained at seed plate angle of 0º and 5 mm cell size at speed ratio of 1.5. Maximum seed rate obtained at seed plate angle 0º and 5 mm cell size at speed ratio of 1.0. Optimized operational parameters for foxtail millet seeds for sowing in field are speed ratio of 1.5, cell size of 3 mm and seed plate angle of 0º. Effective field capacity of millet planter was 0.24 ha h^{-1}. Field efficiency of millet planter was found as 85.7%.

Keywords: Uniformity co-efficient, missing index, multiple index, quality of feed index, seed rate and field efficiency.

Solar Powered Aquaponics for Improving Water Productivity

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ABSTRACT

Ever-changing modern agricultural systems (rural and/or urban) around the globe and in India are becoming more and more precise addressing the constraints of resources. Present scenario of basic resources *viz.,* water, soil, land and energy, either quality-wise or quantity-wise, is alarming for agricultural sector. The quality and quantity of water and soil is decreasing due to population growth, urbanization and resource mismanagement. Soil erosion and water pollution are worsening the situation. Per capita water availability in India has gone down from 6,042 cubic meter in 1947 to about 1,545cubic meter in 2011.Water scarcity has a huge impact on food production, Without water people do not have a means of watering their crops and, therefore, to provide food for the fast growing population an alternative method should be bought in action.

Solar powered aquaponics could serve as one such solution for solving water, land and energy crisis problem by saving 90% of water. Aquaponics refers to any system that combines conventional aquaculture (raising aquacultural animals such as snails, fish, cray fish or prawn in tanks) with hydroponics (cultivating plants in water) in a symbiotic environment. This resource efficient system will effectively tackle the limited resource problems. As the system will promise two types of marketable products using same quantity of resources, there is every possibility of "Doubling the farmers' income" with assured market security. As a part of IFS aquaponics can serve as a boon for farmers to support their livelihood, as crop fails aquaculture will come for support and if aquaculture fails crop can come for the rescue. Aquaponics can also serve as a tool to control the problem of water scarcity by reusing the utilized water –same water for crops as well as aquaculture.

Keywords: Aquaphonics, water saving, productivity

Assessment of Soil Pollution

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ABSTRACT

Soil pollutionhas increased over the last decades and may be at risk for human and ecological health. The main causes of soil pollution are associated with human activities, resulting in the accumulation of contaminants in soils that may reach levels of concern. Soil pollution hampers the achievement of Sustainable Development Goals, including achieving zero hunger, ending poverty, ensuring healthy lives and human well-being, halting and reversing land degradation and biodiversity loss and making cities safe and resilient. The main reason why the soil becomes contaminated is due to the presence of manmade waste. The soil is made more fertile by the waste that comes from nature itself, such as decayed fruit and vegetable waste, animal corpses, and dead plant waste. However, our waste products are full of chemicals that are not originally found in nature and lead to soil pollution. Soil pollutants include a wide variety of contaminants (organic and inorganic chemicals), which can be derived from anthropogenic related activities, or naturally occurring in soil. Soil quality monitoring may be a hard task due to the lack of well-stated monitoring variables and indicators. On the other hand, the pressure on soil quality and the need for sustainability of soil fertility is ever increasing due to the issues related to the world's population increase. Therefore, due to the combination of all the above-mentioned issues, the soil pollution becomes a hot topic. The main aspects of soil contamination and demonstrates the main causes and types of soil pollution such as waste disposal, mining, agrochemicals, industry and atmospheric deposition.

Keywords: Soil pollution, waste disposal, Soil quality, organic and inorganic chemicals.

Hi-Tech Horticulture Technology: Aquaponics as Profitable Income for Small and Marginal Farmers

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ABSTRACT
Hi-tech Agriculture is primarily refer to a commercial farming system that aims to suit the needs of both domestic and export markets. It makes use of farming technology to increase yields, ensure high quality (usually pesticide-free) and optimise market value. Aquaponics is a type of bio-integrated system that connects recirculating aquaculture with hydroponic vegetable, flower and herb production. It establishes a symbiotic relationship between water organisms and plants in a system. The technology has the potential to be utilised for commercial or community-based urban food production, industrial scale production in rural areas, small-scale farming in destitute countries and educational and ornamental systems inside buildings. It has been concluded that there are so many potential uses and implementation contexts for the technology, benefit impacts must be taken into account separately. In addition, because communities, rural and urban infrastructure, and policy contexts are so complex, more research and data collection are needed to fully evaluate all benefit aspects.
Keywords: Aquaponics, Production, Small Scale farming

Impact of Pre and Post Emergence Herbicides on Soil Carbon Fraction and Chemical Properties in Sweet Corn.

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ABSTRACT
Field experiment was conducted at College of Agriculture, Dhule during Kharif 2019 to study the "Impact of pre and post emergence herbicides on soil carbon fraction and chemical properties in sweet corn". All the treatments of pre and post emergence herbicide application were statistically at par in respect of organic carbon fractions viz., total organic carbon, Walkley-black carbon, water soluble carbon, soil microbial biomass carbon, permanganate oxidizable carbon, particulate organic matter carbon and humic acid and fulvic acid at harvest of sweet corn. The total organic carbon, Walkley-Black carbon, water soluble carbon, soil microbial biomass carbon, permanganate oxidisable soil carbon, particulate organic matter carbon, humic acid and fulvic acid was decreased by 9.86 to 10.90%, 17.62 to 18.15%, 12.02 to 12.32%, 13.15 to 14%, 9.57 to 9.94%, 30.23 to 30.93%, 25.30 to 26.74% and 26.64 to 28.15% in the treatments of pre and post emergence herbicides (T3 to T10) over the initial values of 104.2 g kg^{-1} , 5884 mg kg^{-1}, 82 mg kg^{-1}, 130 mg kg^{-1}, 138 mg kg^{-1}, 668 mg kg^{-1}, 13.91% and 7.28%, respectively. The per cent decrease over initial value in organic fractions in the herbicide treatments at harvest of sweet corn was comparatively less as compared to the treatment of weed free check (T2). The treatment of weedy check (T1) recorded significantly higher soil organic carbon of 5.51 g kg^{-1}. The periodical soil available N was significantly influenced at 7, 15, 21, 30 and 45 days after application due to application of pre and post emergence herbicides to sweet corn. At harvest of sweet corn, the application of halosulfuronmethyl @ 90 g ha^{-1} as post emergence recorded significantly higher soil available N (208 kg ha^{-1}), available P (17.11 kg ha^{-1}) and available K (333.33 kg ha^{-1}). The

treatment of weedy check (T1) recorded significantly lower soil available N (195.33 kg ha^{-1}), available P (15.33 kg ha^{-1}) and available K (306.44 kg ha^{-1}).
Keyword: Soil carbon, Halo-sulfuron-methyl, Walkley-black carbon, Humic acid and Fulvic acid

Effect of Potassium and Zinc Application on Sunflower (*Helianthus annus* L.) Growth, Nutrient Uptake, Yield, and Quality in Inceptisols.

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ABSTRACT
At Oilseed Research Station, Latur, a field experiment named "Effect of potassium and zinc application on growth, nutrient uptake, yield, and quality of sunflower (*Helianthus annus L.*) in Inceptisols" was conducted in the 2018 Kharif growing season. Eight treatment combinations and three replications made up the experiment's RBD design. The findings of a field study on how sunflowers responded to potassium and zinc treatment revealed a substantial impact on sunflower growth, nutrient absorption, yield, and quality. By applying potassium and zinc combined with RDNP, the growth parameter, including leaf area, chlorophyll content, and number of filled seeds, considerably enhanced. With the application of treatment RDNP + 60 kilogramme K_2O ha $^{-1}$ + 25 kg $ZnSO_4$ ha $^{-1}$, the availability and absorption of N, P, K, S, and Zn were at their highest levels. With the application of RDNP + 60 kg k_2O ha $^{-1}$ + 25 kg $ZnSO_4$ ha $^{-1}$, additional yield metrics, including seed and straw yield as well as quality parameters like test weight, protein, and oil content of sunflower, were dramatically raised. Furthermore, the application of T8 (RDNP + 60 kg K_2O + 25 kg $ZnSO_4$ ha^{-1}) and T7 (RDNP + 45 kg K_2O + 25 kg $ZnSO_4$ ha^{-1}) as compared to control considerably boosted the growth parameter, accessible soil nutrients, nutrient absorption, yield, and quality parameters of sunflower. When compared to control, the treatment T5 (RDNP + 60 kg K_2O ha^{-1}) significantly improves yield and quality. Thus, it was determined that, based on soil test results, the application of macro and micronutrients greatly boosted production and quality. So, for sunflower to thrive best in Inceptisols, balanced fertilisation of potassium and zinc coupled with RDNP is recommended.
Keyword: Inceptisols, Sunflower (*Helianthus annus L.*), $ZnSO_4$, Potassium and Zinc & RDNP

Assessing Marketing Effectiveness of Lavender across Various Value Chains in Garhwal Himalayas of Uttarakhand

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ABSTRACT
Marketing efficiency pertains to how effectively a marketing system allocates resources and produces optimal value for all stakeholders in the value chain, encompassing producers, intermediaries, and consumers. This entails maximizing the utilization of resources such as time, money, and labor to minimize waste and enhance profitability for all stakeholders. Marketing efficiency is frequently assessed using metrics such as the farmer's share in the consumer's rupee, marketing margin, and price spread. The aim of the current study was to examine the marketing

effectiveness and value chain of Lavender in the Garhwal Himalayas of Uttarakhand. The process of mapping aided in the identification of points in the chain where transactions take place. The price spread is high in value chain I. Value chain II showed the least expensive costs and marketing margins for Lavender bulbs, primarily because of the direct sale of the product to retailers before, during, and after the pandemic. Value chain II demonstrated greater marketing efficiency, resulting in a higher percentage of the consumer's rupee going to the farmers. This was due to lower marketing costs and fewer intermediaries involved, resulting in the farmer's share ranging from 9.86 to 13.52 percent for bulbs before, during, and after the pandemic.

Keywords: Value Chain, Marketing Efficiency, Marketing Margin, Price Spread, Lavender, Marketing Cost

Physical, Textural, and Sensory Analysis of Developed Ready-To-Eat Snacks Using Persimmon (*Diospyros kaki*) Fruit Powder, Soy Protein Isolate and Maize (*Zea Mays*) Flour Blend

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ABSTRACT

Persimmon pulp with soy protein isolate as foaming agent were analyzed for physico-chemical parameters then freeze dried into powder. Foam mat freeze dried powder were further analyzed and the treatment found superior on the basis of physico-chemical analysis were used for the development snacks with maize flour in different ratios viz 0, 10, 20, 30, 40, 50 per cent, respectively. The developed snacks were packed and stored for 180 days under ambient conditions to ascertain the changes in physico-chemical, sensory attributes and microbial count. Foam mat freeze dried powder developed from persimmon fruit pulp in the ratio of 50:50 were found superior on the basis of physico-chemical analysis analysis and used for the development of snacks with maize flour in the ratio of 10,20,30,40 and 50 per cent respectively.The treatments,T_6 (50:50) (M:PPPI) snacks were adjudged superior with better retention of moisture content (3.80 per cent), crude protein (18.07 per cent), crude fat (0.59 per cent), crude fibre (1.39 per cent) during 180 days of storage respectively. Scanning electron microscopy showed fissures and unfolding structures in the treatments i.e T_6 (M: PPPI :: 50:50. Which are desirable for good qualitysnacks. FT-IR absorption spectra of developed foam-mat freeze died persimmon powder of treatment T6 (PP: SPI :: 50:50) with soy protein isolate. It showed spectra band at 3415.50 cm-1 and 3436.60 cm-1 have slight variation in peak intensity. The highest texture scores of 4800 g force persimmon were observed in treatment (T6) in developed snacks i,e T6 (M: PPPI :: 50:50, which decreased with the advancement of storage period.During texture analysis The firmness of persimmon fruit powder was found to be 62 gram force (gf) which can also be mentioned as 62 Newton (N).While as the firmness of persimmon fruit powder after mixing with the soy protein islotae was found to be 93 gram force (gf) which can also be mentioned as 93 Newton (N).Sensory attributes were found superior in terms of colour, texture, flavor, taste and overall acceptability during 180 days of storage. Microbial analysis showed that the treatments (T6) in the developed snacks were found to be safe and economically feasible.

Keywords: Persimmon, soy protein isolate, foam mat freeze drying powder, protein rich snacks.

Problem Soil: Types, Causes, Effects and Reclamation

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ABSTRACT
Problem soils are those soils whose quality and the ability to sustain life have diminished over time as a result of human and natural interventions. Such soils have caused ample land destruction leading to its abandonment and reduction, further resulting in serious environmental issues. Soil not only serves as one of the major reservoirs of nutrients for its flora and fauna, including the micro biota, but also as their habitat. Since plants, microbes and other soil dwelling creatures contribute to a healthy ecosystem, any disturbance in the source of their nutrition and habitat will adversely affect the ecosystem. Owing to this, soil reclamation has become an important integrant in sustainable development strategies in India. According to estimates by ICAR (Indian Council of Agriculture), the area under problem soils has increased from 220 lakh ha (2005) to 243 lakh ha (2010). In this light, the types, causes and effects of problem soils were studied along with their possible reclamation strategies. Use of certain materials such as wheat straw, sugarcane bagasse ash etc. for restoring the structure of soil was explored as well. This poster presents an analysis of various types of problem soil, its causes, effects on environment and their possible reclamation tactics. In conclusion, the aim of this poster was to provide both guidance and reference for cost-effective and ecofriendly reclamation strategies for problem soil.
Keywords: Biopolymer, wheat straw, anthroposols, soil enzymes, soil crusting, fluffy paddy soils

Impacts of Soil Mining on Agro-Ecosystem, Environment, and Health: Risk Assessment and Rehabilitation Measures

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ABSTRACT
Soil mining is one of the leading causes of generating waste rocks and deterioration of soil in terms of fertility and contamination. The mining industry not only provides elements for the innovation of the future but also contributes to providing jobs and the economy of nations. Moreover, there are also a number of negative impacts of mining across all levels, i.e. environmental, agricultural, and health. In developing nations, mining is also associated with the abandonment and shrinkage of agricultural land. Agriculture productivity directly depends on soil quality i.e. biology of the soil, its organic content, availability of nutrients, and other physical attributes. Ecological restoration and mine rehabilitation are the major components of sustainable development strategies. Therefore, in this poster, emphasis has been given to the impacts of mining on agriculture in terms of nutrient loss, contamination, ion imbalance, and complete loss of fertility along with remediation strategies for various mining-affected problem soils. Conclusively, this poster aims to provide guidance towards the sustainable development of an agroecosystem as well as provide a reference for the reclamation of mining-affected agricultural lands and other relevant fields.
Keywords: Acidic soil, Permeable soil, coal mine, cobalt mining, hydroelectric projects

A Novel Physiological Approach for Thermotolerant Genotypes in Chickpea (*Cicer arietinum* L.)

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ABSTRACT
Pulses have been described as a "poor man's meat and affluent man's vegetable" in India. Chickpea (*Cicer arietinum L.*) is the third most legume crop grown during rabi season under receding soil moisture.Chickpeas is known to flourish in drought-prone conditions, but it seems to be sensitive to heat stress exceptionally during reproductive development, resulting in considerable yield loss. The performance of chickpeas under heat stress is more variable. It is crucial to develop screening tools to identify thermotolerant chickpea genotypes because of the increase in average global temperatures. In this view, a lab experiment was conducted to standardize the temperature induction response (TIR) protocol for chickpea seeds. The 70 % hydrated seeds were used for the experiment. This technique can be used as a potential tool to identify and select temperature tolerant lines at the seed stage itself from a large population. A set of six chickpea genotypes were screened for intrinsic tolerance using the standardized Thermo Induced Response (TIR) protocol. Among the genotypes JG-14, JG-11 and A-1 showed highest thermo tolerance in terms of higher survival of seeds (germination percentage) and seedlings with less per cent reduction in seedling survival, root and shoot growth. The genotypes with intrinsic heat tolerance can be explored for the development of varieties suitable for late sown conditions in Karnataka where chickpea is prone to terminal heat stress. The results of the study concluded and standardized the sub lethal temperature as 32 ºC to 50 ºC for 5 hours and 30 min,lethal temperature *i.e.,* challenging temperature as 58 ºC for 3 hours and LD 50 as 52 ºC for 3 hours at seed level itself.
Keywords: Chickpea, Lethal temperature, Sub lethal temperature, LD 50 thermotolerance, Seed level

Drought Management Practices to Sustain Crop Productivity and Farm Income in Red and Black soils of Semi-Arid Tropics of south India

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ABSTRACT
Around a 29% increase in the frequency and duration of droughts has been reported worldwide since 2000. According to a UN report, by 2030, drought will displace an estimated 700 million people worldwide. Among all-natural disasters, drought is a common and frequent thus causing significant agricultural and other economic losses in the world and in India (Sharma Ashish, 2019). Nearly 68% cropped area in India are drought-prone. From 1801 to 2016, the country faced 44 drought years largely due to inadequate or erratic rainfall. 1972, 1987, 2002, 2009 and 2015 were the severe drought years among all. Nearly 16% of the Country's total area is drought prone and annually about 50 million people in the country are exposed to the crisis of drought. A total of

68% of sown area is subject to drought in varying degrees. Most of drought prone areas lie in the arid (19.6%), semi-arid (37%) and sub-humid (21%) areas of the country that occupy 77.6% of its total land area of 329 million hectares.The World Bank estimates that up to 216 million people could be forced to migrate by 2050, largely due to drought, together with other factors such as water scarcity, declining crop productivity, sea-level rise and overpopulation (The World Bank, 2021).Climate change also has been acknowledged as a threat to cause drought-like extreme events (Patil et al., 2023). Hence, drought can be managed by conserving both rainwater *in-situ* and top fertile soil by adopting suitable soil and rainwater conservation practices including appropriate tillage practices at farm level and treating whole area through watershed management. Further adopting location specific improved crop management practices through adoption of improved location specific crops and its varieties/hybrids, cropping systems including Agro-forestry, Agro-Horti-silvi system and animal husbandry through location specific farming systems that improve and sustain biomass and income varying from 10 to 70%. Further by use/incorporation of excess organic residues that are realized in the fields to conserve rainwater, improve soil properties and sustain crop productivity. Even use of microbial culture plays a greater role in combating drought and improving the crop productivity (5-20%). In the arid to Semi-Arid region of south India along with land and crop management practices, adopting livelihood activities like dairy, sheep and goatry, backyard poultry, carpentry, blacksmith, masonry, tailoring plays a greater role in improving and sustaining income of the people/farmers in the region.

Conclusion: To combat drought of different intensities adoption of natural resource management on watershed basis with improved crops and cropping/farming systems along with livelihood activities sustains the farm productivity and income of the farmers in the Arid to Semi-Arid regions of south India.

Keywords: Drought, Crop Productivity, Farm Income, Livelihood Activities, Rainwater Conservation

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Assimilate Partitioning in Stone Fruits

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ABSTRACT

Different physiological processes and environmental and agronomic factors govern the assimilate partitioning in fruits, which are economically significant sink organs. Xylem and phloem transport the majority of the water and solutes necessary for fruit and seed development. Bundles of

vascular tissue enter the base of the stone fruit, then divide to furnish the flesh and the seed, respectively. Stone fruits predominantly accumulate fructose, glucose, and sucrose, along with other minor saccharides. The mechanisms of phloem loading in these fruit species have not yet been elucidated, but the available data indicate either an apoplastic or a symplastic type, or presumably a combination of both, depending on the species and the sugar in question. Similarly, phloem release mechanisms, which have only been elucidated for a handful of species, are dependent on genotype and developmental stage. Surprisingly, the main enzymes and transporters involved in the major sugar conversion and transport processes have garnered a great deal of interest. The presence of more fruits alters the source-sink balance of stone fruit trees, thereby intensifying competition between fruits and between vegetative and reproductive growth. The primary environmental factors influencing this equilibrium, as well as the agronomic and artificial manipulations of source-sink relationships for adequate produce production and quality.

Keywords: Vascular Tissue, Source-Sink Relationships, Assimilate Partitioning, Phloem Loading, Stone Fruits

Effect of Potting Mixture on Growth and Development of Quality Planting Material of *Bambusabalcooa.*

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ABSTRACT

An experiment was conducted to find a suitable pot mixture for improving the vigor of the seedlings in *Bambusabalcooa*. Pot mixture containing garden soil + FYM in 1:1 ratio recorded the maximum seedling height (93.75 cm), number of branches (3.25), base diameter (7.50 mm), no. of internode (8), internode distance (11.25 cm) and weight of tiller (119.50 gm)

Keywords: Bamboo, *Bambusabalcooa*, neemcake, poultry manure and Vermicompost.

Evaluation of Promising Multivoltine Parents of Silkworm, *Bombyx mori* L. under Marathwada Conditions

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ABSTRACT

Many potential multivoltine accessions have been identified which are performing better for multiple traits to meet the present demand for utilizing them in various silkworm breeding programmes. Breeders want such sure and carefully evaluated silkworm genetic resources for inclusion in the breeding programmes in addition to develop region and season specific breeds for varied agro climatic conditions in such contexts this study would be of much value. Hence, in the present study an attempt made to evaluate five parental multivoltine breeds *viz.*, BL_{24}, BL_{67}, MY_1, Hosa Mysore and Pure mysore of *Bombyx mori* L. brought from the CSGRI, Hossur with an objective to evaluate the performance for economic traits, valuable to silkworm breeding under Marathwada conditions at Sericulture Research Unit, Vasantrao Naik Marathwada Krishi Vidhyapeeth, Parbhani during monsoon 2021 and 2022. Observations on the different economic traits of silkworm, *Bombyx mori* L. were taken. The perusal of the pooled data of two years reveals

that the fecundity was recorded from 431.50 (MY_1) to 486.88 (BL_{67}) and hatching per cent ranged from 91.20 (BL_{24}) to 95.92 (Pure mysore). The ten larval weights varied in the range of 17.38 to 24.55 g whereas, larval duration was observed in the range of 19.54 days to 28.80 days. Single cocoon weight 1.103 (Pure mysore) to 1.360 (MY_1 g). Single shell weight 0.150 to 0.241 g. Maximum shell weight recorded in BL_{67} (0.241 g), Shell percentage ranged from 13.68 per cent (Pure mysore) to 18.22 per cent (Hosamysore). Maximum filament length was recorded by BL_{67} (628.13 m). Maximum yield per 10,000 larvae brushed was recorded by MY_1 (13.60 Kg) followed by BL_{67} (13.31 Kg) were observed significantly superior parent compared to others. These findings are important for breeding programs for evolving superior quality multivoltine and also to be used as potential parents to gain heterosis in cross breed development for better post cocoon traits.

Keywords: Multivoltine, *Bombyx mori* L.

Agro-Tourism: A Crossroad of Tourism and Agriculture for Income Generation in Maharashtra state.

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ABSTRACT

Agri-tourism can be defined as a form of **commercial enterprise that links agricultural production and/or processing with tourism** to attract visitors onto a farm, ranch, or other agricultural business for the purposes of entertaining and/or educating the visitors while generating income. Agro-Tourism gives farmers an opportunity to earn extra income; it helps redistribute economic resources in the country from cities and increases the chances of rural people getting income. This generated the large no of visitors for the farm area. The purpose of Agri-tourism is to acquaint onset with agricultural products including entertainment. The Maharashtra state is pioneer for development and promotion of Agri-Tourism. At present there are more than 350 Agri-Tourism centres spread across the 30 districts of Maharashtra, the pioneer districts are Pune, Solapur, Nashik, Nagpur, Kolhapur, Ratnagiri, Sindhudurg, Thane, Sambhaji Nagar, Jalna, Dhule, Jalgaon etc. In Single Solapur district more than 35 seasonal and 18+ permanent agri-tourism centres are running and earning yearly net profit from Rs. 2.5 lakhs to 25 lakhs with generation of employment to 3-9 youth per centres. Agro-tourism is upcoming as a innovative way of enhancing farming income, sale their produce at higher price and generation of employment to greater extent. Farmers of Maharashtra maintaining good standard of household and farm hygiene, ensuring a heart-warming experience for tourists. Tourists can buy farm-fresh / value added produce in the goodness of nature, enjoy farming with a difference where new ideas for growth can be cultivated. It also helps tourists to understand the process of food production, the life of rural masses and cultivate relationship and better understand their needs. The output of more than 320 agri-tourism centres in Maharashtra are seen that the farmers are selling the produce / value added products at higher prizes than APMC rates, creation of jobs for family members or even locals, it opens a venue of sharing farming experiences to urban peoples and bring some real food home. Also the visits are exceeded more than 10 lakhs per year with turnover of more than Rs.20-25 crore . Hence the public and private stakeholders should support the agri-tourism as a new paradigm.

Keywords: Agri-tourism, entrepreneurship, outcome

Variability Studies in Seed Characteristics of *Ulmusvillosa* Brandis collected from Different Sources in Kashmir Valley of J&K U.T

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ABSTRACT

The aim of the study was to examine the variation in *Ulmusvillosa* Brandis seed sources. Seeds were collected from trees in fifteen randomly selected sites across five districts in Kashmir. One tree of uniform age was selected from each site using the check tree method. The study found significant differences in seed morphology (size, weight, and the average number of filled and empty seeds) and seed germination parameters (germination percent, mean daily germination, peak value, germination energy, and germination value) among different seed sources. The results showed that seeds collected from Bijbehara-Anantnag had the highest mean values for length (12.91mm), width (4.72mm), weight (5.62g), and the average number of filled seeds (7.50). The highest number of empty seeds per cluster was observed in the Anchidora-Anantnag site (8.50). Seeds from Bijbehara-Anantnag also had the highest germination percentage (84.30%), mean daily germination (3.01), peak value (3.78), germination energy (56.64), and germination value (11.37). The study also found considerable variability in phenotypic and genotypic variance, their coefficient, and narrow sense heritability. The germination value exhibited the highest phenotypic and genotypic coefficient of variance (61.29 and 56.06, respectively), while the seed length had the lowest values for both (7.77 and 6.21, respectively). Narrow sense heritability was high for all the characters, with the maximum value for seed weight and the average number of filled seeds being 77.1%. Germination energy had the lowest heritability (61%). Genetic advance was highest in seed germination percentage (16.03), while mean daily germination had the highest values of genetic gain (65.83). Furthermore, a correlation study was conducted among the different traits studied during the investigation, revealing that most seed traits (length, width, weight) were positively correlated with corresponding germination traits (percentage, energy, value, peak, mean daily germination).

Keywords: *Ulmusvillosa*, Seed source, Variability, Kashmir

Sun Exposure Effects on Human Skin

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ABSTRACT

As we all known that vitamin D is very essential for our body and its obtained from the sun rays, but in today's era of globalization as the climate is changing, it seems as the heat of sunlight is increasing day by day. Due to high exposure of sun light human beings are facing different types of skin related disease. The ultraviolet rays emanating from the sun are causing a lot of damage to the skin. The impact of climate change has been significant enough to endanger human health both directly and indirectly via heat stress, degraded air quality, rising sea levels, food and water security etc. too much exposure to ultraviolet rays can lead to various skin diseases. Ultraviolet rays can travel more deeply into the skin when UV rays enter skin cells, they upset delicate processes that effect the skin's growth and appearance.

Over time, UV damage can take a toll on our skin and its underlying connective tissue. As a result our skin may develop more wrinkles and lines. Too much sun exposure can also raise our risk for skin cancer, melanoma etc.

Skin related disease with the effect of sun light

Photoaging- When the sun prematurely ages the skin this is called Photo aging and this can lead to skin cancer. Photo aging differs from chronologic aging: the damaging effects of UV rays from the sun of artificial tanning sources after normal skin structures.

Actinic keratosis- Actinic Keratosis are precancerous growths caused by long-term sun exposure. These growths are usually pink, red or less commonly gray or brown. They feel rough and scaly.

Skin cancer- Skin cancer is often caused by UV light exposure from the sun and it is most commonly seen in sun-exposed areas of your skin, your face, ears, neck, arms, hands and legs. It results in sunburn and blistering. UV rays from the sun damage DNA in our skin, causing abnormal cells to form. These cells rapidly divide in a disorganized manner, forming a mass of cancer cells.

Xeroderma pigmentosum- People who have an extreme sensitivity to sunlight are born with a rare disease known as XERODERMA PIGMENTOSUM. They must take extreme measures to protect their skin from UV light. Most children who have xeroderma pigmentosum develop skin cancer before reaching 10 years of age.

Melanoma- Melanoma, the most serious type of skin cancer, develops in the cells that produce Melanin- The pigment that gives your skin its colour.most often develop in areas that have had exposure to the sun, such as our back, legs, arms and face.

Endophytes towards Biotic Stress Management for Sustainable Food Production

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ABSTRACT

The Kashmir valley in India is one of the major and quality saffron (*Crocus sativus*) producing areas in the world. Unfortunately, the area has been continuously experiencing a declining trend in the production of saffron. Poor disease management is one of the major constraints that is negatively affecting saffron production in Kashmir. The fungal pathogen, *Fusaium oxysporum* is the prominent causal agent of saffron corm rot. Coping with the negative impacts of climatechange , we have to find green sustainable solutions against plant pathogens. Endophytes are plant symbionts that inhabit the plant tissue without showing any disease symptoms. Number of research reports herald the biocontrol potential of endophytes.They are known to offer control against many diseases of host plants. In the present study endophytes isolated from healthy saffron corm were assessed for their antagonistic potential against causal organism of saffron corm rot , *Fusarium oxysporum*. Bacterial and fungal endophytes were isolated from healthy saffron corm by surface sterilization method. *Fusarium oxysporum* was isolated as causal organism of saffron corm rot. Twenty fungal and twenty six bacterial endophytes were assessed for their antifungal potential against *F. oxysporum* by dual culture method. Endophytic bacterial isolate

Bacillus sps. TS4, inhibited 75% growth of F.oxysporum whereas endophytic fungal isolate *Penicillium sps.* TS18, inhibited 65% growth of F.oxysporum. After further screening, selected endophytic microbes can be successfully used as a potential microbial consortia for saffron corm rot management. It will prove to be a successful step towards use of green technology for sustainability in general and plant pathogen control in particular.

Keywords: Corm rot, Saffron, Sustainability, Green technology

Soil Chemical Properties and Nutrient Turnover in Temperate Agroforestry Systems of Kashmir valley

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ABSTRACT

The present study was carried out in district Ganderbal of Kashmir Valley during 2017 and 2018. The study was undertaken to access soil nutrient dynamics in agroforestry systems and is very crucial as it influences the amount of biomass production and availability of soil nutrients in the soil and overall controlling the nutrient cycling in Situ and Ex-situ. Two years data was recorded and presented in pooled form. In Home garden the tree species included Poplar and Salix on the boundaries fruit trees included Apple and Pear. The *Rabi* crop components was turnip, radish and kale whereas, chilli, beans and kale in *kharif* season. In Horti-agriculture system fruit trees included mainly apple and crop component in *Rabi* included kale, turnip, radish and *kharif* crops were beans, knol-khol and kale.Boundary plantation Poplar and Salix planted on boundaries and crop components in *Rabi* included oats/mustard while paddy during the *Kharif* season and in Horti-silvi-pasture most of tree component included Poplar and Salix. The fruit trees mainly included apple and prominent natural. For soil analysis samples were collected at two different depths i.e. 0-30 cm and 30-60 cm for pH, EC. Soil pH was found to be slightly acidic to neutral in reaction in all the four prominent agroforestry systems. Maximum pH was recorded as 6.85 in month M_1 (May), while minimum value 6.80 was recorded in the month M_4 (Nov).Monthly observations show significant difference. However months (M_1& M_2), (M_2& M_3) and (M_3& M_4) were at par. The interaction results revealed non significant difference. Soil EC (dSm^{-1}) decreased with increase in soil depth, maximum EC (0.32 dSm^{-1}) at depth D_1 under Home gardens and minimum (0.15 dSm^{-1}) at depth D_2 was found under Horti-agriculture systems. Annual maximum nitrogen turnover 11.2% was recorded in Horti-silvi-pasture system while maximum phosphorus turnover 1.76% was recorded in Home garden and maximum potassium 5.86% was recorded in boundary plantation.

Keywords: Home gardens, Horti-agriculture, Boundary plantation, Horti-silvi-pastoral, turnover.

Impact of Climate Change on Soil Health

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ABSTRACT
The climate changes are happening mainly due to global warming. In present context it has become serious challenges for sustainable agriculture around the globe. The unpredictable pattern of rainfall and changes in global temperature will leads to serious problem of soil erosion and loss of fertile soil and thereby affected on healthy properties of soil *viz*., Organic carbon, alkalinity, pH and nutrients and physicochemical properties. Heavy shower in some region will cause high erosion. IPCC (2007) also reported an enhanced runoff in several parts of the world including Indian subcontinent. This excess quantity of water may not be available to be used in farming and will waste as runoff (93.7 m ha) will leads to flood in several areas. Recently it has observed in arid zone of Rajasthan where Barmer, Bikaner district were experienced the flood like situation. The increased melting of the glaciers and icecap due to rise in global temperature will also cause flood in plain regions and foot hills. Indian Himalayan glaciers have shown overall reduction of 2177 sq km, and an overall degradation of 22 %. This type of enhanced melting of Himalayan icecap and glaciers could affect the availability of irrigation and cause poor soil health in terms of soil health indicators.

Role of Cytokinin in Abiotic Stress Management

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ABSTRACT
Abiotic stress such as drought, salinity, high or low temperature and nutrient deficiency can significantly impact crop productivity and quality. Cytokinins are plant growth hormones that play vital role in plant growth and development, including the response to abiotic stress. Cytokinins can stimulate root growth and development, which can improve nutrient uptake and utilization. This can help plants cope with nutrients deficiency caused by soil salinity or other stress factors. Cytokinins have been shown to increases the rate of photosynthesis, which can help plants maintain their photosynthetic capacity and productivity under stress. Cytokinin can also delay senescence(aging) in plants, which can help plants maintain their photosynthetic capacity and productivity under stress. Several studies have demonstrated the efficacy of cytokinin in improving plant growth and stress tolerance by regulating physiological and biochemical processes. For example, Application of Cytokinin has been shown to enhance the growth and stress tolerance of wheat and maize plants grown under salt stress condition. Foliar application of Cytokinins has been shown to increase the yield and stress tolerance of tomato plants grown under drought conditions. Similarly, application of Cytokinins can be an effective tool for managing abiotic stress in crops. Further research is needed to identify the most effective Cytokinins treatments for different crop species under abiotic stress. This can lead to the development of new and innovative approaches for managing abiotic stress and ensuring sustainable agriculture and food security.
Keywords: Cytokinin, Stress, Nutrient uptake, Photosynthesis, Senescence etc.

Standardization of Green Synthesized Manganese Oxide Nanoparticles for Seed Priming in Soybean

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ABSTRACT
Manganese nanoparticles are promising materials for various applications such as water purification, catalytic oxidation reactions, biosensors, etc. due to their excellent adsorption, electrochemical, catalytic, magnetic, super capacitive properties. This study aims in green synthesis of Mn nanoparticle and Standardization of different concentration of green synthesized Mn NPs by seed priming in Soybean seeds. Mn NPs was synthesized using aqueous leaf extract of *Mangifera indica* with $KMnO_4$ as the precursor. Characterization was done using UV–Visible spectroscopy, Dynamic Light scattering method. The average particle size obtained was approximately <100 nm. Different concentrations of MnO NPs were created to standardize seed priming in soybean at 50 ppm, 100 ppm, 200 ppm, $CaCl_2$ (0.5%) and control (water soaking). The observations were recorded such as Germination rate, shoot length, root length, Root: shoot and seedling vigour index. The MnO nanoparticle synthesized from *Mangifera indica* at 100ppm showed significantly highest germination rate (90%), root length (12.46 cm), shoot length (11.58 cm), and seedling vigour index (2163.6) as compared to control [germination rate (85%), root length (9.3cm) and shoot length (10.4cm) and seedling vigour index (1759)] and other treatment. According to the findings of this study, the MnO nanoparticle synthesized from *Mangifera indica* at 100 ppm is ideal for seed priming in soybean seeds.
Keywords: Green synthesis, MnO nanoparticles, *Mangifera indica*, seed priming etc.

Organic Plant Breeding

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ABSTRACT
Looking to the adverse effects of chemicals (Insecticides, pesticides, herbicides, weedicides, chemical fertilizers) on human health, soil health and environment, Organic plant breeding (OPB) is gaining increased significance of all over the world. Organic and conventional farming (CF) systems are the center of a heated debate; particularly, when highly relevant topics, such as food security and climate change, are discussed. Biodiversity in OF is generally reported to be between 10.5 and 30 % higher than in CF. Organic plant breeding is important for farmers and human health because it is not affected or losing to environment and human health. In which, control of inorganic and synthetic chemicals such as pesticide and insecticide synthetic soluble fertilizers and veterinary medicines, organic farmers rely heavily on preventive and system-oriented practices. Varieties developed through organic plant breeding and multiplication of seed production through use of organic plant breeding. The breeding goals for organic agriculture to produce high yield

compared with conventional breeding method. Incorporation of resistance and tolerance genes to biotic or abiotic factors and higher resource efficiency for plant (water, nutrients and light etc.) Some suitable approaches for organic plant breeding which is very useful for farmers and suggested by Bueren and Struik (2004) these are nuturalness, emotive dimension and normative dimension. The next decade may be the era of organic breeding activities and organic agriculture without any yield barrier and other challenges that we are facing in present scenario.

Time Series Arima Forecasting of Fdi Inflow in India

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ABSTRACT
India is a rapidly developing country which is often seen as an investment ground by the industry giants of foreign countries. The recent trends show an exponential increase in the net foreign direct investment in India from the year 2010-2020. Thus, it becomes crucial for the policy makers and the economist to forecast the future inflows of investment in order to produce effective policies and take better decisions. The result of the better policies would help in overcoming the unbalanced market viability. ARIMA modeling is a technique used in statistics and econometrics which harness the advantages of both Auto Regression (AR) and Moving Average (MA) models by integrating them together to form auto regression integrated moving average model. The present study based on data regarding FDI inflow from 2001-2020 which aims to generate a customized Box-Jenkins ARIMA model for forecasting and analyzing the trend of FDI in India. It proposes ARIMA (0,1,0) model for optimal forecasting of net FDI inflow in India.
Keywords: FDI, ARIMA, Box- Jenkins, Forecast, Stationary

Trends and Market Integration of Kharif Sorghum in Beed District of Maharashtra

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ABSTRACT
Sorghum cultivation has declined over the period of time farmers turned to production high lucrative cereals such as rice, wheat, corn, pulses and competitive crops like oilseeds and cotton. The District Statistic Board of Beed has reported that the cultivation area for *Kharif* Sorghum in the year 2020 to 2021 were 7194 hectors and 481 kg per hector respectively. The time series data of sorghum arrivals and prices were collected from APMCs Beed, Dharur and Parli during the period 2001-2020 to study the growth and market integration of selected markets. The trends and annual compound growth rate in arrivals and prices of *Kharif* Sorghum was calculated by using linear and exponential form respectively where as Market integration was worked out by estimating Bivariate correlation analysis. The present study reported that Beed market has positive annual growth rate, while in Dharur and Parli markets has negatively significant annual growth rate in *Kharif* Sorghum arrivals. Beed, Dharur and Parli markets showed positive and non-significant growth rate in prices of *Kharif* Sorghum. The said study also revealed that there was strong association of sorghum prices among the selected markets.
Keywords: Trends; market integration; *Kharif* sorghum; arrivals and prices.

Price Forecasting of Soyabean in Latur Apmc of Marathwada Region of Maharashtra

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ABSTRACT
The Soybean (*Glycine max*) is popularly known as the "Golden Bean" or Miracle Bean" of the 21st century. The plant is belonging to an oilseed rather than a pulse. Soybean is an important source of high quality and low-cost protein and oil. Forecasting involves making estimates of the future values of variables of interest using past and current information. There are a number of methods to generate prediction ranging in intuitive judgments through time-series analysis to econometric models. With the help of forecasting of prices of Soybean, farmers of this State would find the forecast for the specific month in which they get high and remunerative price of his/her produce. This study aims at collecting the data of arrivals and prices of Latur APMC for Soybean, where data could be obtained. Using these data, different linear, non-linear and time series models have been fitted for Prices of Soybean and best model based forecast has been attempted to fulfil the requirements of planners and farmers. The Box-Jenkins procedure was used concerned with fitting a mixed Auto Regressive Integrated Moving Average (ARIMA) model. The models were first identified based on the Auto Correlation Function (ACF) and Partial Auto Correlation Function (PACF) for the different series Y_t with their respective Q-statistics (AIC=3424.18 AICc=3425.15 BIC=3458.9). The model ARIMA (2,1,5) $(0,0,2)_{12}$ was found to be better fit since, it had the lowest BIC value. The average arrivals of soybean was maximum during November and December (265589.2. quintals and 215715.5.quintals) and after that it was shown decline trend up to August (31933.55 quintals). On the contrary, the average prices of soyabean were high about ₹3216.4/q in the month of July and ₹3212.7/q in the month of June. The Predicted price of Soyabean has ranged between ₹ 5492.27 /q to ₹ 6162.58 /q. for the year 2023 in Latur APMC. Month wise maximum difference in percentage of predicted price to the actual price was -14.51 % and minimum difference was -1.84 % for soybean from month January to June 2023.It is recommended that the APMCs in Maharashtra need to have the strong mechanism for price forecasting which will be helpful for the producers to make appropriate decision of marketing to get benefit of better prices as well as area allocation under the respective crop.
Keywords: Soybean, ARIMA, Box- Jenkins, Forecast, Stationary, APMCs.

Social Status of Sericulture Enterpriser in Solapur District of Maharashtra

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ABSTRACT
Sericulture is formed from the Greek word *'sericos'*, which means silk and the English word 'culture', meaning rearing. Sericulture is an agro-industry that produces silk as a by product. Silk is a fibrous protein generated by the silkworm in order to spin a cocoon. Silk has a natural sheen and an affinity for colours, as well as being light weight, soft to the touch and long lasting. Silk is known as the "Queen of Textile" because of its distinct features. India has the second position of the world largest producer after China.Average age of mulberry growers estimated was 36.36 years. States that the experienced person as well as new generation was engaged in the mulberry cultivation. Year of experience is also important factor in which mulberry cultivation is practiced

very well that why cocoon production is high both qualitatively and quantitatively. Cocoon production of Solapur was 1,23,273 quintal in FY 2021-22. Sericulture farmer was more number in Barshi, Madha, Karmala as follow Pandharpur, Sangola, Malshiras and less number in Mohol, South Solapur, North Solapur and Akkalkot. Area under mulberry cultivation is more in Barshi, Madha, Karmalai.e. 148 and 148.25. Less area in Akkalot, Mohol, South Solapur, North Solapur i.e. 77 and 73 acre. Cocoon production was more in Pandharpur, Sangolai.e 34,060 quintal as follow Malshiras, Mohol, South Solapur, North Solapur and less in Barshi, Madha, Karmala i.e. 11,445.

Keywords: Status, Sericulture, Silkworm Mulberry cultivation, Cocoon production, Solapur.

Role of Digital Technology in Agriculture under Pre and Post Covid Pandemic

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ABSTRACT

COVID- 19 lockdown has seriously disrupted Indian farms, as transport was completely halted and farmer faced severe issues in selling their produce, stagnating the harvest further during the peak harvest produce could not reach mandis, thus disrupting supply chain. To overcome this impact of lockdown and pandemic the various organizations and industries have accelerated the digitization of their customer and supply chain interactions and internal operations. Consumers have moved dramatically towards online channels, companies and industries. So there is rapid shift towards interacting with customers through digital channels. Pre- COVID-19 technology, digital India campaign was launched by Prime Minister Narendra Modi government of India on 1 July 2015. The objectives of this scheme is to ensure the government's services are made available to the citizens electronically by improved online infrastructure and by increasing internet connectivity or making country digitally empowered in the field of technology. Post COVID- 19 a Digital Agricultural Mission had been initiated for 2021-2025 by Government, Ministry of Agriculture and Farmers Welfare on 14 September 2021. Modernization of agriculture sector will continue by adapting new technologies so farmer can increase their income.

Keywords: Digital Technology, COVID- 19, Adaption, connectivity.

Market Intelligence in Agriculture and Allied Business

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ABSTRACT

Agrarian economy has numerous players, agents and stakeholder; all seek information for taking rational decisions for their respective roles and objectives. The main objective of Agricultural Market Intelligence is to maintaining a balance between demand and supply of any agricultural commodity at a remunerative level to farmers. For Increasing Farmers participation in commercial marketing market intelligence needs to be proper. Keeping this in focus, this paper deals with the current status of Market intelligence, the common objectives and process of market intelligence, the role that government plays and should play for improving Market Intelligence. How Market Intelligence is important to the farmers for taking their farming decisions. As for recommendation, the paper drives in the point that Market Intelligence in agriculture and allied enterprise should lead in huge sale with better price of agricultural produce. Market Intelligence should helps to

better agro-processing linkages between farmers, groups related to agriculture, markets and private processors which in turn would make agriculture a more viable proposition.
Keywords: Market Intelligence, Objectives, Process, Importance, Govt. Participation.

Six Sigma – A Strategic Approach for Quality Control in Agriculture
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ABSTRACT
Six Sigma is a process that makes use of statistics and data analysis to analyze and reduce defects up to 3.4 DPMU. The Meta data analysis was done with the help of 35 research papers. The result concluded that Six Sigma in agriculture is rapidly emerging as a new wave of change in direction of quality control and DMAIC methodology is most preferred Six Sigma model in Agriculture. Application of Six Sigma in agriculture reduces the farmer's financial problems due to higher cost of production. Six Sigma is helpful in agriculture to minimize waste in the form of waiting time, production cost, Scrap, damage, defects and financial loss. Application of Six Sigma has improved quality, production, yield, operational efficiency and production efficiency. It was recommended that Six Sigma user groups, specialized extension agencies to create awareness, share and exchange experience of successful Six Sigma projects in agriculture as well as with similar companies which embark Six Sigma project. Six Sigma process in to agriculture still has room to improvement. So it is required, to have culture change by the educating the workforce with six sigma. Agricultural marketing, processing, protected cultivation, logistic, research, finance, export and input production are major fields of six sigma.

Glimpses of Gig Economy
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ABSTRACT
The technological advances and extension of global supply chain have altered the process of production, and thereby change in organizations work, workplace and labour practices. The more adoption of the internet and increasing penetration of smartphones and electronic gazettes, connect online users across the countries over the digital platforms.This helps organizations share their talent needs and contact the remote online workers on digital platforms (Healy et al., 2017).All these have resulted in to the emergence of gig economy. These trends make the gig economy more relevant and prominent in today's digital era. The *gig economy* is a job market which consists of short-term or part-time work done by people who are self-employed or on temporary contracts. It is also called as Freelancer economy, agile workforce, Sharing economy, Independent workforce, Platform sharing, Collaborative economy. *Gig worker* is a person who works temporary jobs typically in the service sector as an independent contractor or freelancer. It was concluded that The literature is fairly new; therefore a conceptual framework underpinning the gig-economy is under established. The current literature has given us a general descriptive perspective of gig. There is increase in the number of gig workers from 2017-18 onwards. And there is tremendous change in number of gig workers during 2019-20, this is because of Covid - 19 impacts, during this period digital platform and home delivery service is increased. The role of digital platforms is crucial for bringing gig culture in developing countries, and in the remote corners of the world. Gig economy

offers many opportunities to gig workers such as flexible work environment, working in interest areas, access to global job postings. However, it poses many challenges to freelancers in the form of less payment, lack of social benefit and job security. In the new era of fourth industrial revolution, Gig economy is on rise and it has potential to bring huge amount of benefits for developing countries like India. Challenges can be converted into opportunities with the help of collaboration between Government, workers and educational institutions. Government policies and labour laws will go a long way in deciding scope of Gig economy in India. Individuals also must be ready for lifelong learning as they will have to upskill or reskill themselves in the changing environment. There is emergence of gig economy in agriculture, now a days farmers becomes literate and aware about the use of digital platforms, so there is wide scope for development of gig economy in agriculture. The research results are significant because the conclusions assist scholars and practitioners to better utilize gig services.

Keywords: Gig economy, Freelancer, Gig worker, Gig economy model.

Constraints and Potentiality of Pig Farming for Tribal Livelihood in Nagaland

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ABSTRACT

The North-Eastern region comprises of a high proportion of tribal population and pig rearing is an integral part of their livelihood since time immemorial. There is growing demand for pork in NE regions especially in Nagaland and much of this demand is met from the imports from other states of India. Majority of pig farmers belong to lower income group, small and medium land holding capacity.Small scale low input pig farming at intensive system prevails all over Nagaland. A study has been undertaken to analyse the in-depth scenario of traditional pig production systems and to identify the constraints where scientific intervention could be initiated for further improvement in production. Survey was conducted with designed questionnaire in selected villages of Mokokchung district. A total of 100 respondents were interviewed on different aspects of socio-economic condition, housing systems, breeding practices, feeding practices, health care practices and market linkages associated with pig husbandry. Result showed that 95% of the farmers faced pressing constraint as poor socio-economic status, 93% of the farmers lack of knowledge about improved technologies and 93% of the farmers lack of skill about improved technologies. The other equal important constraint was that 75% of the famers experienced high cost of feed and high cost of veterinary services. 63% of the famers expressed high cost of labour as another factor in terms of severity. The findings also revealed that family educational status and annual family income had significant relationship with the constraints perceived by the farmers in pig rearing.

Keywords: *Constraints, Pig farming and Tribal livelihood*

Impact of Different Environmental Conditions, Growing Media and Indol-3-Butyric Acid on Biochemical Parameters of Dragon Fruit Saplings

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ABSTRACT

Climate change, along with a slew of abiotic and biotic stress, poses a major danger to global agriculture fruit crops development. It is expected variable weather situations, posing a significant challenge in ensuring food production and plant propagation. Plant proliferation mainly changes in different growing conditions and soils with growth hormones. This study was conducted to determine biochemical changes in dragon fruit saplings under different environmental conditions, growing media and Indol-3-butyric acid concentrations. The impact of different growing conditions (open field, shade net [50%] & glass house), soils (native, black & mix) and IBA conc. (5000, 6000 &7000ppm) on dragon fruit (*Hylocereus undatus*) sapling were investigated at ICAR-National Institute for Abiotic Stress Management, Baramati, (Pune-Maharashtra) India during the summer season. In 2019-20 and 2020-21, during February to June months, temperature and water stress was increase in the open field with native soil as compared to others. Hence, biochemical parameters *viz.*, proline, phenols, proteins and sugars were increased in open field and native soil followed by glass house with native soil. Whereas, total chlorophyll contents increased in shade net conditions as compared to others. Interaction of Indol-3-butyric acid concentrations could not be significantly affected on biochemical parameters. In dragon fruit sapling, shade net condition, native soil with IBA @6000ppm optimizes the biochemical parameters. Hence, these treatments are beneficial to the dragon fruit propagation in dry land or arid region India.

Managing Water Scarcity in Food Production through Innovative Practices and Tools: Climate Change Adaptation Strategies for Agriculture

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ABSTRACT

The scarcity of accessible water and the risks associated with it are being made exacerbated by climate change. Numerous people in earth suffer from hunger and malnutrition as a result of a scarcity of accessible water for agriculture. Therefore, the adoption of such technology in agriculture that can contribute to the conservation of water and have a positive impact on both the production of food and its availability is vitally important. The term "hydroponics and aeroponics" refers to ways of growing plants without using soil, and the efficiency with which it uses water is far higher than that of a conventional system. Our research has revealed that soilless farming is a viable solution for mitigating the effects of climate change, especially water scarcity as compared to traditional farming practices.

Keywords: Climate change, hydroponics, aeroponics, water scarcity, crop production

Study of Zooplankton in Sasta Oxbow Lake at Paroo Block of Muzaffarpur, Bihar, India

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ABSTRACT
Zooplankton are the primary consumers of the aquatic food chain. It has been extensively studied in various water bodies of our country. The present study pertains to the zooplankton community of Sasta-oxbow lake at Paroo block of Muzaffarpur District, Bihar.
Zooplanktons are defined as free-floating organisms of animal origin incapable of locomotion, running almost on the mercy of water currents and waves for movements. They are reported from all natural water bodies irrespective of their physico-chemical characteristics. It plays a vital role in the enhancement of water body providing one of the most important ingredients of food to the fishes and other aquatic organisms. The role of zooplanktons in the aquatic food chain is very important as it is a primary consumer as well as a secondary producer. The productivity of zooplanktons will reflect the state of the aquatic system. A series of studies showed presence of about 11 species of Cladocerans, 16 species of Rotifers, 20 different species of Ciliated Protists and other Zooplanktons. Along with Zooplanktons, 12 species of phytoplanktons like Bacillariophyceae, Chlorophyceae and Dinophyceae and also recorded. It is very rich in aqua flora and fauna and its rich biodiversity has made the Sasta oxbow lake very productive. The physical - chemical condition are very suitable for aquaculture in the lake
Keywords: Zooplankton, Sasta oxbow lake, Muzaffarpur, Bihar.

An Insight Review of Consumer Protection Act 2019
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ABSTRACT
The advent of digital era with the introduction of new technologies and E-commerce as well as the new set of customer expectations marked the replacement of Consumer Protection Act 1986 with the Consumer Protection Act 2019. Digitization has made it simple to access a wider range of options, convenient payment methods, better services, and convenient purchasing. However, with the arrival of digitisation; there were certain provocations associated with the consumer protection. Consequently, in order to assist in tackling the new set of challenges faced by consumers in the digital era; the Indian Parliament passed the Consumer Protection Act 2019 which leads to timely and effective administration of consumer protection with the settlement of consumer disputes. This act widens the definition of the consumer and enables them to file e-complaints from anywhere which was not possible earlier. It made enhancement in the grievance redressal mechanism by laying the foundation of Central Consumer Protection Authority as well as introduced the concept of product liability and endorser's liability with the associated penal consequences and the penalties for misleading advertisements. Thus, the act empowers the consumers by safeguarding their interest through time bound redressal, easier filing of complaints and protecting them from unfair trade practices.

Chawki Rearing Performance of Silkworm *Bombyx Mori* L by using Different Mulberry Varieties
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ABSTRACT

Chawki rearing has been identified as the most crucial period for bivoltine silkworm rearing since it ensures the crop stability and higher cocoon yield. Chawki rearing center is recommended for catering to the needs of cluster of farmers, since all farmers can not maintain requisite hygienic conditions, optimum environment for young worms and adequate quality mulberry leaf. Eventhough few mulberry varieties are recommended for chawki stage, they have their own seasonal limitations. In backdrop of this KSSRDI has developed few varieties *viz*. Vishala, DD1, Suvarna-3, etc. Identification of suitable mulberry variety through moulting test has been conducted by using short-listed mulberry varieties in three different seasons of a year. The leaf yield potential, quality and rearing performance of promising mulberry genotypes (varieties) for moulting test was conducted by following the standard procedures. In the present study four mulberry varieties viz.V1 (check), S36, Vishala, Suvarna-3 were used which are maintained (RBD) with recommended package of practices KSSRDI, Bengaluru. The cross breed DFLs namely PM x CSR2 / IMH x CSR2 were used for the experiment. The moisture retention percentage of varieties , Moulting ratio, Moulting period, feeding period, larval period etc. were recorded and analysed (ANOVA).The moulting ratio with Suvarna-3 is 34.25, 38.39, and 38.10% respectively during three seasons. It has be deduced that the genotypes Suvarna-3 and S-36 performed significantly better and on-par, followed by V1 variety. The results are discussed in the paper.

Keywords: Silkworm, *Bombyx*, Chawki, mulberry variety

ABSTRACT

Introduction:

Silkworm *Bombyx mori* L is an economically important insect reared for cocoon production essentially a monophagus insect feeds solely on mulberry leaves (*Morus* spp.) as the sole natural food. Silkworm larval growth and development and cocoon yield are mainly influenced by nutritional quality og mulberry leaf. It is confirmed fact that leaf quality differs among mulberry varieties which in turn responsible for the difference in silkworm rearing performances. KSSRDI has developed few mulberry varieties suitable for different regions both for late age rearing and chawki rearing. However, identification of suitable mulberry variety for chawki rearing through moulting test is need of the hour. Hence, in the present experiment an attempt has been made to screen better performing mulberry variety through silkworm rearing experiment at our institute keeping in view the quality leaf for chawki rearing.

Materials and Methods

In the present study four mulberry varieties viz.V1 (check), S36, Vishala, Suvarna-3 were used. V1 mulberry variety is used as check variety for the comparison purpose. Mulberry plots of these varieties are maintained (RBD) with recommended package of practices, at the campus of KSSRDI, Bengaluru. The cross breed DFLs were prepared at the Silkworm Crop Improvement Section of KSSRDI and used for the experiment. The experimental design is as follows.

Mulberry genotypes/Varieties (RBD): V1 (check), S36, Vishala, Suvarna-3

Spacing : 90 cm x 90 cm (pit system)

No. Of plants per Replication of mulberry variety : 200

Cultural practices: Pruning is yearly thrice (Step-up pruning)

Harvest: Leaf harvest

FYM : 20 M tonnes/ha/yr

Chemical fertilizers: NPK (300:120:120 kg/ha/yr)

Statistical design: ANOVA (for silkworm bioassay)
Silkworm Races: Cross breed (PM x CSR) /BV hybrid
Experimental design of moulting test:
No. of treatments: Four
Number of Replicates: Five
Seasons: Pre-monsoon, Monsoon, Post-monsoon
c. Leaf quality evaluation through moulting test:

$$\text{i. Moulting ratio} = \frac{\text{No. of larvae out of moult}}{\text{Total no .of larvae brushed}} \times 100$$

ii. Larval weight: weight of 100 larvae will be recorded as cumulative weigh of larvae out –of-moult to calculate average weight of larvae.
iii. Feeding period: Duration from the hatching to preparation period for moult will be considered as feeding period.
iv. Moulting period: From starting to the end of the preparatory stage (resumption) will be considered as moulting period
v. Larval period: From brushing to the end of II moult will be considered as
length of larval Period

The moisture retention percentage of varieties under consideration has been studied. The studies were conducted in three seasons of the year *viz*. Monsoon, pre- monsoon and post-monsoon followed by statistical analysis of the data.

Results:

In silkworm (*Bombyx mori*), the larval growth and development varies depending on the quality and quantity of mulberry leaf used as food source, which is inturn indicated by commercial characters of cocoon crop (Krishnaswami, S. *et.al*. 1970; Bari, M.A. *et.al*. 1989). Keeping this in view, the bioassay studies of four selected mulberry varieties were conducted in all the three seasons of a year with two rearings/season. The PM x CSR2 (Kolar Gold) race of silkworm *Bombyx mori* were used for bioassay study.

Moulting test:

Moulting tests were conducted under standard rearing conditions, with four replicates/genotype and 100 larvae/replication. Moulting tests were conducted separately for I & II moults, using tender leaves from respective mulberry genotypes. Data on larval weight (g) and moulting ratio (%) was collected and analysed statistically by following ANOVA.

The four promising genotypes showed significant differences for moulting parameters of first and second moults. The single larval weight after first moult in Suvarna-3 is significantly higher with 5.25, 5.65 and 5.62 mg respectively during pre-monsoon, monsoon and post-monsoon seasons respectively. Similarly, the moulting ratio during first moult was 31.93, 30.64 and 30.50 % respectively in three seasons (tables 1-3). Besides this, the single larval weight with Suvarna-3 during second moult is 30.27, 30.25 and 31.27 mg during Pre-monsoon, monsoon and post-monsoon seasons respectively. Similarly, the moulting ratio with Suvarna-3 is 34.25, 38.39, and 38.10 % respectively during three seasons (tables 1 to 3). The said parameters are on-par with S-36 and V1 varieties of mulberry as indicated in the tables 1 to 3.

The data pertaining to leaf quality evaluation through moulting test and moisture retention percentage have been depicted in the following tables 1-3.

Discussion and Recommendation: It is evident from the present studies that, moulting ratio, silkworm larval weight and rearing performance of chawki worms in three different seasons of a year namely, Monsoon, Pre-monsoon and Post monsoon. The mulberry varieties *viz*. S-36 and V1 good development of chawki worms.

Taking into consideration, the overall performance with respect to growth, leaf yield, quality of leaf, and rearing parameters, it can be deduced that the genotypes Suvarna-3 and S-36 performed significantly better and on-par, followed by V1 variety. Hence, Suvarna-3 can be an ideal alternate to S-36 in tropical condition.

Table 1: Effect of varietal feeding on moulting parameters in *Bombyx mori* (Pre-Monsoon)

Mulberry variety	Lar. period (Hrs.)	Wt. of single larva (mg)		Moulting ratio (%)	
		After I moult	After II moult	During I moult	During II moult
V1	171.33	5.30	29.77	29.77	29.61
Vishala	172.0	4.87	28.06	26.57	24.07
S-36	169.66	5.23**	31.27	31.93*	34.25**
Suvarna-3	169.66	5.25**	31.11	31.46*	38.33**
SD value(±)	1.56	0.19	1.33	2.27	5.66
F-Value	2.71	49.19	9.73	9.52	78.30
CD @ 5%	4.49	0.18	2.56	4.43	4.32
Significance	NS	HS	NS	S	HS

Table 2: Effect of varietal feeding on moulting parameters in *Bombyx mori* (Monsoon)

Mulberry variety	Larval period (Hrs.)	Wt. of single larva (mg)		Moulting ratio (%)	
		After I moult	After II moult	During I moult	During II moult
V1	173.20	5.29	29.14	29.08	28.24
Vishala	172.35	4.86	27.73	27.32	23.98
S-36	171.55	5.24**	30.10*	30.64	35.08*
Suvarna-3	171.19	5.65**	30.25*	31.78	38.39*
SD value(±)	1.59	0.19	1.23	2.28	5.51
F-Value	2.76	54.25	11.32	7.29	71.82
CD @ 5%	4.38	0.189	2.19	4.82	4.96
Significance	NS	HS	S	NS	S

Table 3: Effect of varietal feeding on moulting parameters in *Bombyx mori* (Post-Monsoon)

Mulberry variety	Larval period (Hrs.)	Wt. of single larva (mg)		Moulting ratio (%)	
		After I moult	After II moult	During I moult	During II moult
V1	172.33	5.29	29.11	29.67	28.71
Vishala	172.66	4.86	27.73	26.51	24.06
S-36	170.65	5.24**	30.76*	30.50	34.68*
Suvarna-3	170.66	5.62**	30.08*	31.27	38.10*
SD value(±)	1.44	0.19	1.20	2.24	5.76
F-Value	2.43	54.25	10.22	7.30	70.92
CD @ 5%	4.27	0.173	2.27	4.82	4.87
Significance	NS	HS	NS	NS	S

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Effect of Culture Media, Nitrogen Sources Temperature and PH on Growth of *Phytophthora drechsleri* f. sp.*cajani*

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ABSTRACT
Pigeonpea (*Cajanus cajan*.) stem blight caused by *Phytophthora drechsleri* f.sp. *cajani* are most widely distributed and destructive disease of pigeonpea, causingabout 70-80 per cent yield losses. Therefore, present studies were undertaken with theobjectives *viz*., isolation, identification, pathogenicity test and effect of different culturalmedia, different nitrogen sources, pH, and temperature on growth of *Phytophthoradrechsleri* f. sp. *cajani*. Thepigeonpeaplantsshowingstemblightsymptomswereisolatedbyapplyingtissueisolationtechniqueo nPDAplatesandpureculturewasmaintainedonPDAslanttubes for further studies. Pathogenicity of these *P. drechsleri* f. sp. *cajani* was provedbyapplyingsoildrenchingmethod.Based on symptomatology, pathogenicity test, morpho-cultural characteristicsand microscopic observations of the *P. drechsleri* f. sp. *cajani* identified and furtherconfirmed by comparing with their authentic description. *P. drechsleri* f. sp. *cajani* ondifferentculturalmediaexhibitedwiderangeofvariationinmorphologicalandculturalcharacters.
Effect of temperature on growth of *P. drechsleri* f. sp. *cajani* revealed thathighestmycelialgrowthof*P.drechsleri*f.sp.*cajani*wasobservedattemperature30°C(87.00mm)foll owedby35°C(84.50mm),25°C(80.00mm).EffectofpHongrowthof*P.drechsleri*f.sp.*cajani*revealedth athighestmycelialgrowthof*P.drechsleri*f.sp.*cajani*wasobservedatpH6.5(88.00mm)followedby6(83. 00mm),7(81.00mm).Among different nitrogen sources Ammonium Ferrous Sulphate$(NH_4)_2Fe(SO_4)_2.6H_2O$wasfound most effective with nomycelial growth.
Keywords: *Cajanus cajan*, Stemblight, *Phytophthoradrechsleri* f. sp.*cajani*, pH, Cultural media

Evaluation of Different Fungicides against *Phytophthora drechsleri* f. sp.*cajani*

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ABSTRACT
Pigeonpea is an important grain legume crop of rainfed agriculture in the semi-arid tropics. Pigeonpeaisoneofthemajorand inseparabledietary protein sourcesto thelargemass of the Indianpopulation. However, the crop is susceptible to many diseases such as wilt,sterilitymosaic,*Alternaria*blight, anthracnose, stem blight and *Cercospora* leaf spot amongst which, the majoroneis stem blight causes quantitativeaswell as qualitative losses. Though the disease is sporadic in nature, occasionally it assumes epidemicproportionsinplacesofheavyandfrequentrainfallleadingtomortalityofyoungplants. The disease caused heavy plant mortality at seedling andvegetative stages, resulting in poor plant stand and lower yield. Considering these issues, the present studies on effect of fungicides on pigeonpea

stemblight caused by *Phytophthora drechsleri* f. sp. *cajani* were planned and conductedattheDepartmentofPlantPathology,CollegeofAgriculture,Latur.Seven systemic fungicides evaluated *in vitro* (each @ 500 and 1000 ppm),Metalaxyl MZ 35% WS, Fosetyl AL 80% WP resulted with cent per cent mycelialgrowthinhibition(100%)in*Phytophthoradrechsleri*f.sp.*cajani*,followedbyHexaconazole70 %WP(88.88%),Dimethomorph50%WP(86.94%),Difenconazole 25%EC(81.10%),Azoxystrobin23%EC(79.71%)andThiophanatemethyl70%WP (79.16%),respectively. Similarly, all the non-systemic / combiproduct fungicides (each @ 2000 and2500ppm)evaluated*invitro*werefoundmosteffectivewithsignificantlyhighestmeanmycelial growth inhibition of *Phytophthora drechsleri* f. sp. *cajani*, over untreatedcontrol.However,itwasmaximumandcentpercentwithMancozeb75% WP,Cymoxanil8%+Mancozeb64%WP,Metalaxyl8%+Mancozeb64%WP,Iprovalicarb 5.5% + Propineb 61.25% WP. These were followed by Thiophanatemethyl45%+Pyraclostrobin5%FS(80.30%)Tebuconazole50%+Trifloroxystrobin25% WG(80.55%),Chlorothalonil75%WPandCopperhydroxide77%WP(77.22%)andCopperOxychlorid e 50%WDG(71.10%), respectively.

Keywords: *Cajanus cajan*,Stemblight, *Phytophthoradrechsleri* f. sp.*cajani*, pH, Temperture Cultural media

Effect of Exogenous Auxins Application on Fruit Cracking in Litchi (Litchi chinensis Sonn.) cv. Dehradun under Field Conditions of District Reasi Jammu J&K 182311

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ABSTRACT

Litchi (Litchi chinensis Sonn.) an arillate fruit species possess a unique structure compromising thin and leathery pericarp that enclose the aril as its edible part in Litichi. Fruit cracking is a serious physiological disorder that occurs in litchi with a period characterised by high day temperature (35-400 C) and low relative humidity. Besides climatic effects abnormal development of skin during early fruit growth promotes this disorder. In this context experiment was carried out at three locations of district Reasi and auxins viz different concentrations (20,30 and 40 ppm) were sprayed on anthesis and pea stage respectively. Study revealed that different concentrations of NAA showed significant effect on percentage of fruits carried to maturity. NAA 40 ppm controlled (7.75%) fruit cracking followed by 30ppm ppm(7.05%) significantly higher than control (14.91). NAA (20ppm) recorded minimum fruit cracking (10.58%) however significantly higher than control. Exogenous applications of NAA on litchi also showed significant effect in reducing the Number of days carried from fruit set to maturity.

Keywords: Auxins, Litchi and Cracking, Maturity.

Synthesis of Ag Nanobioparticles Using Bio Waste for Removal of Heavy Metal from Water

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ABSTRACT

As a known carcinogen, cadmium is among the heavy metals that consistently provide a significant risk to human health. Silver nanobioparticles were synthesized by utilizing extract of mixed vegetable and fruit peels which acts as a reducing agent. The characterisation of the synthesized silver nanobioparticles (Ag NBPs) was performed by XRD, FTIR, UV- VIS, and FESEM. XRD confirmed the phase of Ag NBPs which showed face cubic crystal with spherical to rod shape morphology with a size of 48-55 nm. Adsorption is widely utilized as a technique for removing heavy metal ions because of its high efficiency, low maintenance, and low cost. Due to their size and large surface area, silver-based nanomaterials were shown to be more appealing for the removal of heavy metals from the aqueous solution. Therefore, this work used batch adsorption studies to remove lead from aqueous solutions. Adsorption studies conducted at 10 ppm cadmium concentration and 25ºC room temperature showed that 79% of the metal could be removed.

Investigations for the Causes and Prevention of Microbial Spoilage of Fruits

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ABSTRACT
Consumers' awareness of healthy nutrition is increasing day by day. Moreover, the fruit quality and safety are both important as they are more easily get attacked by the numerous microbial species. Mostly, the microorganisms that cause spoilage will invade the fruits during the period of growth and also during post-harvest handling. Some other means of entry are physical damage of the fruit tissue that can lead to microbial contamination. Due to various physical and chemical damages the enzymatic digestion and spoilage of fruits occurs, but most significantly due to microbial activity. The process of spoilage of fruits initiates when spoilage microorganisms invade the fruit and thereafter enhanced with time passage. The growing microbial community brings some undesirable changes to original state of the fruit. Microorganisms need nutrients for their grow and development; they generally get the necessary nutrients from the host organism whom they actually invade. Fruits are more juicy and also highly concentrated in nutrients necessary for spoilage micro-organisms growth. So, the most important is to know about the basic causes of fruit spoilage and to prevent the fruits from these losses. In our study, we have compiled for commonly adopted methods and practices to prevent fruit spoilage.

Antimicrobial Importance of Ghingaru an Important Medicinal Plant in Uttarakhand Region

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ABSTRACT
Ghingaru is an important medicinal plant that is believed to be a native of Nepal and China. It is distributed from Sutlej valley to Bhutan between 1000 -2600 m in India. Rich diversity in the North India, in state of Himachal Pradesh and Uttarakhand. The Garhwal Himalaya is known for

its rich bio-resources and ethnocultural diversity. The sources of drugs is mainly depends on these natural products from plant, animal, microorganism and minerals, which is treatment of human and animal disease. Medicinal plants represent a rich source of potent and powerful drugs. Also, increased resistance to conventional antibiotics by pathogenic microbes has made the search for new efficacious antimicrobial agents from plant source inevitable. Initial screenings of plants for possible antimicrobial effects typically start with the use of crude extractions (aqueous or alcohol) and can be followed by various organic extraction methods. While some plants have been screened for their antimicrobial activity, many are being screened, and more will still be screened. So, in our study to provide a best alternate to chemical treatment method against microbial diseases; the antimicrobial nature of Ghingaru medicinal plant was explored.

Stone Fruits as Phytochemical Biofactories with Potential Applications to Human Well-Being and Nutrition

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ABSTRACT

It is widely acknowledged that fruits play an important role in human nutrition and health, and their consumption is associated with a reduced incidence of chronic diseases. Stone fruits, which are members of the Rosaceae family, are a significant source of bioactive compounds, such as phenolic compounds, terpenoids/isoprenoids, and nitrogen- or sulfur-containing compounds, which may play a role in human health. In stone fruits, phenolic compounds, such as flavonoids, phenolic acids, and stilbenes, are the most abundant secondary metabolites. It has been demonstrated that these compounds possess antioxidant, anti-inflammatory, anti-cancer, anti-diabetes, and anti-obesity properties. Environmental factors, such as light, temperature, and the availability of water, as well as genetic factors, such as cultivar and rootstock, regulate the biosynthesis of phenolic compounds in stone fruits. In addition to carotenoids, tocopherols, and phytosterols, stone fruits also contain terpenoids and isoprenoids as secondary metabolites. Stone fruit's phytochemical composition can be affected by pre- and post-harvest practices such as irrigation, fertilization, and harvesting time. In peach and plum, water stress during fruit development can enhance the concentration of phenolic compounds. Similarly, postharvest interventions, such as storage temperature and atmosphere, can influence the concentration of bioactive compounds in stone fruits. Proper management of these factors during pre- and post-harvest handling, as well as further characterization of phytochemicals and monitoring of their production in various cultivars, may increase the quantities of these compounds, resulting in the anticipated improvement of stone fruit not only to enhance organoleptic qualities but also to benefit human health.

Keywords: Stone Fruits, Rosaceae, Anti-obesity, Anti-cancer, Phenolic Compounds

Climate Resilient Agriculture: "A way forward for sustainable agriculture and food security in the Indian subcontinent"

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ABSTRACT
The global agriculture food production system faces an emergent crisis from the vagaries of weather parameters coupled as global warming events, erratic rainfall, recurrent drought, long spells of flooding and water stress, high temperature stress and freezing stress in many of the agro-ecosystems worldwide. The traditionally grown varieties of most of the cereal and pulses and other crops have now become susceptible to these kind of abiotic stresses which has significantly reduced the yield in many regions of the world including India. Therefore it is the need of the hour to address the above challenges through a multidisciplinary approach involving the different stakeholders (farmers, scientists, policy makers, civil society etc.) and to formulate the better strategies for a climate resilient agriculture. It is of utmost necessity to adopt modern practices in crop production such as conservation agriculture, zero tillage, multiple cropping, integrated farming systems, development of climate resilient varieties specifically heat tolerant varieties of cereal and pulses. Efforts should be given to maximize farm income through multiple farm enterprise adoption of different agro-techniques in order to make farmer's income stable over different growing seasons. Hence, it is of paramount importance to adopt different climate resilient practices in order to transform Indian agriculture to a climate smart agriculture.
Keywords: Climate resilient agriculture, heat stress, zero tillage, conservation agriculture.

Bio - Efficacy of Novel Insecticides against Mustard Aphid (*Lipaphis erysimi* kalt) in Mustard Crop (*Brassica campestris* L.)

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ABSTRACT
The field experiment was conducted in randomized block design with three replications of nine treatments for a crop season of the year i.e. "*Rabi* 2021-22" at the agricultural research farm of Baba Raghav Das Post Graduate College Deoria Up, India. Different insecticides against L. erysimi revealed that all the insecticides were significantly more effective in reducing the population of aphids and thus increasing the yield than control. Higher yield ranged between 9.00 q/ha to 17.50 q/ha and were proved significantly superior over control 6.75 q/ha.
The highest seed yield of 17.50 q/ha was obtained from the imidacloprid 17.8 % SL treated plot and it was significantly superior over the rest of the treatments. Cost benefit ratio from the table that thiamethoxam 25 WG ranked first indicating the maximum return Rs 1:23.13 per rupee invested followed by imidacloprid 17.8 % SL (1: 17.31) and carbosulfan 25 EC (1:13.15).
Keywords: Efficacy, novel insecticides, mustard aphid (*Lipaphis erysimi*).

Biotic and Abiotic Stress Response in Flower Crops

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ABSTRACT
India has varied agroclimatic conditions due to which there is increased possibility of growing flower crops around the year in open as well as protected environment. Major flower crops viz. rose, carnation, gladiolus etc. are imperative cut flower crops. They find use in various flower arrangements, decoration, bouquets, hanging baskets, display and in beautification of landscape. Loose flower crops like marigold, crossandra etc. are used for making garlands, rangoli, temple offering, etc. Various stress factors are also associated with flower crops that directly or indirectly affect plant growth which leads to development of poor quality flower. Abiotic stress is a major problem affecting flower crops to a greater extent. It is caused by drought, temperature or salanity affecting crop growth and productivity. On the other hand biotic stresses i.e. diseases related to fungus, bacterial, etc. can cause severe losses from seedling death to drastic decrease in the yield of flower. Therefore knowledge of these stress conditions, their control measures and response of flower crops towards them is utmost important for successful cultivation of ornamental flower crops.

Formulation of Low-Calorie Papaya (*Caricapapaya*L.) Jam Enriched with Chia Seeds: A Study on Quality Characterization

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ABSTRACT
Jams are the most well-liked fruit based goods. However, the majority of jams on market are prepared with sugar which can reach 60-70% by weight. People today are more health aware. Natural sugar fortification from plant extracts is one of the option can be chosen to fulfil needs of the health conscious consumers and has good impact on health. As high sugar source has negative impacts on health like metabolic syndrome, diabetes, obesity and high cholesterol. Jams prepared with using low sugar reported with changes in texture of jam. To overcome this we need to come up with alternative sugar substitute that can bind water. So, chia seed is a strong water binding agent that can be used to reduce water activity. The present study entitled "Formulation of Low-Calorie Papaya (*Caricapapaya*L.) Jam enriched with chia seeds: A study on quality characterization" was conducted in Horticulture Lab at Lovely Professional University, Phagwara, Punjab during the year 2022-2023. The jam samples were stored in pre-sterilized glass jars and were analyzed physico-chemically as well as organoleptically (taste, colour, texture, flavor, appearance and overall acceptability). The analysis of physico-chemical analysis was done using Association of Official Agricultural Chemist (AOAC) official methods of analysis. During storage, a decrease was recorded in ash content, moisture content, ascorbic acid content, pH, total phenol and total carotenoid content. On the other hand, increase was observed in TSS, total sugars, reducing sugars, titratable acidity and crude protein content. The physico-chemical analysis of sugar fortified papaya jam showed that the product had 31.07± 0.20 % moisture contents, 23.00 ± 0.54 % total soluble solid, 0.49 ± 0.02 % titratable acidity, 3.27± 0.52 in pH, .30± 0.10 mg/100g ascorbic acid content, 18.60 ± 0.18 % total sugar amount, 12.60± 0.78 % reducing sugar content, 2.81± 0.08 mg/100 total carotenoid, 0.540 ± 0.02 mg/100g total phenol, 5.43 ± 0.06 % dwb of

crude protein content, and 1.89 ± 0.03 % ash content with respect to treatment with chia seeds (*Salvia hispanica* L.) @ 6.25 % and stevia @ 10 ml/kg. The physico-chemical attributes of low-calorie papaya jam found still in the range of jam standard standardized by FAO and low- calorie papaya jam fortified with chia seeds and stevia as source of natural sugar is the best product with respect to above physico-chemical and organoleptic characteristics.

Keywords: Papaya, Sugar, Fruit, Jam, TSS

Food and Gastrosomatic Index of Hillstream, Cold Water Fish *Garra gotyla gotyla*

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ABSTRACT

Food compensates the energy loss during foraging and reproductive activity and help in growth and vital function of body (Begum et al., 2008). Food and feeding habit of fish vary according to season and locality. It plays an important role when fish culture to live in association with other fish species, selection of a group of species for pond culture and avoid competition for food and optimum production of fish in captive condition (Deewan and Saha, 1979). Food substance inside gut provides information about diet however the length of digestive tract determines the feeding habit of a fish species. The aim of present investigation was to study the food & feeding habit, relative length of gut (RLG) and gastrosomatic index (GaSI) of indigenous fish, *Garra gotyla gotyla.* The study revealed that the fish is phytoplanktyvorous / Benthic herbivorous and feeds on Bacillareophyceae as most preferable food. The RLG value recorded between 3.32-4.87 while the GaSI was found between 1.71-7.12. The present study would be helpful for ex-situ culture of this precious fish. In present study *Garra gotyla gotyla* was observes as a bottom feeder, so this species can be culture with column feeder and surface feeder in polyculture system. Present study will be helpful to develop culture technologies, conservation and sustainable fisheries management of this fish in captive condition.

Keywords: Relative length of gut, Phytoplanktyvorous, Feeding intensity, Sustainable fisheries.

Physical Workload's Health Effects Analysis on Rural Women Living in Uttarakhand's Hilly Terrain

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ABSTRACT

In general, rural women have a difficult time navigating life, but living in a mountainous area where access to necessities like potable water, fuel wood, cattle feed, and hospitals is limited, makes things even more difficult. This requires manual material handling tasks like awkward or constrained heavy lifting, carrying, pushing, or tugging. Due to the well-established risk factor of excessive physical labor, it is a serious health problem for rural women leading to long-term pain, disability, lower productivity, and increased medical expenditures. The current study looks at

potential triggers related to the physical health of rural women from the hilly area. 150 women from Amsore village of Uttarakhand were enrolled for this study. All the participants were evaluated using a semi-structured questionnaire for demographic profile and Borg scale of perceived exertion for activities impact assessment. Fetching water (100%), fodder collection (71.33%) and firewood collection (80%) were reported as the most exertion inducing tasks causing physical stress to the women. The result reveals that physical workload have a direct impact on the physical health of rural women thus these findings urge for preventive efforts and safety guidelines.

Keywords: Mountainous region, rural women, physical health, stress

Novel Technique for Preparation of Ber Candy

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ABSTRACT

The experiment on preparation of ber candy was conducted at CCS Haryana Agricultural University, College of Agriculture, Bawal (Rewari). The candy of ber cultivar Umran was prepared after destoning of fruits. The mature fruits were harvested from the plant when fruits turned to yellowish and having some brownish tings on the fruit surface for preparation of candy. The candy was prepared from blanched and unblanched fruits. The candy of unblanched fruits was turned to brownish colour as compared to candy of blanched fruits. The candy prepared from the destoned fruits was better and more acceptable in organoleptic rating as compared to candy of ber fruits with stone. The nutritive value of the destoned fruits candy was better and this candy have smooth surface, however candy of with stone fruits have pricking impressions on the surface. It can be served to all age group kids or persons without hesitation of getting down/ swallow of stone.

Keywords: Ber (*Ziziphus mauritiana*), candy, destoning, organoleptic rating, Umran

Effect of Different Planting Density and Genotypes of Leek (*Allium Porrum*) under Subtropical Condition

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ABSTRACT

Leek (*allium porrum*) is non-bulb forming member of the family Alliaceae. It is closely related to the onions and is grown for its blanched stem and leaves. However, the production and productivity of leek is not such expected because of lack of appropriate planting density and ideal variety for the specific areas. Hence a field experiment was conducted at Department of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (Marathwada region) during the rabi season of November 2022 to April 2023. An experiment to asses "Effect of different planting density and genotypes of leek under subtropical condition". Three different spacing [40x10 cm (S_1), 40X15 cm (S_2) and 40x20 cm (S_3) and four varieties [American Flag (V_1), Atal (V_2), Amaya (V_3) and Bulgarian giant (V_4)] was taken for study. The layout of experimental field was laid down in Factorial Randomized Block Design with four replication and twelve different treatment combinations viz. T_1 (V_1 S_1), T_2 (V_1 S_2), T_3 (V_1 S_3), T_4 (V_2 S_1), T_5 (V_2 S_2), T_6 (V_2 S_3), T_7 (V_3 S_1), T_8 (V_3 S_2), T_9 (V_3 S_3), T_{10} (V_4 S_1), T_{11} (V_4 S_2), T_{12} (V_4 S_3). The growth characters like plant height (cm), number of leaves per plant are recorded periodically on 30, 60,

90 Days after transplanting. The study shows that the combined application of 40x10 (S_1) Spacing with variety Amaya (V_3) was best under subtropical condition (Marathwada region) followed by Atal, American flag and Bulgarian giant. The revealed data indicated that days to 90% physiological maturity, leaf length, leaf width, plant height, dry matter weight, biological yield and total pseudo-stem yield, pseudo-stem diameter (cm) number of scales was found maximum in variety with spacing 40x10.

Keyword: Leek, varieties, planting density, growth and yield parameter.

Effect of Seasonal Variation on the Lipid Profile of Selected Fresh Water Fishes

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ABSTRACT

During research work three different seasons summer, monsoon and winter were selected for collection of three different specimens *Labeo calbasu, Wallagu attu and Clarius batrachus*. Collected samples were toexamined on their lipid profile level (omega-3 and omega-6 fatty acid profile) on biochemical basis, fishes contain unsaturated fatty acids as lipid component. Accordingly, the study was conducted by selecting three sites of water land of Darbhanga district. These included stretches of Kamala near village Hati and Balan near village Mahinam of Benipur block. Selected specimens *Labeo calbasu* (Bhakur) *Wallagu attu* (Boari) and *Clarius batrachus* (Mangur) is detritus feeder, carnivorous and predaceous in habit respectively. According to fat extraction by Soxhlet extraction method, fat content of *L. calbasu* were 25.6-27.1%, Iodine value in the range of 96-97, saponification value between 152.4-158.7 and acid value between 6.5-7.4. Similarly, in *Clarius batrachus*, fat content was 20.6-21.8%, iodine value in the range of 53.93-61.65and saponification value is 311.87-316.45. All these data ranges were calculated between these three different seasons.

Keywords: Seasons, Fish samples, omega-3 fatty acid, iodine value

Climate Change and Global Warming: Impacts and Management in Urban areas

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ABSTRACT

The world is encountering the pernicious calamities frequently owing to climate change with rising global temperature that imbalance the natural systems of survival with extreme weather conditions such as extreme heat and cold, increased risks of floods and drought, intermittent rainfall with irregular distribution, rise in sea level, storms, untimely precipitation and other disasters that not only influence our mother nature but also flourish innumerable deadly diseases for humans and animals like epidemic COVID-19 that causes huge casualties during two years. The increased human population, rapid urbanization and other developmental projects brought about depletion of earth's green cover and other natural resources and also, the construction of huge concrete structures and roads that not only responsible for wildlife habitat loss but the heat absorbed by these structures produces warm effect across the globe that is accountable for climate change. As a result, an appropriate management plan of action must be devised in order to reduce the consequences of climate change across the world in a collaborative manner. In these

circumstances, there is a greater emphasis on the importance of urban agroforestry, vertical farming, horticulture and gardening in urban settings that not only improves the green cover of our environment but also contributes to the habitat for birds, food for humans and acts as horticulture therapy for urban people.

Keywords: Climate change, Global warming, Natural calamities, Urbanization, Urban agroforestry, Vertical farming

Approaches for Climate Change Mitigation

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ABSTRACT

Climate change mitigation involves actions that reduce the emissions of greenhouse gases or increase their removal from the atmosphere. Greenhouse gas emanations from farming, forestry, and other land uses conceal 24% of worldwide secretions, demonstrating the additional flashpoint in the influence on climate change in the energy segment. Consequently, the land-dwelling subdivision is vibrant in the framework of climate change, contributing to the topic and helping to solve it, especially given the ability of soils and biomass to store atmospheric carbon. Forest management has an impact on the resilience of forest ecosystems (adaptation to climate change) and carbon sequestration (mitigation). We identify three impacts. (1) an eco-system-based strategy, which implies that an adaptable environment (adaptation) has tremendous potential as a source of carbon dioxide (mitigation); (2) a method that promotes sustainable forest management, which seeks to improve forests' resilience and carbon sink potential at the same time; and (3) a cross-sectoral approach, which fosters collaboration among various sectors of agriculture, forestry, urban design, and nature conservation. Equitable emission reduction objectives are necessary for long-term climate change mitigation initiatives. Without them, it is difficult to strive towards long-term, sustainably reducing emissions, which is essential for stabilizing the climate. The goal of this article is to better understand how sustainable land management may increase the mitigation potential of the land sector, especially at the level of small-scale rural landscapes. In conclusion, this paper provides a comprehensive overview of the current knowledge and challenges of climate change mitigation approaches. It highlights the need for a holistic and integrated approach that considers the multiple dimensions and implications of mitigation actions. It also emphasizes the importance of a transformational change in the energy and socio-economic systems, as well as a strong commitment and collaboration from all stakeholders, to achieve the global goals of reducing greenhouse gas emissions and limiting global warming.

Keywords: Climate change mitigation, land management, carbon sequestration and forest resilienc

Green Technology Approach for Sustainability

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ABSTRACT

Green technologies are currently playing a significant role in redirecting the nation's economic growth in the direction of sustainability and offering an alternative socio-economic model that will enable both the current and following generations to live in a clean and healthy environment, in harmony with nature. Green technology, also known as clean technology, refers to the improvement and replacement of existing technologies with new ones that better serve society's needs while also minimizing the negative effects of human activity on the environment, lowering environmental risks, and reducing ecological scarcities. It is an approach that prioritizes environmental sustainability by reducing carbon emissions, energy consumption, and waste production. The goal of green technology is to minimize the negative impact of human activities on the environment and to achieve a sustainable future. It includes renewable energy sources like solar, wind, and hydroelectric power, as well as energy-efficient appliances, buildings, and transportation. By using these technologies, individuals and organizations can reduce their carbon footprint and contribute to the global effort to combat climate change. Another important aspect of green technology is waste reduction. This can be achieved through recycling, composting, and the use of biodegradable materials. By reducing the amount of waste that goes into landfills, green technology can help preserve natural resources and prevent pollution. The development and implementation of green technology are crucial to create a sustainable environment for present and future generations. There is a need to emphasize more research to contribute to the advancement of green technology and its potential impact on the environment, society, and the economy. There must be a good study to provide insights and recommendations for policymakers, businesses, and individuals alike. Ultimately, more research will inspire greater awareness and action toward a more sustainable and resilient future.

Keywords: Sustainability, Carbon emissions, Renewable energy, Solar power, Wind power, Climate change, Resilient future.

Climate Changes and Global Warming: Impacts, Policies, Planning, and Management

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ABSTRACT

Climate change and global warming have become pressing environmental issues that require urgent attention. The impacts of these phenomena are widespread, affecting various sectors including agriculture, health, energy, and water resources. The increasing concentration of greenhouse gases in the atmosphere, primarily carbon dioxide, is the main cause of climate change and global warming. This results in rising global temperatures, melting glaciers, rising sea levels, and more frequent and intense weather events such as droughts, floods, and storms.To address the impacts of climate change and global warming, various policies, planning, and management strategies have been implemented at the local, national, and international levels. These policies include reducing carbon emissions, promoting renewable energy, improving energy efficiency, and increasing climate resilience. Additionally, planning and management strategies involve adaptation and mitigation measures to reduce the negative impacts of climate change.In addition to policies, planning and management strategies also involve measures such as disaster risk reduction, sustainable agriculture, and biodiversity conservation. Disaster risk reduction aims to reduce the impacts of climate-related disasters, such as floods and storms, through early warning systems, evacuation plans, and disaster preparedness. Sustainable agriculture involves promoting practices that reduce greenhouse gas emissions, improve soil health, and increase productivity

while maintaining biodiversity. Biodiversity conservation aims to protect and restore ecosystems, which can help to reduce the negative impacts of climate change and improve resilience. Climate change and global warming have wide-ranging impacts on various sectors and require a comprehensive approach involving policies, planning, and management strategies. The implementation of these strategies can help to mitigate the negative impacts of climate change, improve resilience, and promote sustainable development.

Keywords: Climate change, Global warming, Environmental issues, Greenhouse gases.

An Economic Analysis of Raisin Production in Solapur District

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ABSTRACT
A study was conducted in the year of 2021-2022. For study multistage sampling technique was used, in which Solapur district was selected purposively. The Pandharpur tehsil was selected as based on larger production of grapes. From Pandharpur tehsil four villages as Karkamb, Tulsi, Bhose, and Parite were selected on the basis of maximum number of raisin production units. From each village four raisin production units were selected, so total sixteen raisin production units were selected for study purpose. For analysis purpose descriptive statistics was used such as mean, tabular analysis, Fixed and variable costs concepts was used. The study revealed that total raisin production cost was Rs.13830023.8 and per tonne production cost of raisin was Rs.144817. The fixed and variable cost per kg of raisin production was Rs. 17.36 and Rs. 127.4 respectively. The gross income received was Rs. 16712500 and per tonne gross income was Rs.144817. Net income from Raisin production was Rs. 2882476.2 and per tonne net income received was Rs. 30182. Benefit cost ratio was around 1.21. It was concluded that Raisin production was economically viable.

Keywords: Raisin production, Solapur, Benefit cost ratio, Economically viable.

E-Marketing of Natural Farm Products

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ABSTRACT
Natural Farming is a chemical-free traditional farming method. It is considered as agro-ecology based diversified farming system which integrates crops, trees and livestock with functional biodiversity.Andhra Pradesh, Himachal Pradesh and Gujarat are the leading States and other States like UP, MP, Odisha, Chatisgarh and UK are also promoting natural farming. GoI is promoting Natural Farming through a scheme named Bhartiya Prakrit Krishi Padhti (BPKP). Marketing strategies will help the farmer to market their natural farm products these awere connect or online presence, Processing, Subscription model, selling through organic retail outlet and use of different online platform available. E-marketing methods which help the natural farming products were Search engine marketing (SEM), Online PR, e-Mail Marketing, Banner Advertisement, Viral

Market and blog market. E-commerce platform used in India for marketing of natural farm products were Jaivik Kheti portalunique initiative of Ministry of Agriculture (MoA), Department of Agriculture (DAC) along with MSTC to promote organic farming globally. Another online portals which used by the farmer were e-NAM, Desta mart/dsta talk, e-chaupal. AGMARKNET, Big haats and agricultural commodity exchange.

Keywords: Natural Farming, Traditional farming, E-commerce, e-NAM, Farm products, e-chaupal.

An Arima Approach for Predictive Analysis of Pomegranate Prices

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ABSTRACT

Pomegranate is an important fruit in India and ranked third in the world. The present study was carried out to forecast prices of pomegranate in Solapur district of Maharashtra which is foremost district in terms of production and area. The study deals with the analysis of time series data on monthly prices of pomegranate, during January 2006 to December 2020. In this study Box-Jenkins Auto Regressive Integrated Moving Average method was used for modelling and forecasting the prices of pomegranate. Various model selection criteria such ACF, PACF and ADF test were used for the identification of representative model for forecasting. The results indicated that seasonal ARIMA (2,1,2) $(1, 0, 0)_{12}$ model was the most adequate and efficient model for forecasting the prices of pomegranate. Study also showed the predicted midpoint prices of pomegranate for the period from January 2021 to December 2023. It was observed that there is high fluctuation in the prices of pomegranate in Solapur market. Such studies predict the future price behaviour which will be helpful to the farmers to take the suitable decisions in the marketing of their agricultural produces.

Keywords: Pomegranate, ARIMA, Box- Jenkins, Forecast, Stationary

Glimpses of Gig Economy

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ABSTRACT

The technological advances and extension of global supply chain have altered the process of production, and thereby change in organizations work, workplace and labour practices. The more adoption of the internet and increasing penetration of smartphones and electronic gazettes, connect online users across the countries over the digital platforms.This helps organizations share their talent needs and contact the remote online workers on digital platforms (Healy et al., 2017).All these have resulted in to the emergence of gig economy. These trends make the gig economy more relevant and prominent in today's digital era. The *gig economy* is a job market which consists of short-term or part-time work done by people who are self-employed or on temporary contracts. It is also called as Freelancer economy, agile workforce, Sharing economy, Independent workforce, Platform sharing, Collaborative economy. *Gig worker* is a person who works temporary jobs

typically in the service sector as an independent contractor or freelancer. It was concluded that The literature is fairly new; therefore a conceptual framework underpinning the gig-economy is under established. The current literature has given us a general descriptive perspective of gig. There is increase in the number of gig workers from 2017-18 onwards. And there is tremendous change in number of gig workers during 2019-20, this is because of Covid - 19 impacts, during this period digital platform and home delivery service is increased. The role of digital platforms is crucial for bringing gig culture in developing countries, and in the remote corners of the world. Gig economy offers many opportunities to gig workers such as flexible work environment, working in interest areas, access to global job postings. However, it poses many challenges to freelancers in the form of less payment, lack of social benefit and job security. In the new era of fourth industrial revolution, Gig economy is on rise and it has potential to bring huge amount of benefits for developing countries like India. Challenges can be converted into opportunities with the help of collaboration between Government, workers and educational institutions. Government policies and labour laws will go a long way in deciding scope of Gig economy in India. Individuals also must be ready for lifelong learning as they will have to upskill or reskill themselves in the changing environment. There is emergence of gig economy in agriculture, now a days farmers becomes literate and aware about the use of digital platforms, so there is wide scope for development of gig economy in agriculture. The research results are significant because the conclusions assist scholars and practitioners to better utilize gig services.

Keywords: Gig economy, Freelancer, Gig worker, Gig economy model.

Compound Growth Rate and Instability in Soybean Crop of Marathwada Region of Maharashtra

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ABSTRACT

Soybean has an important and valuable place in world's oilseed cultivation scenario, due to its high productivity, profitability and vital contribution towards maintaining soil fertility. The direction and magnitude of growth and instability in area, production and productivity of Soybean was estimated with the help of functional analysis and Cuddy-Della Valle Index. Secondary time series data were used for estimating for the years from 2000-01 to 2019-20. Growth rate and instability were computed for two sub-periods and overall period. The compund growth rate of area was highest for beed (19.84) for period I and osmanabad had area,production and productivty highest for Period I,II and overall periood.Latur had highest productivity for overall period. Hingoli district was consistent in the case of area for period I, II and overall period. In case of Production for period I, II and overall period Hingoli (63.82 per cent), Parbhani (51.87 per cent) and Aurangabad (62.85 per cent), respectively showed a minimum coefficient of variation and were consistent. Parbhani district was consistent in the case of productivity for period I, II and overall period. Parbhani district showed a positive compound growth rate (16.14), (10.40) and (9.41) with minimum instability index (35.04), (41.17) and (44.84), respectively. Developed new varieties of soybean which introduced for commercial usage in India, resulted the replacement of the tradition cropping pattern and improvement in the yield resulted the increase in area and production of districts of Marathwada region of Maharashtra.

Keywords: Soybean, Production, Compound Growth Rate, Maharashtra, Cuddy and Della instability index (CDVI).

Diversity and Ecology of Cold-Tolerant Cultivable Soil Microfungi from a High-Altitude Pass of The Trans-Himalayan Region

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ABSTRACT
Cold habitats are dominated by cold-tolerant (psychrotolerant) and cold-adapted (psychrophilic) microorganisms. Cold-tolerant microorganisms are gaining importance in view of their ability to colonize extreme low temperature environments, which are emerging as promising source of bioactive metabolites. These cold habitats are known to be domains viz., Bacteria, Archaea and Eukarya (yeasts, filamentous fungi and algae) which recites in soil, air, plants etc. Soil is a complex entity which serves as a medium for diverse microflora. Infact, soil is not a single habitat but it comprises of numerous microhabits for the survival of many microbes including microfungi. During the present study, diversity of cold-tolerant microfungi inhabiting high altitude pass, Fotula (4,180 msl) of the trans-Himalayan region was done. Soil collection was done by randomized sampling. Surface and sub-surface soil samples were collected aseptically at depths of 0 to 5 cm with the help of sterilized spatula. The soil samples were brought in sterile polybags to the laboratory where it was stored at 4^{o} C until processing. The colony forming units (CFU) of the fungi were determined by serial dilution and pour plate technique while modified Czapek dextrose agar (CDA) medium supplemented with streptomycin was used as isolation medium. The further identification of the recovered microfungi was done by allowing them to sporulate on different culture media, such as, potato dextrose agar medium (PDA), malt extract agar medium (MEA), Czapek yeast agar medium (CYA) and potato sucrose agar medium (PSA).In order to assess and investigate soil properties of study area, a total of three composite surface soil samples were taken from study site are examined and analyzed for physico-chemical properties viz. 10 physical and 5 chemical properties. A total of 289 microfungal isolates were recovered from 20 samples which were further identified on the basis of cultural and morphological characterization. A total of 57 taxa have been isolated and 42 taxa belonging to 20 genera have been identified so far. The dominant fungal genera were species of *Aspergillus* followed by *Alternaria*.
Keywords: Diversity, Fotula, Colony forming units, Physico-chemical properties, Psychrotolerant, Trans-Himalayan region

Unmanned Aerial System-Based Climate-Smart Agriculture Technique for Reduction of Agricultural Input & Increase in Farm Output

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ABSTRACT
Climate-Smart Agriculture (CSA) governs the new advances in sustainable farming and farm mechanization practices. UAS are an eminent component of Precision Agriculture Technologies (PAT) and CSA-based approaches towards solving the climate-related problems in the Crop Protection domain in agriculture at a local and global level. We have thus analyzed the economic feasibility of UAS & also forecasted climate impact when related to the water & pesticides usage

through UAS systems in Western Uttar Pradesh regions, compared to the conventional practices of pesticide spraying application. We have conducted a study on the comparison of knapsack sprayers and UAS at the given natural conditions such as environmental temperature, humidity, wind speed, and pressure for wheat crop in Western U.P. With the results of the field trials of knapsack sprayer and UAS, UAS showed better results over the parameters considered - water and pesticides usage, application time (time-motion analysis), and resulting climate-impact. Also, this system used a geo-tagged mapping mechanism which ensures precise spraying on the required areas of pest infestation. Thus, Variable Rate Technologies (VRT) using UAS in pesticide application has immense advantages over the conventional methods of spraying. This also has the potential to contribute towards indirect reductions in GHG emissions which can be further validated in the future studies.

Keywords: Precision Agriculture, Unmanned Aerial Systems, Climate-Smart Agriculture, Greenhouse Gas emissions, Variable Rate Technologies

Climate Change and Its Impact on Food Security

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ABSTRACT

Warmer temperatures altered precipitation patterns and an increase in the frequency of extreme weather events in terrestrial areas around the world are all directly related to anthropogenically increased fossil fuel emissions, which are the main cause of the increased atmospheric concentrations of carbon dioxide ([CO2]) and other greenhouse gases. The ability of the world to sustain adequate food production for a growing and increasingly affluent population with shifting access to affordable and nourishing food can be impacted by climate changes in agriculturally productive regions. Even though there is a significant information gap about the implications of climate change on horticulture, it is particularly significant in specialty cropping systems. This includes crops for fruits, vegetables, and perennial cropping systems, which, along with row crops, also contribute to our global diet. We must broaden our narrow focus from increasing yield and plant productivity to include the impact of climate change on the nutritional value of these crops to get a complete picture of the true impact of climate change on our global food supply. We require a multifaceted strategy that combines physiology and genomics technologies and conducts extensive trials under accurate representations of the future forecasted climate to answer these concerns.

Keywords: Climate change, Perennial crops, Plant nutritional quality, Physiology, Genomics, Fruit, and vegetable crops

Effect of Arbuscular Mycorrhizal Fungi on Soil Total Glomalin, Soil Aggregation and Growth of Vetiver (*Vetiveria zizanioides cv.* Gulabi)

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ABSTRACT

AM fungi are known to secrete a sticky and highly resistant substance known as glomalin, an N-linked glycoprotein shown to be very important in soil aggregation. Additionally, glomalin-related soil protein (GRSP), mucilages, polysaccharides, and other compounds produced by AM fungi participate in soil aggregate formation. Therefore, a successful establishment of viable populations of AM fungi was an important step toward increasing the stability and thereby reducing the soil erosion. An investigation was carried out to isolate and screen the native AM fungal isolates for their ability to synthesis glomalin under *in vivo* and *in vitro* conditions. A total of fifty native AM fungal isolates were recovered from pristine and eroded soils of the Central Western Ghats region of Karnataka. Among the AM fungal isolates, UASDAMFG-02 (3.00 mg/ml) recorded the highest, followed by UASDAMFG-17 (2.89 mg/ml) and AMF-42 (2.82 mg/ml). All the three efficient glomalin producing native AM fungal isolates were validated under water runoff model at AICRP on Dry Land Agriculture, RARS, Vijayapura. The results have indicated that the treatment received UASDAMFG-02, UASDAMFG-17 and UASDAMFG-42 recorded the least water runoff (382.28, 442.58, 526.03 m^3/ha respectively) compared to uninoculated control (607.02 m^3/ha). Similarly, the highest soil loss was recorded with the treatment received zero application of AM Fungal cultures (862.01 kg/ha), while least soil loss was recorded with the application of UASDAMFG-02 (373.69kg/ha), followed by UASDAMFG-17(529.74 kg/ha) and UASDAMFG-42 (660.24 kg/ha). In addition, per cent water stable aggregate (WSA) in vetiver rhizosphere was found to be the highest in the treatment received UASDAMFG-02 (59.61%), followed by UASDAMFG-17(53.64%) and UASDAMFG-42 (51.36%) compared to uninoclated control (46.87%). The infiltration rate was the highest with the treatment received UASDAMFG-02(0.86 cm/hr), followed by UASDAMFG-42 (0.72 cm/hr) and UASDAMFG-17(0.76), while the lowest infiltration rate was received in the non mycorrhized controlled plots (0.64 cm/hr).The highest soil organic carbon content was recorded in the treatment received UASDAMFG-02 (0.69 %), which is superior to the treatments receive *viz*., UASDAMFG-17 (0.61%) and UASDAMFG-42 (0.58%). The mycorrhizal root colonization was maximum in the treatment received UASDAMFG-02(78.60%), followed by UASDAMFG-17 (66.39%) and UASDAMFG-42 (64.39%). The lowest percentage of root colonization was observed non mycorrhizal vetiver plants (56.33%). Furthermore, the plant growth, physiological parameters and soil biological activities were the highest with native UASDAMFG-02.

The outcome of the present investigation has revealed that the glomalin producing native AM Fungal isolates can be exploited in the rehabilitation of the eroded soils.

Keywords: AM fungal isolates, Glomalin, Water runoff, Soil loss.

Vulnerability Assessment of Mountain Forest Ecosystems Using Bottom up Approach: A Case Study of Sindh Forest Division, Jammu and Kashmir, India

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ABSTRACT

The Indian Himalayan Region (IHR) is extremely susceptible to both the variability and effects of climate change. The current study uses a bottom-up, indicator-based methodology to evaluate the

vulnerability in Sindh Forest Division. Indicators were chosen from exposer, hazard and vulnerability domains. The systematic sampling belt-transaction approach was used to place the appropriate sample plots in various locations. Weight assigned via pairwise comparison method (PCM) for the construction CVI. Using RS & GIS, ranking, vulnerability, and quartile maps were produced. Findings showed that the Kullan forest block was the most vulnerable, with a CVI of 0.71 (1st rank) having socio-economic risk under present scenario and the Chattergul forest block had the lowest CVI (0.41) indicating that it was the least susceptible. Range-wise the Sindh range was most at risk from the current climate, whereas the Harran-Shallabugh range was least at risk assessment. Major drivers for all, relative to the case study;s findings, were landslides, flood discharge, droughts, high fire frequency, highest population density, drainage density, percent area under slope greater than 30°, low literacy rate, and invasive species prevalence Therefore Sindh Forest Division can better adapt to climate change by using this approach to help create forest management plans..

Keywords: Adaptation, Climate change, Indian Himalayan Region, Vulnerability, Indicator

Estimation of Physicochemical Properties During Different turnings of button Mushroom cultivation

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ABSTRACT

Composting is an aerobic biotic decomposition that is governed by different physicochemicalproperties and microbiological factors. Compost if properly prepared is very selective in nature and only*Agaricus bisporus* mycelium can grow successfully on it at the practical exclusion of other competingorganisms. The present study has been carried out to use horse dung as one of the prime constituents incompost formulation and to compare the formulation with those already *in vogue*. Samples of ingredientsand of different stages during compost preparation of different compost formulations were analysed forvarious physicochemical properties. The various properties analysed were moisture content, bulk density,porosity, pH, EC, carbon, nitrogen and C:N ratio. Among thevarious physico chemical properties of thematuredcompost,C:Nratioplays animportantroleforhigheryield andextendedcroppingperiod.

Maximum C:N ratio was found in C4 at fifth turning (22.12:1) and minimum in C3 at sixth turning(13.88:1).

Keywords: Physico-chemical properties, compost, buttonmushroom, C:N Ratioand horsedung

Sub Theme: Environment and Sustainable Energy-Friendly Resources: Renewable Energy, Green Energy, Bio-Fuels and Waste Product Energy

Central PM-KUSUM Scheme: A Sustainable and Environmental Friendly Alternative to conventional energy in Agriculture

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ABSTRACT

Today, a country's energy consumption is frequently used as a measure of its level of development and India ranks third in energy consumption globally. Annually, 213 billion units were being consumed from over 22 million grid-connected agriculture pumps installed in India, which account for 18% of the country's total electricity consumption. Eleven major distribution companies account for 95% of total agricultural electricity consumption and provide approximately Rs 1 lakh crore in agricultural electricity subsidies. The PM-KUSUM Scheme is being implemented by the Ministry of New and Renewable Energy. Initially, 17 lakh off-grid agricultural solar pumps will be distributed by the government. 20,000 MW of solar power plants will be built on unused land. The adoption of PM-KUSUM has several environmental and sustainable benefits. First, it reduces the dependency on non-renewable sources of energy. Second, it reduces the emission of greenhouse gases, which are primarily responsible for global warming and climate change. According to the International Energy Agency (IEA), solar power could become the largest source of electricity in the world by 2050 and by doing so, it could help to limit the increase in global temperature to below 2 degrees Celsius. The solar industry has seen exponential growth in which Rajasthan tops among all states in solar power generation potential. In states like Bihar, Jharkhand etc. where adoption rate of such schemes is relatively low, it can provide electricity where it is difficult or expensive to extend the grid, thereby improving access to energy and promoting socio-economic development in those areas. Despite the numerous benefits of solar energy, its adoption is not without challenges. With the right policies and investment, solar energy can play a key role in promoting a sustainable and prosperous future.

Keywords: Climate change, Environmental and Sustainable benefits, Greenhouse gases, Solar energy.

Concrete Made from Stone Dust and Recycled Coarse Aggregate: Mechanical Properties

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ABSTRACT

In this experimental investigation a composite material out of recycled construction waste and stone dust is developed. The stone dust is the replacement of fine aggregate and recycled construction waste is the replacement of coarse aggregate. The concrete developed by partial replacement of fine and coarse aggregate is tested for compression, flexure and split tensile. Four different types of samples were developed by varying the percentage of stone dust at 0%,50%,60%,70% and recycled construction waste was kept constant at 10%. Water cement ratio of 0.46 was adopted throughout the manufacturing of all samples. The maximum strength after 28 days of moist curing was obtained in S70RC10 sample (i.e., 70% stone dust and 10% recycled

construction waste) for compression and flexure. The test results indicate that stone dust and recycled coarse aggregate can be used as alternate to fine aggregates and coarse aggregates respectively in designed proportions in conventional concrete.

Keywords: Compressive strength, split tensile strength, stone dust, recycled coarse aggregate.

Estimation of Greenhouse Gas Emission in the Paddy Field, its Impact and Mitigation Strategies to Combat Future Climate Change

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ABSTRACT

Agricultural soil acts as a source and sink of important greenhouse gasses (GHGs) like methane (CH4), nitrous oxide (N2O) and carbon dioxide (CO2). Rice paddies have been a major concern to the scientific community because they produce threatening and long-lasting GHGs, mainly CH4 and N2O. around 30% and 11% of global agricultural CH4 and N2O, respectively emitted from rice fields. Thus, it is urgent to simultaneously quantify the fluxes of CH4 and N2O to improve understanding of both the gases from rice fields and to develop mitigation strategies for upcoming climate change reduction. In paddy fields, the emission of CH4 and N2O was measured by the static box or automated closed chambers technique. After collection, samples were brought to the laboratory and gas concentration was determined by a gas chromatograph fitted with flame ionization and electron capture detectors, respectively. Improper management of organic residues, fertilizers, irrigation water, traditional rice cultivation in standing water *etc*., are the main reasons for more methane emissions from the rice field. So, proper management of these is very important to reduce methane emissions and ensure higher rice productivity under climate change. Climate resilient practices like a selection of less methane transport rice cultivars, modification in tillage practices *viz.,* zero tillage, conservation agriculture; water-efficient rice establishment methods *viz.,* SRI, wet and dry direct seeding, aerobic method; changing N fertilizers doses, use of slow releasing fertilizers *viz.,* deep placement of urea, urea super-granules, neem coated urea; inclusion of nitrification inhibitors, changing irrigation practices like alternate wetting and drying; adding of more and more organic inputs like seed cakes, biochar and crop residues help minimize the CH4 emission and sustain the rice production systems.

Keywords: Greenhouse effect, Methane emission, Gas chromatograph, Climate change, rice establishment methods

Efficacy of Different Bioagents against *Alternaria Alternata* in Black Gram [*Vigna mungo* (l.) Hepper]

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ABSTRACT
Black gram *(Vigna mungo*) is one of the important food legumes for human consumption across the globe because of its nutritional and medical properties. Black gram is also known to improve fertility of the soil where it is grown. Despite its crucial role in tropical agriculture, the productivity levels are of lower order in comparison to their cereal counterparts. The productivity of black gram gets severely hampered by pests and diseases caused by bacteria, fungi and viruses. The percent of yield loss of legume crops due to biotic factors is in the tune of 40-60%, out of which the fungal pathogens alone account for 10-25%. Alternaria alternata are soil borne fungal pathogens which cause leaf blight. Several methods for controlling such fungal borne diseases have been evaluated by studying the use of resistant varieties of crop, chemical control of pathogens, novel agricultural practices, by applying various plant volatile compounds, plant extracts and biological control, especially with species of Trichoderma. *Trichoderma harzianum* was most effective controlled growth of mycoflora and carried healthy growth. Among the six bio-agents used for the management of Alternaria leaf blight of Black gram seeds, *T. harzianum* @ 10 g/kg of seed was found to be more effective with minimum incidence of mycoflora on seeds (8.33 %) followed by *T. asperellum* @ 10 g/kg of seed with incidence of (8.67 %) , *T. virens* @ 10 g/kg of seed (9.33 %), *Bacillussubtilis* @ 10 g/kg of seed (11.00 %),*Pseudomonasfluorescens* @10g/kgofseed(10.67 %),andActinomycetes spp.@ 10 g/kg of seed (10.33 %) as compared to control.
Keywords: Black gram, Mycoflora, Blotter paper, Agar plate, Bio agent, *Alternaria alternata*, *Trichoderma harzianum.*

Farm Mechanization and Post-Harvest Technologies to Enhance Farm Productivity
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ABSTRACT
The adoption of farm mechanization and post-harvest technologies has been identified as critical to enhancing farm productivity, reducing post-harvest losses, and increasing the income of farmers. In a recent conference on agricultural productivity, experts discussed the various farm mechanization and post-harvest technologies that could be adopted to achieve these objectives.
Farm Mechanization:-
Farm mechanization involves the use of machines and equipment in agricultural operations to increase efficiency and reduce labor requirements. The adoption of farm mechanization has the potential to significantly increase farm productivity and reduce post-harvest losses. Some of the farm mechanization technologies discussed at the conference includes:
Tractors: Tractors are widely used in agriculture for various operations such as plowing, harrowing, planting, and harvesting. They can be used to perform multiple operations, thus saving time and reducing labor requirements.
Harvesters: Harvesters are machines that are used for harvesting crops such as wheat, rice, and corn. They can significantly reduce labor requirements and increase the speed of harvesting operations.

Planters: Planters are machines that are used for planting crops such as maize, soybeans, and beans. They can plant crops at a uniform depth and spacing, thus increasing the efficiency of planting operations.
Irrigation equipment: Irrigation equipment such as sprinklers, drip irrigation, and pivots can be used to improve water use efficiency and increase crop yields
Conclusion:-
In conclusion, the adoption of farm mechanization and post-harvest technologies has the potential to significantly increase farm productivity, reduce post-harvest losses, and increase the income of farmers. Tractors, harvesters, planters, and irrigation equipment are some of the farm mechanization technologies that can be adopted, while drying and storage facilities, processing equipment, packaging and transportation, and cold storage facilities are some of the post-harvest technologies that can be adopted. To ensure the widespread adoption of these technologies, it is important to provide farmers with access to finance, training, and information on the benefits of these technologies.
Keywords: Farm Mechanization, Agricultural productivity, Post-harvest technologies

Impacts of Physical and Chemical Treatments on Seed Viability and Soybean Seed-Borne Fungi

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ABSTRACT
Soybean is an important food commodity in Indonesia after rice and maize. Plant diseases continue to limit soybean production growth. One of the plant pathogenic infections can occur during the seed phase. As a result, the purpose of this study was to assess the effect of physical and chemical treatments on seed-borne fungus management and their impact on soybean seed germination. This study used a completely randomized design with nine treatments: physical therapy heating the seeds in a microwave at 40°C for 10, 20, 30, and 40 seconds and chemical treatment by soaking the seeds in a fungicide with active ingredient difenoconazole with a concentration of 0.5%, 1%, 2%, and 3%. soaking fungicides. Each treatment was repeated three times. The seeds that have been given treatments are then planted using the growing test technique and incubated for seven days. Furthermore, the seed viability and the growth of pathogenic fungi were observed at the end of incubation. The results showed that soybean seed germination was not affected by physical and chemical treatments.
The seed viability of 100% with or without treatment. This was confirmed by the findings of seed-borne fungi (*Curvularia, Fusarium, Aspergillus*) with a low infection rate of 0.01-0.19%. Chemical treatment with concentrations of 0.5%, 2%, and 3% had a significant effect on the Fusarium infection level, which was higher than the control, which was 0.18%, 0.17%, and 0.19%. Meanwhile, for *Curvularia* and *Aspergillus*, physical and chemical treatments did not have a significant effect.
Key Word: Soybean, Fungicide, Seed, Physical, Chemical

Evaluation of Newly Developed Genotypes of *Gossypium hirsutum* for Seed Cotton Yield and Yield Contributing Traits under Rainfed Condition

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ABSTRACT

Cotton is one of the most important fiber and cash crop of India and plays a dominant role in the industrial and agricultural economy of the country. In the present investigation, twenty three genotypes of *Gossypium hirsutum* along with four checks viz. NH 348,NH 615,NH 545 and NHH 44 were evaluated at Cotton Research Station, Nanded. These genotypes were analysed for fibre quality parameters like Upper Half Mean Length, micronaire, fibre strength, uniformity index, ginning outturn, as well as for quantitative characters like seed cotton yield, lint yield and boll weight. Out of twenty three strains tested, only one strain, NH 784 (2311 kg/ha) depicted significant superiority for seed cotton yield (kg/ha) over all varietal checks *viz.*, NH 615(1760 kg/ha), NH 545 (1669 kg/ha) and PH 348 (1553 kg/ha) while four more strains *viz.*, NH 788 (2168 kg/ha), NH 782 (2155 kg/ha), NH 757 (2150 kg/ha) and NH 791 (2060 kg/ha) recorded significant mean seed cotton yield over varietal check PH 348 (1553 kg/ha). None of the strain depicted significant superiority over hybrid check, NHH 44 (1848 kg/ha).Out of twenty three strains tested, the strain NH 784 (948 kg/ha) recorded significantly superior lint yield over all varietal checks *viz.*,NH 615 (684 kg/ha), NH 545 (641 kg/ha) and PH 348 (390 kg/ha) as well as hybrid check NHH 44 (707 kg/ha). Ginning outturn was ranged from 32.05 (NH 783) to 41.03 per cent (NH 784) amongst the strains under testing,Two strains NH 788 (40.23 %) and NH 789 (40.00 %) depicted promising ginning out turn.In general, performance of strain NH 784 was found excellent for seed cotton yield (2311 kg/ha), lint yield (948 kg/ha) and better ginning outturn (41.03%).

Performance of Interspecific Derivatives of *Desi* Cotton (*Gossypium arboreum*) for Seed Cotton Yield and Fibre Quality Traits

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ABSTRACT

Cotton is an important agriculture commodity for export in the form of raw cotton, cotton yarn and other value added textile goods. Indigenous diploid *Gossypium arboreum* cotton possesses inherent ability to resist major insect pests and diseases, but had inferior fibre length and smaller boll size than tetraploid *Gossypium hirsutum* cotton. Attempts to introgress favorable traits like big boll size and fibre length (staple length) of cultivated tetraploid *G.hirsutum* into cultivated diploid *G.arboreum* were made by interspecific hybridization of *G.arboreum* and *Gossypium hirsutum.* Introgressed genotypes developed by introgression along with three checks viz. PA 08, PA 402 and NH 615 were evaluated at Cotton Research Station, Mahboob Baugh Farm, VNMKV, Parbhani. These genotypes were analysed for fibre quality parameters like Upper Half Mean Length, micronaire, fibre strength, uniformity index, as well as for quantitative characters like seed cotton yield, lint yield and boll weight. Results were statistically significant for seed cotton yield. Based on the mean performance for seed cotton yield, the genotype PAIG 423 recorded

highest seed cotton yield (1388 kg/ha) followed by PAIG 421 (1310 kg/ha) and PAIG 424 (1301 kg/ha). The ginning outturn ranged from 34.24 (PAIG 416) to 38.62 per cent (PAIG 424). The genotype PAIG 424 recorded highest ginning outturn (38.62 %) followed by PAIG 415 (38.56 %). As regarding performance for fibre quality traits, the genotype PAIG 417 recorded highest upper half mean length (29.4 mm) followed by PAIG 420 (29.2 mm) and PAIG 419 (20.0 mm).Micronaire value ranged from 4.7 to 6.0 µg/inch. The genotype PAIG 421 recorded highest fibre strength (26.9 g/tex) followed by PAIG 418 (26.8 g/tex) and PAIG 424 (26.8 g/tex).In general, performance of genotypes PAIG 423 and PAIG 421 was most promising.

Field Performance of Gamma Irradiated Banana Plantlets

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ABSTRACT

In present the shoot tip of banana cv. Grand Naine were established on MS medium containing 2 mg/l BAP were exposed to ^{60}Co gamma rays doses ranging from 0, 10, 20, 30, 40, 50 and 60 Gy @ 20 Gy/min. at BARC, Mumbai. Analysis of data for field conditions was analyzed using Randomized Block Design. In field conditions, the treatment control recorded maximum plant height (189.99 cm), stem girth (72.80 cm), number of suckers (4.46), number of leaves (21.8), leaf area (11.8 m^2) and leaf area index (8.75) over rest of the treatments under study. While the treatment T_7 recorded less plant height (163 cm), stem girth (56.57 cm), number of suckers (2.9), number of leaves (17.6), leaf area (7.8 m^2) and leaf area index (6.0). The results on shooting, bunch and finger characters showed that the treatment 0 Gy irradiation recorded significantly minimum days for flowering (209.9 days), days to fruit maturity from flowering (97.86 days) and crop duration (308.53 days) while bunch attributes *viz.*, bunch length (63.35 cm), number of hands per bunch (9.83), number of fingers per hand (16.1), number of fingers per bunch (155.26) and bunch weight (22.7 kg) of banana and finger attributes *viz.*, finger length (23.7 cm), finger girth (14.68 cm) and fingers weight (133.41g) of banana was recorded more as compared to remaining treatments of gamma irradiations under study. Regarding quality attributes, the control treatment recorded significantly maximum total soluble solids (23.5 %), total sugar (23.25 %) and reducing sugar (17.65 %) over rest of treatments under study while, the treatment applied with 60 Gy recorded less total soluble solids (20.91 %), total sugar (20.6 %) and reducing sugar (16.29 %). The acidity and non-reducing sugar differed non-significantly. Per cent disease incidence of cucumber mosaic virus and banana streak virus showed non-significant differences as affected by irradiations. The total mutation spectrum of irradiated plants was 14.22 % and showed predominance of plant stature type of mutant (31.34 %) with maximum mutation frequency (42.84 %), mutagenic effectiveness (0.12 Mp/kR) in treatment of 40 Gy. Maximum variability for various quantitative and quality parameters in field conditions were recorded in treatment applied with 40 Gy. Total 07 useful putative mutants (03 early maturing and 04 dwarf type) were selected at harvest from the wide range of M_IV_4 generation of gamma rays induced putative mutants population of Grand Naine for their performance and further utilization.

An Economic Analysis of Constraints Faced by the Farmers in Production and Marketing of Major Coarse Grains in North Eastern Karnataka

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ABSTRACT
Coarse cereals have been traditionally playing an important role in the farming calculus of the small and marginal farmers of North Eastern Karnataka region, in the consumption basket of the poor, as a livestock feed and sustaining the rainfed economy. The North Eastern Karnataka region is one of the most backward regions where agriculture is dependent on rainfall and very few portion have access to irrigation facility. In this regard majority of the area under agriculture is being cultivated under rainfed conditions. The present study tries to analyse the constraints faced by the farmers in production and marketing of major coarse cereals such as maize, bajra and sorghum in the study area. The primary data was collected from randomly selected 120 sample farmers based on land holding pattern *viz.* marginal and small, medium and large in Koppal and Raichur districts of the region using pre-tested, well-structured schedule through personal interview method. The major constraints were listed and then ranked based on the responses of the maize growers using Garrett's ranking technique. The results revealed that, erratic behaviour of rainfall was major constraint reported by the maize respondents (90%), followed by high cost of inputs (87.5%) and non-availability of credit for the production (80%). High cost of inputs (85%) was the major constraint faced by the bajra growing farmers in the study area, followed by erratic behaviour of rainfall (77.5%) and non-availability of labour (72.5%). Majority (90%) of the sorghum producing farmers faced erratic behaviour of rainfall as the major constraint and ranked first, followed by non-availability of labour (82.5%) and high cost of inputs (80%). In maize crop, results indicated that lack of dissemination of news was major marketing constraint and ranked first (85%) followed by high transportation cost (82.5%) and lack of storage facilities in growing areas (72.5%). Majority of the bajra farmers opined that high transportation cost (87.5%) was ranked first, followed by lack of transportation facilities and road facilities from villages to market (77.5%) and lack of dissemination of news at appropriate time was the third major constraint (67.5%). The lack of dissemination of news was the foremost constraint faced by the sorghum farmers (87.5%) of the region, followed by high transportation cost (77.5%) and long distance of regulated market from the sorghum crop growing areas (67.5%).
Keywords: Maize, bajra, sorghum, coarse grains, production and marketing

Environmental Issues

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ABSTRACT
Human civilization has, made an impressive progress to achieve economic wellbeing and all-round development that has certainly made life a lot more comfortable. However, this progress has come at enormous cost to the environment that often negates the advantages of economic growth. The term environment refers to everything that is around us land, water, atmosphere, plants and animal life. In fact, environment is the main supplier of vital resources that we need to survive. It is no wonder that the other planets have no life simply because their environments cannot sustain life. It is a truth that ecosystems and its peoples are bound together in a tenuous symbiosis. The

industrial society is increasingly destroying this relationship giving rise to many complex environmental problems of far reaching consequences. In addition, the unintended and unanticipated environmental and social damage caused by the prevalent paradigm of economic development has resulted in complex environmental problems that seriously undermine food security, water security and biodiversity. The main problems threatening our life support system of our the planet are elaborated in the following paragraphs.

The biggest issue facing the environment is over population of humans. The global population has more than tripled in the last 60 years placing stress on every aspect of the environment. Ever increasing area of land is being taken up by urbanization and human settlements to accommodate the fast growing population. Rising levels of carbon dioxide and other gases, such as methane, in the atmosphere create a 'greenhouse effect', trapping the Sun's energy and causing the earth and oceans to warm. The higher the amounts of greenhouse gases in the atmosphere, the warmer the earth becomes. There is clear evidence to show that climate change is happening. Since the industrial revolution, atmospheric concentrations of greenhouse gases (GHGs) are now at their highest level for hundreds of thousands of years. There is an overwhelming scientific consensus that climate change is primarily due to the use of fossil fuels, which releases carbon dioxide and other greenhouse gases into the atmosphere. The CO2 concentration in the atmosphere is now , and . The average temperature at the earth's surface is now about 1°C higher over the last century. Ambient temperature data show that 13 of the 14 warmest years on record have occurred in the 21st century, and in the last 30 years each decade has been hotter than the previous one. Rising ambient temperature affect crop yields globally, with all other factors being equal. Some studies have estimated that the crop yields may drop by about 10 percent by 2050. Apple cultivation in Himachal Pradesh has suffered adversely from rising temperature, affecting livelihood of lakhs of farmers. For apple trees winter temperature and precipitation in the form of snow are critically important to ensure normal flowering and fruiting in apples. Apple trees requires over 1200 hr. of chilling for satisfactory flowering and fruiting. Relatively warmer December and January fails to provide the critical chilling requirements. Data of last thirty years show that apple crop is getting adversely affected in all apple growing regions (Shimla, Kullu, Lahaul and Spiti) as a result of relatively faster warming of the Himalayan region than most places in the world.

This year in early May, blistering summer heat melted the asphalt roads in Valsad, Gujarat, resulting into a life threatening situation for pedestrians, who found it difficult to walk as their shoes got awkwardly stuck in the melted asphalt and had to struggle to free their shoes.

Currently, one third of humans have inadequate access to clean, fresh water. The number is expected to increase up to two thirds by 2050. Some experts believe that in the near future water will become a commodity just like Gold and Oil. Some experts say that wars will be fought over who owns the water supply. In India, water availability is becoming increasingly crucial because per capita availability of water in the country has sharply declined as a result of population growth. Most of our rivers are in varying degrees of decline and distress. Over seventy percent water bodies in the country have been polluted or drained. Large volumes of untreated effluents are drained into rives, and water bodies. Most of the Indian rivers are thoughtlessly used for disposing raw sewage and untreated effluents. It is obvious that water of most of our rivers is unfit for drinking, and in many stretches not even fit for bathing. Despite various efforts, pollution of Ganga and other rivers continue to remain a major challenge. Sea level is rising. The latest measurements show that the average sea level is currently 50 mm higher than in 1993. According to a United Nation's forecast, sea levels are likely to rise well over 50 cm by 2100, posing serious threat to coastal communities. Half of the 10 largest cities in the world, including Mumbai,

Kolkata, New York City, French Rivera and one-third of the world's 30 largest cities are already threatened by sea level rise. The Maldives, a chain of 1,200 islands and coral atolls, about 500 miles from the tip of India, is one of the lowest countries on the planet, with an average land level of 1.5 m above sea level, may disappear, if the present pace of global warming continues unabated. The chemistry of the oceans is also changing as they absorb much of the excess carbon dioxide being emitted into the atmosphere. This is causing the oceans to become acidic more rapidly than at any point in the last 65 million years. Increasing acidity is highly damaging to marine food-chains and ocean productivity. Climate change promotes melting of polar ice-caps, which in turn contributes to rise in sea level. As the Arctic warms, sea ice is rapidly decreasing. Over the past 20 years the ice sheets in Greenland and the Antarctic have shrunk, as have most glaciers around the world. India has 5243 glaciers covering an area of 37579 km2 and containing 142.88 km2 of ice. The Gangotri glacier, the source of the Ganga is receding at a rapid pace. Some of the most devastating effects of glacial meltdown occur when glacial lakes overflow and burst and give rise to disastrous floods downstream. The 2013 Uttarakhand disaster resulted from heavy cloudburst coupled with collapsing of an upstream glacial lake. Episodes of extreme rainfall events and cloud burst cases have increased and they are likely to be more frequent in the coming years.

Floods have become more frequent and affect the maximum number of people in the world. Many of the fastest developing cities in coastal areas, means that more people, infrastructure, and buildings are vulnerable to the flooding caused by storm surges or cyclones, and sea level rise. Even if not on the coast, cities have sprawled onto floodplains and wetlands. There is simply more stuff, more people, more industries, more infrastructures and more investment in coastal areas than few decades ago. Globally exposure and vulnerability of coastal communities have increased manifold. Changing rainfall patterns will affect water supplies. Too much rainfall in some areas and not enough in others will contribute to both flood and drought conditions. We are already seeing increasing numbers of heavy rainfall events, and expect this increase to continue, with greater risk of river and flash flooding. Growing populations and rapidly expanding urbanization and infrastructure are making the societies more vulnerable to extreme weather events. More extreme weather events are being seen around the world. Heat waves have become more frequent and are lasting longer. Warming is expected to cause more intense, heavy rainfall events. Recent devastating floods in Chennai were to a large extent due to the building of the cyber city in a low lying area without worrying about the local ecological and hydrological features. Accordingly, a heavy spell of rain flooded the area causing enormous hardships to residents and office goers, apart from substantial economic loss to individuals, institutions, entrepreneurs and public exchequer. In future extreme events are expected to become more common, more intense and more frequent and this needs to take into account in future development.

According to the UN projections the global population is expected to grow from 7 billion in 2012 to 9.3 billion by 2050. In spite of growing economic prosperity and technological progress approximately 870 million people remain undernourished even today. The question of food security, hunger, malnutrition, poverty and parity are high on the global agenda. India with a population of 1.2 billion is the second largest populous country of the world and likely to touch 1.6 billion by 2030, surpassing China. Despite economic growth and self-sufficiency in food grain production, high level of food insecurity and malnutrition persists in the country. Forests are natural sinks of carbon dioxide and produce fresh oxygen, help in regulating temperature and rainfall, but getting destroyed without realizing that there is no substitute for the services they provide. Trees are now dying globally at a rate never seen before. Since 1990 half of

the world's rain forests have been destroyed. Currently, many plants and animals are in danger of becoming extinct, either from being forced out of their habitats by anthropogenic actions or by climate change. When a species become extinct, it has a knock on effect in the food chain upsetting the structure and function of ecosystem, which have developed through a long process of evolution. The biological, chemical, and physical interactions between the components of an ecosystem (e.g., soil, water, plants, animals and microorganisms) produce a variety of services in the form of oxygen needed for breathing and fuel combustion, clean water, carbon sequestration, soil fertility and control of soil erosion among others. Another critically important ecosystem service for humans is pollination. It is the transfer of pollen from the producing anthers to the receptive stigma and it is an essential step for sexual reproduction leading to fruit and seed formation in flowering plants. Success of pollen transfer to stigma is directly related to yield for all crops in which the pollination is a prerequisite for sexual reproduction. Rapid and large changes in global temperatures 4oC or more, above the pre-industrial temperature, could cause mass extinction of species and collapse of ecosystem services and jeopardize human survival.

The desperate scenario presented by the environment challenges can be reversed and turned into opportunity, provided urgent and concerted actions are taken simultaneously on multiple fronts. Environmental conservation and effective use of ecosystem services must receive highest priority and should be the under lying theme of all development activity. We have to make an all-out effort to decarbonize the economy, increase resource use efficiency, protect biodiversity and ecosystem services for the benefit of present and future generations. Paris climate agreement, and global agreement on sustainable development goals SGDs, are very encouraging developments. We must support these initiatives and resolve on the eve of The World Environment Day to protect Mother earth –Our only home- from environmental abuse and commit to work for improving quality of life and human well-being.

Removal of Textile Dye Effluent Using Activated Carbon from Sesame

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ABSTRACT

Textile dyeing industries are one of the most polluted industries which create lots of problems for environmental pollution. The textile dyeing industry produces in large amount of production and release of waste water effluent. The adsorption process using various agricultural waste products can be applied for the removal of dye effluent from wastewater. In the present study activated carbon prepared from waste i.e. sesame was used for effluent treatment. The powdered sesame was treated with 5% NaCl for 24 hours. The acid activation process of 2.5 N H_2SO_4 was treated for 24 hours. Pyrolysis of carbon was done at 300˚c temperature for 2 hours. For dye effluent treatment different concentrations of adsorbent 0.1%, 0.25%, 0.5% and 1.0% and time period 30, 60 and 90 minutes were used respectively. The resultant activated carbons were subjected to ball milling and characterized by using various analytical techniques. The clarity of the effluent was found at 1.0% concentration for 30 minute and the absorbency was recorded as 0.213nm. The adsorbent of porosity, ash content and moisture content were recorded as 0.3600%, 0.160% and 0.033%. The adsorbent of sesame bulk density was 4.600g/cm^3. The methylene blue was recorded 88 mg/g of the adsorbent. The point zero charge, pH, particle size and iodine number were recorded i.e. 5.64pzc, 6.52, 1326.66nm and 16.40m^2/g respectively.

Keywords: Sesame, oil cake, activated carbon, dye effluent, adsorbent, FTIR, pH, SEM

Conservation and Characterization of Cyanobacteria/ MGA from Indo - Burma Biodiversity Hotspot Towards Agricultural and Biotechnological Potentials

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ABSTRACT
The present study deals with the cyanobacteria of north eastern region of India which comprises the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The region is one of the 12 mega-biodiversity rich zones of the world and forms a distinctive part of the Indo-Burma biodiversity hotspots that ranks 8th among the 34 biodiversity hotspots of the world. Cyanobacteria as a whole and Nostocalean forms in particular thrive exuberantly in the natural habitats of north eastern region of India which falls under the Himalayan region of Indo-Burma biodiversity hotspots. Despite its abundant occurrence in the north eastern region of India, few studies have been done so far as most of the previous studies were concentrated on state or region specific. Therefore, the present study was aimed to explore, isolate and identify by classical and modern PCR based molecular methods and characterization of the Nostocalean cyanobacteria of the north eastern region of India. With the establishment of correct identification of the potent strains through molecular approaches, application as eco-friendly biofertilizer in various cultivable lands can help in increasing the productivity without polluting the soil environment which is a burning problem of the present scenario.
Keywords: Nostocalean cyanobacteria, Indo-Burma biodiversity, PCR, molecular characterization

Occurrence of Major Fungal Species of Maize (*Zea mays* L.) at Post-harvest Storage Structure

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ABSTRACT
Maize is an important staple cereal food crops produced in high-land and low-land parts of Ethiopia. Somali National Regional state is known by livestock production, however, Gode district is the potential maize production in the region, and the crop is playing an important role in food security and providing livestock feeds. Mold developments at post-harvest stages are the major threatening the commodity for use, likely dragging the storage products out of markets and home consumptions. The previous report in the region was lack, therefore the present study focused on the identification of post-harvest fungi of maize grains in traditional storage containers harvested in Gode in 2022. Direct plating on a PDA was used to examine the frequency and incidence of internal mycoflora in 30 maize samples. The most frequent fungal genera isolated in maize grain were species of Aspergillus and Fusarium. The other genera included Penicillium, Rhizopus, Mucor, Chaetomium, Helminthosporium, Rhizoctonia bataticola and Trichoderma were isolated in less frequency. The data revealed the high incidence of A. flavus (12.40%) and A. niger (8.75%) among the nine fungal genera recorded. The result was immense value for assessing the possible health hazards in humans and animals upon consumption of such contaminated food grains likely produce secondary metabolites such as toxigenic mycotoxins. Future research was focused on the levels of mycotoxins in the maize grains in the mold hot spot areas of Somali National Regional State of Ethiopia.

Keywords: Aspergillus, Fusarium, Frequency, Incidence, Maize, Occurrence, Traditional storage structure.

Surgical Management of Farra Gall in an Asiatic Elephant - A Case Report

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ABSTRACT
An Asiatic elephant (*Elephas maximus)* was presented with history of fluid filled swelling on the back, on clinical examination it was diagnosed as farra gall, a condition which is caused by extended use of ill fitting logging / riding harnesses in elephants. In this paper surgical management of farra gall is discussed, The tusker was treated after immobilization with xylazine and ketamine @ ratio 1.25:1. (Sarma 2002). After sedation all the procedure was performed in standing position of the animal by sitting on the back of elephant along with mahavat. The local anesthesia Lignocaine 2% was injected locally in and around the abscess area. An elliptical opening was made in the direction of muscle. Abscess was drained out completely and washed with 2% potassium permagnate solution, Povidine iodine gauge was inserted. .Bull was kept on Enrofloxacin @10mg/Kg body weight, Meloxicam @0.2mg/Kg body weight (Kadirvelu Senthilkumar *at el* 2014)and Vitamin B Complex (Tribivet) 50ml daily for 7 days parentraly along with electrolyte (electrobest) powder 500g once daily orally for 3 days. Next day animal cooperated well and dressing was done with gauge of oxytetracyclin. Dressing was done alternatively with Povidine iodine and oxytetracyclin gauge for next 6 days. After 7 days of parentral treatment, tusker was kept on oral medicine Bolus Meloxicam 6 twice daily and Multistar syrup 60 mi daily for next 7 days.
Keywords: Elephant, farra gall, harness, tusker, abscess.

Disturbance of Traffic Noise

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ABSTRACT
Several adverse of stimuli can cause annoyance due to the characterized by such effects of distraction on health and delay in activities. Noise annoyance mainly due to the increasing in traffic volume has recognized as important environmental stressor which associated to anxiety and depression. In this manner, it can impose serious damage to human wellbeing, human comfort ability and reduces labour productivity. Hence, this paper aims in evaluating the effects on traffic noise and managing the precaution on road corridors in order to reduce the traffic noise. This case study had been conducted at residential area which is located at Kankerbagh, Patna, residential area located in the East region patna, Bihar. The traffic noise index (TNI) and noise pollution level (NPL) were recorded for a whole day in order to evaluate noise performance with different time durations. From the study, it was shown that the noise level at the Kankerbagh, Patna is above than 75 dBA at most of time which is exceed the permissible limit from the guidelines recommended by the World Health Organization (WHO) and Department of Environment (DOE). According to the guidelines, the maximum limitation for noise pollution during daytime at residential area is about 55 dBA. From the interviewed conducted, it shows that reduction on the traffic noise can be improved by proposing and providing the noise barrier which includes the restoration of trees and concrete wall which can reduce the effects on the traffic noise.

Empowering Women through Self Help Group: A case study of Nainital District in Kumaon Region of Uttarakhand

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ABSTRACT
Self help group linkage programme is one of the most prominent programmes ongoing in various areas to promote women empowerment. It is important to note that while microfinance SHG model has been successful in promoting financial inclusion. Sustainable development requires a multifaceted approach that includes access to education, healthcare and basic infrastructural goals to promote empowerment. The success of Mahila Vikas Mandal (A SHG in Haldwani city of Nainital district), of 16 women who have been able to uplift themselves through interloaning and entrepreneurial activities such as making jute bags, masks, dresses, hats and polybags. The microfinance industry in India has indeed been instrumental im promoting financial inclusion and empowering women in rural areas.
Nonetheless, the success of Mahila Vikas Mandal is an epitome of how small steps can lead to significant progress in empowering marginalised communities upto a greater extent.

Keywords: Self-Help Group Model, Haldwani, Nainital District, Financial Inclusion, Women Empowerment, Entrepreneurial Activities, Sustainable Development.

Cultivation technology of Oyster mushroom (*Pleurotus sp*) in East Kameng District of Arunachal Pradesh

P. P. Tripathi, M.C. Debnath, V.K. Misra, and Habung Ganga
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ABSTRACT
Oyster mushroom (*Pleurotus sp.*) is a world famous edible mushroom variety that has high demand due to its deliciousness and high quality nutritive value. It needs high temperature (28 °C -35 °C) and 80-85 % relative humidity in the growing environment. There is a good demand of this mushroom variety in the district East Kameng, Arunachal Pradesh but due to lack of knowledge for proper method of cultivation the production is low and there is a big gap between demand and supply. Therefore an experiment was conducted in thirteen villages (*Viz.* New Sopung, Sangrikwa, Seppa Ty - II, Jayanti, Pabua, Pampoli, Wessang, Champing , Tata Tara , Kadeya, Yangsey, Weshi and Shilla) during the year 2018 to 2023, where environmental condition are likely to favorable for cultivation of the said mushroom species. The experiment were conducted in the nearby area of farmers house by using the paddy straw as main substratum material. The data were recorded properly at regular interval during all the cropping time from all the experimental sites and were analyzed properly. The average yield of oyster mushroom from paddy straw were recorded in the range from 650 to 800 gram / bundle/cutting and overall production was found 2.50kg to 3.0 kg after up to 3rd cutting. There were significant yield differences between different farmers and at different locations. The experiment was successfully carried out to fill the gap between demand and supply and to make this technology as a profitable business among the farming community in the district East Kameng Arunachal Pradesh.

The result was encouraging and significant in term of adoption of technology among farmers and gain of employment opportunity from the farm activity.
Keywords: Oyster mushroom (*Pleurotus sp.*), relative humidity, paddy straw farming community etc.

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ABSTRACT
Oyster mushroom (*Pleurotus sp.*) is a world famous edible mushroom variety that has high demand due to its deliciousness and high quality nutritive value. It needs high temperature (28 °C -35 °C) and 80-85 % relative humidity in the growing environment. There is a good demand of this mushroom variety in the district East Kameng, Arunachal Pradesh but due to lack of knowledge for proper method of cultivation the production is low and there is a big gap between demand and supply. Therefore an experiment was conducted in thirteen villages (*Viz.* New Sopung, Sangrikwa, Seppa Ty - II, Jayanti, Pabua, Pampoli, Wessang, Champing , Tata Tara , Kadeya, Yangsey, Weshi and Shilla) during the year 2018 to 2023, where environmental condition are likely to favorable for cultivation of the said mushroom species. The experiment were conducted in the nearby area of farmers house by using the paddy straw as main substratum material. The data were recorded properly at regular interval during all the cropping time from all the experimental sites and were analyzed properly. The average yield of oyster mushroom from paddy straw were recorded in the range from 650 to 800 gram / bundle/cutting and overall production was found 2.50kg to 3.0 kg after up to 3rd cutting. There were significant yield differences between different farmers and at different locations. The experiment was successfully carried out to fill the gap between demand and supply and to make this technology as a profitable business among the farming community in the district East Kameng Arunachal Pradesh. The result was encouraging and significant in term of adoption of technology among farmers and gain of employment opportunity from the farm activity.
Keywords: Oyster mushroom (*Pleurotus sp.*), relative humidity, paddy straw farming community etc.

An Economic Analysis of Problems Associated with Production and Marketing of Watermelon Fruit and Seed in Koppal district of Karnataka

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ABSTRACT
Due to the extreme perishable nature of the produce, seasonal production and bulkiness, production and marketing of watermelon crop is very complex and risky. For watermelon fruit and seed, the range of prices from producer to customer, which is the product of the demand and supply of transactions between various intermediaries at different levels of the marketing system,

is also peculiar.In addition, marketing agreements at various stages often play an important role in the price levels at different stages, i.e. to the ultimate consumer, from the farm gate. These features make the fruit and seed marketing system different from other agricultural commodities, especially in the provision of utility services for time, shape and space. An opinion survey was conducted to identify the problems faced by the 30 randomly selected watermelon fruit and seed farmers at different stages in the production and marketing of watermelon fruit and seed in Koppal district of Kalyan Karnataka region. Problems were evaluated using Garrett's ranking technique and the findings revealed that lack of irrigation facilities (1st rank) followed by a significant occurrence of pests and diseases during crop growth stages (2nd rank) and lack of availability of labours at peak time (3rd rank) were the main watermelon fruit production problems faced by sample farmers. Extreme occurrence of pests and diseases (1st rank) followed by lack of irrigation facilities (2nd rank) and high cost of seed inputs (3rd rank) were the main problems faced by the sample farmers in case of watermelon seed production. The opinion survey was also carried out with pre-tested questionnaires from the sample farmers who sold their goods to the wholesaler or retailer in order to understand the watermelon marketing problems. The analysis showed that lack of transportation facilities (1st rank) followed by lack of storage facilities (2nd rank) and breakage of fruits at the time of transportation, loading and unloading (3rd rank) were the key problems faced by the sample farmers on the marketing watermelon fruit in Koppal district. The results also showed that higher rejection rates (1st rank) followed by irregular payment (2nd rank) and low contract price (3rd rank) were the key problems faced by the sample farmers on the marketing of watermelon seeds in the study area.

Keywords: Watermelon, fruit and seed production, fruit and seed marketing

Scenario of Sesame Diseases and their Integrated Management using Indigenous Practices

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ABSTRACT

Sesame (*Sesamum indicum* L.) is an ancient oilseed crop. It plays an important role in the oilseed economy throughout the world. The seeds contain high oil ccontent ranging from 32.8 The export demand is an increasing trend/ promising trend a bright future for export potential. Indian contributes the highest sesame acreage of above 16.03 lakh hectare and production 7.08 lakh tones and productivity 442 kg/hectare. The low productivity is attributed to poor crop management and exposure of the crop to a number of biotic and abiotic stresses. Sesame phyllody is the most destructive disease in India. Among the fungal diseases, leaf blights, *Alternaria sesami* ;*Phytophthora parasitica* leaf spot, *Cercospora* sp., are important. *Macromophomina phaseolina* causing Root root/Stem rot/ Charcoal rot of sesame. Powdery Mildew is mild disease. Bacterial leaf spot, *Pseudomonas sesami* causes considerable yield reduction whenever it infects the Sesame crop. Bacterial blight, *Xanthomonas sesami* is serious during the monsoon and to young plants. A number of organisms have been reported to cause this disease. The incidence of important diseases varies from state to state based on agro- climatic situations. For management of the diseases it is necessary to adopt certain cultural practices like phytosanitary measures; crop rotation, suitable planting date, integrated fertilizer dose, proper plant population etc, Seed treatment with Thiram (0.2%) + Carbendazim 50WP (0.1%) or and foliar spray should be done with eco-friendly fungicides like Karathane (0.1%) Wettable sulphur (0.2%) was most effective to

minimize the incidence of powdery mildew. For bacterial diseases streptocycline (250-300ppm) may be used for seed and treatment. Two sprays of (Mancozeb 2%+Carbindazim1% was effective in reducing foliage Alternaria and *Cercospora leaf spot* and recorded highest yield. For the management of sesame phyllody, seed treatment with Imidacloprid (70 WS @ 7.5 g/kg seed) followed by two foliar spray of Thiomethaxam @ 0.2 g/l was found effective in reducing the vector population and phyllody incidence. Seed treatment with *Trichoderma viride* (5g/kg seed)*+ Pseudomonas florescence* (10g/kg seed)*;*soil application of *T. viride* or *Pseudomonas florescence* before sowing @ 2.5 kg/ha was found effective and economical for the management of *Macrophomina root rot* of sesame under organic sesame production.

Identification of Resistance Germplasm in Sesame (*Sesamum Indicum*) Against Sesame Phyllody Disease

K. N. Gupta Rajani Bisenand A. K. Panday

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ABSTRACT

Sesame (*Sesamum indicum* L.) is an ancient oilseed crop. It plays an important role in the oilseed economy of the world. The export of sesame is increasing day to day and having bright future for its export potential. The crop is affected by many pests and diseases. one of the important pests is leafhopper *Orosius albiacinctus*. which transmits phyllody diseases cause by phytoplasms. The yield loss due to phyllody in India is estimated to be about 39-74%. Phyllody an important disease of sesame is caused by a Plemorphic mycoplasma-like organism (Phytoplasma) and transmitted by leaf hopper. The affected plants become stunted and the floral parts being modified in to leafy structure which results in non bearing of fruits and seeds causing yield loss up to 33.9 percent. The proposed work the investigation was planned and undertaken to screening of a large number of germplasm against phyllody disease in sesame. A field experiment was conducted to find out Identification of resistance germplasm against phyllody at Research Farm of Project Co-ordinating Unit, Sesame and Niger, JNKVV., Jabalpur (M.P.) during the year *kharif* 2022. 67 accessions were sown in augmented plot design with resistance and susceptible check after every 12th row. The incidence of Phyllody was recorded individually by counting the number of infected and healthy plants at random by quadrate selection in each row and percent disease incidence was calculated. Observations on disease incidence, test weight and yield gm/plant were recorded. The economic device was also calculated

Results: Among the 67 accessions of sesame, most of the line was susceptible and only 23 accessions were found resistance against phyllody& disease reaction is below less than 10%.

Conclusion: It is concluded that among the 67 accessions only 23 accessions were found resistance against phyllody disease reaction is below less than 10%.

Evaluation of Mating Disruption Technology as A Tool in Rice IPM for the Management of Rice Yellow Stem Borer, *Scirpophaga incertulas*

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ABSTRACT
A field experiment was conducted during *Kharif* (autumn) and *Rabi* (spring) 2018-19 to refine and validate the existing integrated pest management practices by incorporating different IPM modules, namely existing IPM modules, refined modules used with wax-based SPLAT formulation pheromone (application of 4 g pheromone in 400 source points), conventional farmers practice (indiscriminate use of insecticides) and untreated control were compared. The results of the present study led to the conclusion that the rice yellow stem borer is effectively managed by the SPLAT-based IPM module. The inclusion of mating disruption technology avoids mating of pest there by achieves damage by the pest and reduces the financial burden to the farmer and encourages environmental health. Overview of commonly used climate models and their approaches Owais Bashir, Shabir Ahmad Bangroo, Shahid Shuja Shafai, Soora Naresh Kumar, Ayyanadar Arunachalam, Sheikh Amjid, Nasir Bashir Naikoo.

Effect of Microbial Consortia on productivity of Sorghum (*Sorghum bicolar* L.), Soil Quality and Chlorophyll Content under Rainfed Condition of Marathwada Region

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ABSTRACT
Sorghum is grown on considerable area under rainfed condition in Marathwada region both in *kharif* and *rabi* season. However, the productivity of sorghum particularly in *kharif* season is fluctuating. Also sorghum is grown majorly for fodder production in *kharif* season. In order to increase the productivity of sorghum in *kharif* season, an experiment was conducted to study the Response of microbial consortia on productivity of sorghum (sorghum bicolar L.) and soil quality under rainfed condition of Marathawada region. The experiment was laid on research farm of All India Coordinated Research Project on Dryland Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. This study investigated root colonization of sorghum (Sorghum bicolar) infected by two different types of microbial consortia culture (MC_1 & MC_2) leads to alteration in the biosynthesis of secondary plant metabolites including phytoharmones and osmolyte proline under drought stress. The promising microbial consortia procured from authentic sources (Department of Microbiology CRIDA, Hyderabad and those consortia culture contain mixture of effective beneficial microbes such as N-fixing bacteria, PGPR and mycorrhizal fungi). Application of microbial consortia C_2 in T_6 (seed treatment + soil application of consortia 2) significantly increased grain and straw yield i.e. 20027 and 4869 Kg ha^{-1} respectively as compared to other treatments. Similar trend was observed in case of GMR (Rs. 65021), NMR (Rs. 39721) and B:C ratio (2.57) with significant and highest values respectively under treatment T_6 and found at par with T_3 under moisture stress condition. Also the dual inoculation of microbial consortia culture (C_2) through seed treatment and soil application significantly increased moisture retention. Proline content of soil at harvesting stages of sorghum crop was found significantly high (1.96 ug g^{-1}) under treatment T_6 which was followed by in the treatment T_3. Same results also found under the chlorophyll content of plant whereas the effect of microbial culture on proline content in sorghum leaf was found non- significant after the end of dry spell period.

Evaluation of Grape Juice Varities for Growth and Yield Parameters under Northern Dry Zone of Karnataka

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ABSTRACT
An experiment entitled "Evaluation of Grape juice varieties for growth and yield parameters under northern dry zone of Karnataka" was conducted at Horticulture Research and Extension Centre, Vijayapur (Tidagundi), UHS Bagalkot (Karnataka) during the year 2020-21, with an objective to study the performance of different grape juice varieties for growth and yield parameters. The experiment was laid out in randomized block design (RBD) with six treatments and four replications. The result revealed that among the different varieties evaluated, the minimum number of days taken to bud burst (6.25 days), highest number of matured canes per vine (46.02) and fruitful canes per vine (42.59) was recorded in ARI - 516. While, the variety Manjari Medika recorded the highest leaf area (132.47 cm^2) and chlorophyll content (41.40 SPAD value). The variety Bangalore Blue took less number of days for panicle appearance (10.75 days). Whereas, minimum number of days for harvesting (118.25 days) and highest number of bunches per vine (78.00) was noted in ARI - 516. The performance with respect to yield pointed out that the variety Manjari Medika recorded the maximum bunch weight (311.22 g), bunch length (21.03 cm), bunch width (9.42 cm) and yield (14.82 kg/vine).
Keywords : Grape, juice varieties, evaluation, yield

Opportunities for Agri Business through Value Added Products of Broken Walnuts Kernels

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ABSTRACT
Nowadays, the demand for functional foods is increasing at fast pace. There is a lot of interest in nuts globally and demand for walnut kernels in increasing a lot of more potential for value added products. Jammu and Kashmir is the main contributor to India's walnut production. Walnuts from J&K state are exported as whole in shell or in kernel form to various Indian and foreign markets which generates revenue of more than 700-800 crores annually. Walnut trade occupies an important place in rural economy of Jammu and Kashmir State. Walnut processing provides employment opportunities to a large section of population. The UT of J&K has been designated as walnut export zone by APEDA as the monopoly of growing quality walnuts. As per WTO agreements global competition in walnut trade has to meet quality standards of the buyer countries. In shell walnut quality depends on shell colour, shell thickness, suture seal, kernel size, kernel colour, taste, flavour fungal infection, rancidity etc. After harvesting of nuts, adoption of

non-scientific traditional practices of dehulling, washing, sun drying, nut cracking, kernel drying, packaging and storage are responsible for poor quality of whole nuts or walnut kernels. The poor quality nuts with stain marks on surface are not appealing. Similarly kernel colour, texture, and rancidity problems lower the quality grade of the produce which fetches poor price in the market and as such the income level of producers is declined. Walnuts are loaded with many health benefits. An attempt has been made in this investigation under the National horticulture Board project(NHB) project for utilization of broken walnut kernels for development of value added products viz roasted broken walnut kernels, Jaggery coated walnut kernels, honey dipped walnuts, walnut jaggary chikki walnut bar trail mix, quince walnut murabba, walnut millet biscuits,
Keywords: Walnut jaggary, chikki, broken walnut kernels, value added products that have by huge demand locally and internationally .Thus for sustainable rural income creation of employment opportunities, raising purchasing power and ultimately decreeing balance of trade deficit ,production and sale of good quality walnuts is of paramount importance and emphasis should be upon linking walnut production growers with marketing through value addition.

Volume Controlled Current and Thermal Noise Behavior in Single Injection in Insulator with Thermal Free Carriers in Sublinear Cddm Regime

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ABSTRACT
The electrical transport behavior of the single injection current flow in insulating materials depends greatly on the carrier density of free carrier in insulators. In research area of solid state electronics the important role of insulators in plate to fabricate the electrical solid state devices drive from the insulating materials. The information of the electrical transport properties of the insulator are obtained from the work on simple samples under sublinear carrier density dependent mobility (CDDM) regime. The present study deals with the investigation of the single injection current flow and thermal noise behavior in insulator with thermal free carriers in sublinear carrier density dependent mobility regime in the presence of thermal free carriers. The consideration of thermal free carrier modifies the magnitude of current flow, the complete current-voltage characteristic and thermal noise characteristic. Such important investigation provides the valuable informations of basic requirements which are generally applicable to the noise generated in other types of non-linear devices. Such regimes are present in a low mobility insulator where the carrier mobility is controlled by the mechanism other than scattering. It provides the increase in the concentration of free carriers which gives the average mobility depending on the carrier concentration. It gives the value of carrier mobility as the function of carrier density.
Keywords: single injection current flow, carrier density, free carriers, CDDM regime.

Developing Options for Climate Change Resilient Crops

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ABSTRACT
Extreme weather events can cause crop failures and production losses, making climate change a potential danger to global food security. Developing climate-resilient crop alternatives is crucial for preserving food security and minimising farmers' susceptibility to climate change. We

investigate many ways for generating climate change resilient crops in this research, such as enhancing genetic variety, traditional knowledge, breeding programmes, biotechnology, sustainable farming practises, and farmer education and awareness. We discuss the advantages and disadvantages of each technique, emphasising the need of collaboration among several stakeholders, including farmers, academics, policymakers, and the commercial sector, in developing and deploying climate change adaptable crops. Genetic variety must be promoted through seed banks, farmer-led selection, and breeding programmes in order to generate crops that can adapt to changing climate conditions, pests, and diseases. Indigenous and local community knowledge can give useful insights on agricultural adaptation to climate change. Breeding programmes might concentrate on choosing features that enable crops to tolerate climate extremes including drought, heat, and flooding. Although biotechnology can be used to introduce traits such as drought tolerance or pest resistance, its use is controversial and may have unintended consequences. Agroforestry, conservation agriculture, and intercropping are examples of sustainable farming practises that can help crops establish resilience and protect them from harsh weather occurrences. It is vital to educate farmers about climate change and raise awareness about the significance of creating climate-resilient crops. Collaboration among many stakeholders is required to guarantee that climate change tolerant crops are efficiently produced and deployed. Not only farmers, researchers, politicians, and the commercial sector are involved in this relationship, but so are international organisations and donor agencies. The CGIAR System Organisation, for example, has launched the Climate Resilient Agriculture programme, which aims to produce climate-resilient crops and sustainable farming practises. In conclusion, developing climate change resilient crops is critical for ensuring food security and reducing farmer vulnerability to climate change. Promoting genetic variety, traditional knowledge, breeding programmes, biotechnology, sustainable farming practises, and farmer education and awareness may all help to produce climate change tolerant crops. Collaboration among many stakeholders is vital for efficiently deploying these solutions and building resilient food systems that can resist the challenges of climate change.

Keywords: Climate change, crop, resilient, breeding, biotechnology, stress tolerance, drought, genetic variety, heat, flooding, adaption, pest, diseases.

Effects of Extreme Climate Changes on Insects

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ABSTRACT

Among the most numerousanddiversespeciesinthebiosphere, insectsarewidelyrecognisedfortheircontributionstothehealthandservicesprovidedbyecosystems.Anthropogenic climate change has recently increased the frequency and severity of climaticextremes(CE),subjectinginsectpopulationsandcommunitiestohugepressure.Thedistribution and abundance of insect species on Earth are strongly influenced by temperature,and as a result, many insect populations and the ecosystems they live in are likely to seechanges as a result of global warming. Future climate predictions indicate that there will

bemoreextremeweatherevents,whichwillsubstantiallyimpactinsect biodiversity.Sinceinsects have brief life cycles and temperature significantly impacts those cycles, they areexpected to be highly responsive to climate change. Although this field of study has beengrowing quickly, there are still knowledge gaps. To summarise the effects of extreme climateevents on insects and to pinpoint potential topics for further study, we surveyed the literature.In this study, we investigate the variables that affect insect's susceptibility or resistance toclimatic extremes atthe individual, population, andcommunitylevels.In order to fullycomprehend the impact of extreme climate events on insects, future studies should focus on avarietyoftopics,includinghowtheseeventsaffectnon-trophicinteractions,populationdynamics, and the functional trait set of communities. Extreme climatic events and globalchangetogetherposeathreattoseveralinsectspecies.Inordertoreducethelossofbiodiversity and the supply of ecosystem services by insects, biologists and policymakersshould takethe roleof severeeventsinto consideration.

Keyword: ClimateChange,Insectbiodiversity,DirectandIndirecteffect,Phenology,SpeciesDistributions.

Transforming Thar Desert: Ecological Impact and their Consequences

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ABSTRACT

Thar desert is a significant ecological region of India; due to its unique physical conditions, it plays an important role in biodiversity. The Thar Desert is endowed with more than 45,000 species. Changes in the ecosystem of Thar are taking place over time. Government schemes like the Indira Gandhi Canal Project (IGCP) has influenced the ecosystem at large scale which ultimately resulted into disturbance of the biodiversity of the region. Although, there has been comparatively better agricultural production than before due to excessive irrigation (in 1965 the production was only 12.7 %, but by 1990 the proportion has increased to 24.9%). Furthermore, at the same time, the biodiversity is adversely affected i.e. those species which were well-adapted to dry and harsh climatic conditions are gradually vanished from the region while some are at the verge of extinction. Although, this project was successful in addressing all financial and social problems to a great extent, but simultaneously, the ecological problems have increased. We assess the ecological impacts and changes in climate due to heavily irrigated areas of Thar Desert, in India. This paper will also elaborate the significance as well as adverse effects of IGCP.

Keywords: *Biodiversity, Endemic species, Ecological impacts, Irrigation*

Bioremediation of Heavy Metals: A Biotechnological Approach for Sustainable Agro-ecosystem

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ABSTRACT

Recent biotechnological approaches for Bioremediation include Bio-mineralization, Biosorption , phytostabilization, Hyperaccumulation, Dendroremediation. Exposure of heavy metals (Pb, Zn,

Cd) threat human health and agro-ecosystem by direct ingestion on food chain and magnification through tropic levels. Microorganism clean-up the polluted environment and convert toxic heavy metal into less toxic form but has some limitations i.e. the production of toxic metabolites. Therefore, emphasise should be given to the recent biotechnological interventions such as genetic engineering of microorganisms or implementation of advance techniques to remove contamination from soil and water. Application of synthetic fertilizers and due to various anthropogenic activities (industrial and household wastes) in agriculture, leads to bioaccumulation of toxic substances followed by a disturbance in agro-ecosystem, environment and health. However, early diagnosis and proper management can reduce the impact of heavy metals on agriculture production as well as human and livestock health. To overcome with the aforementioned problems, biotechnological approaches are prominent option for sustainable agriculture, health and environment. In this light, we reviewed the role of some recent biotechnological tools such phytoremediation, bio-mineralization, biosorption, phytostabilization, hyperaccumulation and dendroremediation for the sustainable development. In this paper attention has been also given to the role of organic farming in maintaining long term soil ecology as well as quality of crop.

Keyword: Bioremediation, Agro-ecosystem, Biosorption, Bio-mineralization, Hyperaccumulation, Dendroremediation

Impact of Synthetic Fertilizers on Soil and Ecosystem

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ABSTRACT

Chemical fertilizers increase the growth and productivity of plants; hence meet the food security of the world. Although, plants grow with amendments of chemicals also affects human health and environment. Some chemicals release the toxic chemicals or gases like NH_4, CO_2, CH_4 etc. creating the air pollution. Untreated chemicals are disposed off from industries into nearby water bodies resulting into water contamination. Chemicals from synthetic fertilizers when get added to soil, degrade the soil health and quality and causes soil pollution. The adverse effect of these synthetic chemicals on human health and environment can only be reduced or eliminated by adopting new agricultural practices such as shifting from chemical intensive to integrated nutrient management. The over use of chemical fertilizer reduces the soil fertility through time in terms of soil microbial diversity along with nutritional and minerals deficiencies, thereby harming the environment. Continuous utilization of chemical fertilizers is responsible for the decline of soil organic mater. Constant use of chemical fertilizer can alter the soil pH, increase pests, acidification and soil crust, which results in decreasing organic matter load, useful organisms, and stunting plant growth. This study aimed to provide a scientific validation in favor of organic farming and harmful impacts of synthetic fertilizers. Attempts have been made to explore the significance of organic inputs such as manures, bio-fertilizers, bio-pesticides and nano-fertilizers furthermore the adverse impacts of synthetic fertilizers were also analyzed.

Keywords: *Chemical fertilizer, environment and ecosystem, plant growth and maturity, organic agriculture*

Organic farming: a Prominent Option for Food Security & Sustainable Agriculture in Context of Low Land Holders of Ladakh.

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ABSTRACT

Organic farming is a system of crops that emphasizes environmental protection and the use of natural farming techniques. It is concerned not only with the end-product, but with entire system used to produce and deliver agricultural products. People of Ladakh have now realized that organic farming is the way forward. The government is also taking initiatives which will also help people living in this hilly region to be economically and socially strong. For the past few years, the word "organic" has been the buzz word, as the people across the world have started taking steps to restrict the intake of synthetically grown agricultural products.There has been a sudden increase in the supply and demand of a wide range of organic products like - cereals, millets, oilseeds, sugar, tea, fruit juice concentrates, spices, pulses, dry-fruits, etc. The use of organic manures by Ladakh farmers has brought soil's organic matter from medium to high on cultivated lands, and at the same time switched to avoid using the chemical fertilizers, and maintaining the taste of their own management system with limited resources. In this paper, we assessed that organic farming follows eco-friendly agricultural practices without making the use of harsh chemicals and in turn maintaining our health and protecting the environment from pollution.

Keywords: Organic Farming, Food security, Management, Pollution, and Sustainable agriculture.

Effects of Organic Manures on Soil Fertility

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ABSTRACT

In this present situation, India, as well as the world, needs for good nutritional and healthy food demand, due to the constantly growing population and increased food demand, it is quite impossible for commercial farmers to grow crops without using any chemical fertilizers due to production and disease management related issues. Attention is needed towards the uses of organic manure to maintain the fertility of the soil in terms of soil biology and physical parameters along with the minimum use of synthetic fertilizer for optimum production and environmental sustainability But this is not possible to implement the complete use of organic manures in agriculture as a consequence of less yield, but with organic manures, we can get good quality yield without disturbing the soil biology along with its fertility characteristics i.e. Texture, EC, BD, pH, WHC, and so on. In this review, we assess the role of organic manures in maintaining soil quality along with their preparation methods i.e. plant residues, Live stock manure, Green manure, vermicompost, poultry manure FYM, close pit compost, etc. This Paper will provide guidance towards sustainable development of agro-ecosystem for future food security.

Keywords: Organic manures, Soil fertility, vermicompost, natural materials, eco-friendly, agro-ecosystem, green revolution

Designer Crops: A Potential Option to Mitigate the Impact of Climate Change in Agriculture

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ABSTRACT
Climate change and rapid population growth demand an immediate need for developing future crops that are highly resilient and widely adaptable to changing environments to maintain global food security in the near future. Designer crops are those that are created by breeders utilizing cutting-edge molecular biology techniques that genetically alter the native genotypes of plants. Intensive selection during domestication has genetically disadvantaged farmed crops by narrowing down their genetic base and reducing their utility in breeding programs. As a result, future crop improvement efforts must rely on integrating various genomic strategies ranging from high-throughput sequencing to machine learning, in order to exploit germplasm diversity and overcome bottlenecks created by domestication, expansive multi-dimensional phenotypes, arduous breeding processes, complex traits, and big data. Therefore, this study aims to explore the significance of designer crops for future farming for food security, sustainable health, and the environment.
Keywords: Designer crops, genome editing, sequencing, climate resilience and food security

Role of Organic Manures in Improving Soil Biology and Sustainable Agro-ecosystem

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ABSTRACT
India is the world largest producer of many fresh fruits like mango, banana etc, and vegetables like chick pea, okra, milk and major spices like chilli, pepper, fibrous crops like jute and millets and castor oil seeds. For past few decades, intensive farming has taken a toll on the soil environment both structural and microbial. It has caused physical and physico-chemical problems in the soil. Agricultural chemicals has caused soil and water pollution. The word "organic" pertains to the use of non-chemical fertilizers as manure and compost and the word "manure" refers to any natural substance for fertilizing the soil, especially dung or refuse. The manures made by natural raw materials like, animal excreta, plant residues, animal residues, etc. and are decomposed by micro-organisms. Some micro-organisms in manures are involved in nitrogen fixation in soil. Organic fertilizers have long been known as to improve soil physical properties i.e. reducing bulk, improved saline water leaching, decreasing acidity, improving the aeration and water logging requirement in the soil. On increasing the humus content, there is a change in biological properties of soil that help in flourishing of beneficial macro and micro organisms. Organic fertilizers are capable of mitigating problems associated with synthetic fertilizer and also reduce the necessity of repeated application of synthetic fertilizer to maintain soil fertility. Hence, in this paper emphasis has been given to the preparation of different organic manures which are being used since long back in rural and interior region of India along with their significant role in maintaining biology and physico-chemical characteristics of soil, conservation of agro-ecosystem, health and economic stability of a nation.
Keywords: Vermicompost, Live stock manures, poultry manures, Goat sheep manures, Bio-Fertilizers, Bio-Pesticides, Poultry Manure

Millet: A Super-Food for Global Food and Nutritional Security in Context of Climate Change

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ABSTRACT
In developing nations, millet is a super essential and traditional crop for 59 crore people. Asian and African continent totally depends on the agricultural sector, for their economic stability. Consistently increasing challenges such as growing population, climate change, and drought force farmers to choose alternative methods to fulfill the demand. In the meanwhile, millet attracts farmers, scientists, and policymakers due to its climate resilience and drought resistance characteristics along with excellent nutritional properties (i.e. high dietary fiber, proteins, lecithin, carbohydrates, and phytochemicals). Production of millets has long been documented and linked with the civilization and livelihood pattern in India but in recent years special emphasis has been given not only to the increased production by the selection of varieties, fertilizer management, and providing suitable climatic conditions but the quality is also taken into consideration. In this paper, we explore the importance of nutritive millet in health, the environment as well as the economy of a nation in the context of changing climatic conditions.
Keywords: Climate resilience, Soil-biology, photochemical, lecithin

Millets: A Super Food for Future

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ABSTRACT
A group of cereal is called millet. It is one of the major crops and is recently considered to be a superfood for the future. It is widely grown in Africa and Asia since prehistoric times. In Asia, it is an important cereal crop in India, Pakistan, China, and southeastern Asia. India is one of the important millets growing countries. In India millet growing states Tamilnadu, Madhya Pradesh, Orissa, Bihar, and UP. Millets grains are highly nutritious and even superior to major cereal crops. It contains 12.5% of protein and a high amount of Ca (344mg/100gm). Millets are small grained and can cultivate in warm weather. Millets can uptake less amount of water compression than other cereal crops. It is tolerant in sandy soil, extreme weather condition, and drought resistance. Millets are sensitive to water logging and acidic soil. It can use in various ways of consumption such as-Processing techniques, a product of millet, roasting, and Milling. Millets contain a significant amount of nutrients and bioactive compounds that can be beneficial for humans. Millets production has been increasing in the last decades and it is one of the major cereal crop Production. Millets can have a good source of all essential nutrients like protein, carbohydrates, fats, minerals, vitamins, and other bioactive compounds. The genetic diversity of Millets lends itself to many diverse and Innovate applications of Millets in areas such as-Therapeutics and Pharmaceutical opportunities for regional and international trade. In this paper, attempts have been made to unhide the significant characteristic of millets i.e. nutritious quality, and health benefits along with its future perspective in the context of changing climate
Keywords: Roasting, Milling, Pharmaceutical, Climate change, climate resilience

Impact of Temperature on Soil Microbiota

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ABSTRACT
Temperature is one of the most important factor in regulating the microbial activity and shaping microbial community. Fungal and bacterial growth rates had optimum temperature around 25-30^{0}C. Thus, if temperature is more than 38^{0}C, there is an uncoupling between respiration rate and microbial activity. Microorganisms are very specific to their nutritional, temperature and pH requirements. Therefore, increased temperature (i.e. more than 40^0 C) can cause decrease in microbial activities in the soil. Soil biology plays a crucial role in soil health and plant growth. This in turn, affects the quality and quantity of crops grown; also any pathogen or disease can be detected which would enhance the crop production. Microbial population in soil is determined by various factors i.e. soil depth, organic matter, aeration and gaseous concentration, pH. Decreased microbial activities are associated with reduced Bio-transformation of nutrients and biogeochemical cycles like nitrogen cycle, phosphorus cycle, and carbon cycle. Emphasis has been given to the influence of temperature on microbial metabolism and their subsequent impacts on soil health and environment.
Keywords: Soil Microbial Biomass (BMC), pH, Electrical Conductivity (EC),Actinomycetes , Nutrient Cycling, Bio- transformation

Impacts of Climate Change on Hydrology & River Discharge of Bagmati Glacier of Nepal

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ABSTRACT
Since the early 1900s, many glaciers around the world have been rapidly melting. Anthropogenic activities are at the root of this phenomenon. Specifically, since the industrial revolution, CO_2 and other greenhouse gas emission have raised temperatures, even higher in poles, and as a result, glaciers are rapidly melting, calving-off into the sea and retreating on land. Many problems are been faced by the farmers of Nepal like, water shortages, less feed for their livestock, and an increased risk of landslides and glacial floods. Another factor, i.e. climate change is causing the glaciers in the Nepal's Himalayan region to melt at an alarming rate, threatening fragile ecosystems, vulnerable communities, and billions of people downstream who rely on rivers fed by ice pack. The assessment of changing climate and its impacts on hydrological resources (Bagmati River, Nepal) is needed along with the future implications. For long-term planning and management, change in the pattern of land-use, water demand and water availability should be analyzed for proper management of natural resources and ecosystem functioning. Thus, in this paper, attempts have been made to explore the causes and impacts of climate on environment, glaciers hydrology and river discharge along with their mitigation techniques as well.
Keywords: Climate change, Bagmati River, Glacier, Greenhouse gases, Ecosystem, Landslides, Hydrological resources.

Isolation and Characterization of Laccase Enzyme from *Pleurotus. sajor caju* and their Potential Role in Bioremediation

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ABSTRACT
Laccase belongs to the blue multi copper oxidases, it participates in cross-linking of monomers, degradation of polymers and ring cleavage of aromatic compounds. It is widely distributed in higher plants and fungi. Occurrence of this enzyme has been previously reported in Ascomycetes, Deuteromycetes and Basidiomycetes and lignin-degrading white-rot fungi. Laccase decolorizes and detoxify industrial effluents and help in wastewater treatment and can be effectively used in paper and pulp industries, textile industries, xenobiotic degradation and bioremediation. It is found that the laccase enzyme has the positive impact on the environment due to its activity against phenolic and nonphenolic lignin-related compounds as well as highly recalcitrant environmental pollutants. Utilization of immobilized laccase for the removal of bisphenol-A reported earlier, which is an endocrine disruptor known to cause detrimental effects on the reproductive function and development of cancer in humans. In this paper, an assessment for optimum production of enzymes by optimization of carbon, nitrogen source, and pH has been done along with their potential role in the degradation of environmental pollutants.
Keywords: Xenobiotic, Recalcitrant, Endocrine disruptor, Oxidases

Flash Droughts

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ABSTRACT
Flash drought has become one of the major problems worldwide due to the elevating temperature in the past few years. The sudden onset of drought or when the pre-existing drought-like conditions are exacerbated by intense temperature, the condition thus created is known as flash drought. It, being spawned by abnormally high temperatures accompanied by lower than-normal precipitation, is a direct result of climate change, mostly caused by anthropogenic events. According to studies, deficit precipitation is the chief driver behind flash droughts in western India. Since both flora and fauna of a place depend on soil, flash droughts cause extensive damage to them, which further damages the ecosystem. Timely prediction of flash drought is a necessary step for the prevention and mitigation of damage caused by it. Evapotranspiration has been marked by scientists as a warning sign. Flash droughts are not only detrimental to the ecosystem but also to the economy and public health of a nation. Owing to this, the causes and effects of flash droughts were studied. This poster aims to provide guidance regarding the various aspects relating to flash droughts, their causes, and effects, and the possible ways to prevent their occurrence.
Keywords: Flash drought, precipitation, onset, climate change, anthropogenic, moisture, La-Nina, El-Nino, climatology, evapotranspiration.

Climate Change and Horticulture

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ABSTRACT

India is the second largest producer of vegetables in the world. Climate change is the primary cause of losses in vegetable production worldwide, in terms of reducing growth, yield and quality. Climate change cause an increase in average air temperature of 1.4ºC, increase in atmospheric Co_2 concentration, and significant changes in rainfall pattern. Usually extreme temperatures, limited soil moisture, reduced availability of irrigation water, high wind speed, increase in occurrence of hails and thunderstorms, frost damage and tsunamis etc., are the major limiting factors for reduction in the quality produce. Vegetables are very perishable and due to the hail storms the prices rise and thus decreasing the consumer preferences. Sudden change in climate also influences the incidence and resurgence of pests and diseases, host-pathogen interactions, soil microbial population. Change in the behaviour of pollinators due to erratic weather conditions leads to poor pollination which affects the seed development and fruit set. The crop management practices like mulching with crop residues and plastic mulches help in conserving soil moisture. Excessive soil moisture due to heavy rain is also a major problem.

Development of new cultivars of horticultural crops tolerant to high temperature, resistant to pests and diseases, short duration and producing good yield under stress conditions, as well as adoption of hi –tech horticulture and judicious management of land use resources will be the main strategies to meet these challenges. Breeding techniques and biotechnology are essentially required to meet these challenges. Protected structures will provide best results in cultivation of horticulture crops and mitigation of climate change impacts.

Keywords: Climate change, Hi-tech horticulture, Mitigation, Protected structures.

Effect of Different Fruit Bagging Treatments on Guava Cultivarsin Rainy Season

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ABSTRACT

Guava (*Psidium guajava* L.), a member of family Myrtaceae, is one of the most important fruit crops. It is popular fruit widely grown in the tropical and subtropical regions of the world. Fruits of the rainy-season crop may be insipid with poor quality as the rainy-season guava crop is severely infested by fruit fly. Fruit bagging is a common agricultural practice used to protect fruits from environmental factors such as pests, diseases, and adverse weather conditions.

This present investigation involves covering individual fruits with various coloured paper, polythene and cloth bags.The fruits of different guava cultivars *viz*. Hisar Safeda, Hisar Surkha, Allahabad Safeda and Shweta were bagged immediately after fruit set. The use of fruit bagging has been found to affect various fruit quality parameters.

Results of present study showed that the fruits bagged with blue polythene exhibited the maximum total soluble solids(11.5%) which was statistically at par with cotton cloth (11.3%), while the minimum total soluble solids (9.9%) were observed in unbagged fruits. The maximum fruit weight (114.03 g) was recorded in fruits bagged with blue polythene, which was statistically at par with

fruits bagged in cotton cloth (111.61 g) whereas the lowest fruit weight (91.01 g) was observed in control. Among the cultivars, the maximum total soluble solids (11.2%) were observed in fruits of Hisar Surkha, while the minimum total soluble solids (10.3%) were observed in Shweta fruits. Maximum fruit weight (122.14 g), was recorded in fruits of Shweta, while the minimum 91.12 g, was recorded in fruits of Hisar Surkha.

Overall, fruits bagged with blue polythene, cotton cloth and green polythene were found promising in enhancing the physical parameters of various guava cultivars taken in the study. However, further studies are needed to fully understand the effect of fruit bagging on different fruit species and to optimize bagging techniques for different agricultural settings.

Keywords: Cloth bag, cultivars, Guava, pre-harvest bagging, paper bag, polythene bag

Buzzing with Innovation: CRISPR as a Game-Changer in Honey Bee Pest Management

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ABSTRACT

Honey bees are fascinating social insects that belongs to genus *Apis* and are important pollinators for many plant crops, but they are vulnerable to various pests, such as *Varroadestructor*, wax moths, ants, wasps, and hornets, which can cause significant losses to the apiculture industry. To address this issue, molecular techniques like CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) gene editing can be used to improve integrated pest management (IPM) of honey bees by enhancing gene drives. CRISPR is a contemporary gene-editing tool that can precisely cut double-stranded DNA at specific locations in the genome, allowing for the modification of genes with high accuracy. This technology has been successfully applied to control a variety of insect pests, including mosquitoes, drosophila, moths, beetles, wasps, and grasshoppers, by disrupting key genes that control female viability and male fertility in pest species. A new CRISPR-based technology called precision guided sterile insect technology (pgSIT) has been developed, which enables simultaneous sexing and sterilization of pest insects, leading to superior pest population suppression. CRISPR-based approaches have been used to genetically modify honey bees and social wasps, offering promising possibilities for improving the health of honey bees and other critical pollinator species. In summary, CRISPR gene editing holds great promise for advancing pest management in honey bees and promoting the sustainability of global agriculture. Using CRISPR, researchers can target specific genes in the *Varroa* mite and disrupt their ability to reproduce or infect honey bees. This could provide a targeted and sustainable solution to the problem of Varroa infestations, which have been linked to colony collapse disorder in honey bees. Furthermore, CRISPR can also be used to enhance the immune system of honey bees, making them more resistant to pests and diseases. This could reduce the need for harmful pesticides and antibiotics, leading to healthier and more sustainable bee populations.

Keywords: Honey bee, CRISPR, Pest management, *Varroa*

Studies on Performance of Different Cultivars of Sweet Orange under Marathwada Conditions

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ABSTRACT
The present investigation entitled "Studies on performance of different cultivars of sweet orange (Citrus sinensis (L.) Osbeck) under Marathwada condition" was carried out during the year 2015-2016 at the instructional field of College of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The objective was to study the performance of different cultivars of sweet orange under marathwada condition and to study the floral biology and physicochemical characters of different cultivars of sweet orange. Experiment was laid out in Randomized Block Design (RBD) with nine treatments and three replications. Treatment comprimised of nine varieties viz. Washington Navel, Katol Gold, Pineapple, Sathgudi, Nucellar, Malta Blood Red, Jaffa, Valencia Late and Hamlin. Floral biology parameters viz. duration of flowering, flowering and fruiting habits, mode and time of anthesis, time of anther dehiscence and receptivity of stigma differed significantly in all the varieties under study. Nucellar variety recorded more duration of flowering (26.70 days) along with highest terminal flowering (40.20%). On other hand variety Hamlin recorded highest axillary shoots (47.50%) while mixed shoots (33.93%) was recorded in Sathgudi. Minimum duration of flowering (18.40 days) was recorded in Washington Navel. Lowest terminal shooting (24.50%), axillary shooting (27.42%) and mixed shooting (21.30%) were recorded in Valencia Late, Sathgudi and Katol Gold, respectively. Maximum mode and time of anthesis and time of anther dehiscence in all nine varieties was found between 10.00 am to 12.00 noon and variety Nucellar recorded maximum values for above characters. The percentage of fruit set was recorded maximum at 1 day before anthesis, on the day of anthesis and 1 day after anthesis in all the sweet orange varieties and maximum in Nucellar. In respect of fruit characters viz. number of fruits per tree, weight of fruit, yield of fruits per tree, fruit length, fruit breadth, number of segment per fruit, number of seeds per fruit, peel thickness of fruit. Peel % of fruit, pomace %, juice % differed significantly in all the varieties of sweet orange under study. It was concluded on the basis of present study that Nucellar followed by Sathgudi found satisfactory among studied varieties of sweet orange in flowering behavior, fruiting characters and quality parameters in Marathwada conditions.
Keywords: Sweet orange, Cultivars, Nucellar, Sathgudi,Marathwada, Katol Gold.

Effect of Varied Crop Geometry and Planting Periods on Growth and Yield of Garlic (*Allium sativum* L.)

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ABSTRACT
The field experiment entitled "Effect of varied crop geometry and planting periods on growth and yield of garlic (*Allium sativum* L.)" was conducted with split plot design at Horticulture farm, MARS, University of Agricultural Sciences, Raichur during the year 2020-21. The crop was sown at different planting periods *viz*., second fortnight of October (D_1), first fortnight of November (D_2), second fortnight of November (D_3) and first fortnight of December (D_4) with varied spacings

of 10 x 7.5 cm (S_1), 15 x 7.5 cm (S_2) and 20 x 7.5 cm (S_3). The experiment was objectivated to know the response of garlic for varied crop geometry and planting periods, to standardize the suitable crop density and planting period for garlic and to workout economics of garlic for varied crop geometry and planting periods.

The results emanated from the experiment revealed that, amongst the four different planting periods, early planted crop on second fortnight of October (D_1) resulted in vigorous growth and high yield through maximum per cent emergence, plant height, number of leaves, leaf area, leaf area index, plant girth, neck thickness, fresh weight of bulb, number of cloves per bulb, bulb girth, bulb length, bulb diameter, average clove weight, test weight of cloves and bulb yield. Amongst the crop geometries, lower plant density with wider spacing of 20 x 7.5 cm (S_3) (6,66,667 plants ha^{-1}) resulted in better performance of the all parameters except the bulb yield. Maximum bulb yield was harvested with higher plant density of 13,33,333 plants ha^{-1} in a spacing of 10 x 7.5 cm (S_1).

It was evident that, garlic planted during second fortnight of October with the spacing of 20 x 7.5 cm resulted in better performance of all the parameters. Maximum bulb yield was recorded with planting on second fortnight of October by adopting the spacing of 10 x 7.5 cm for which B:C ratio was also found to be high (2.11).

Keywords: Planting periods, spacings.

The Road Ahead for FPOS in India FPO- Linking Farmers to Markets

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ABSTRACT

The small and marginal land holdings constitute 86.08 per cent of total holdings in India. In the post green revolution period, adoption of intensive agriculture practices has led to overexploitation of resources. Hence, these small and marginal farmers play an important role in the sustainability of Indian agriculture. Farmer collectives is the best strategy that could be adopted where small and marginal farmers voluntarily pool their resources like land, labour, capital and skills to form a larger enterprise. Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India has identified farmer producer organisation registered under the special provisions of the Companies Act, 1956 as the most appropriate institutional form around which to mobilize farmers and build their capacity to collectively leverage their production and marketing strength. The FPCs are promoted by the government of India and registered as a company. The motive of FPC is to bring collective action by providing both forward and backward linkages, hence achieving economies of scale. There is no perfect model for farmer collectives. They are contextual and differ based on their resources, needs, problems and leadership pattern. Each case study helps us to understand successful factors for adoption and identify the issues experienced. The aim is to enhance farmers' competitiveness and increase their advantage in emerging market opportunities. The FPO's major operation and business include supply of seed, fertilizer and machinery, market linkages, training and networking and financial and technical advice. Efforts must be made to ease the market barriers in the growth path of FPOs. Incentives should be given to institutional lenders

to lend to FPOs and give room for private equity to enter for FPCs to help them transition from a grant-based model to a self-sustaining business entity.

Sea Buckthorn- A Minor Small Fruit Crop in Daily Healthcare Management

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ABSTRACT
Over the years, people from all over the world have discovered how to use plants to prevent illness, promote health, and provide a vital source of income for rural and indigenous populations. Today, this knowledge is the foundation of an accessible and affordable health care system. Plant-based diets are a current nutritional trend that is being adopted by people who are becoming more and more interested with leading healthy lifestyle.
Sea buckthorn (*Hippophaë rhamnoides* L.) also known as sand willow, sea thorn, grazing land thorn, painful thorn, fire thorn, red thorn, or pheasant fruit, is a thorny, nitrogen-fixing deciduous shrub that is indigenous to various countries in Asia, including India, China, and Nepal.It is a plant with great virtues, containing large number of bioactive substances like vitamins (A, C, E, B2, B9 and K), carotenoids (a, b, d-carotene, lycopene), flavonoids (isorhamnetin, quercetin, myricetin, kaempferol and their glucoside compounds), organic acids (malic acid and oxalic acid), sterols (ergosterol, stigmasterol, lanosterol and amyrins) and some essential amino acids (Prabhu *et al.*, 2010). So, in order to prevent and treat diseases linked to diet, an increasing number of people are including it in their daily diet.
The dosage for dry fruit and leaf extracts for dietary supplementation ranges from 500 to 2000 mg per day, while dosages for oil range from 2000 to 5000 mg. Whole fruit, fruit pulp, fruit oil, and seed oil extracts have been shown to have antibacterial, antioxidant, and immunomodulatory properties. Seabuckthorn was used for its several medical purposes, including treating skin conditions, mucosal injuries, cardiovascular ailments, and the flu (Geetha S, 2004).
Currently, there are many different types of medications and healthcare products made from sea buckthorn, including raw plant materials like clear juice, unstrained juice, concentrated juice, fruit oil, seed oil, fruit residual oil, raw powder, and pigment; beverages like soft drinks (syrup), nutrient solution, and alcoholic drinks like wine and beer; cosmetics like skin care cream, hair shampoo, body lotion, and beauty cream; and medications like (acetylsalicylic) flavonoid tab. Given the relatively broad variety of applications and the rising corpus of scientific and clinical research on sea buckthorn preparations, it is possible that they will become well-known consumer goods in the near future, which is why it is referred to as a third-generation fruit.

Role of Transcriptomics in Improving the Temperature Stress Tolerance in Ornamentals

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ABSTRACT

Climate change affecting the entire planet. Although there are numerous discussions about how this phenomenon affects humans, we frequently overlook the impact that this phenomenon has on plants and their habitats. Plants are complex, sessile organisms, which are constantly exposed to a variety of environmental stresses from the vegetative to the post-reproductive stage. These stresses, known as abiotic stressors, can negatively impact a plant's survival and growth. The distribution and duration of the growing season for plants are mostly influenced by temperature (Yang *et al*., 2005). Plant stress response is a complicated biological process whose molecular mechanism is still being fully understood. The mechanisms of plants' cold and heat responses have been thoroughly studied thanks to the development of transcriptomics.

Transcriptome sequencing is a powerful and popular modern genetic research tool which refers to the sum of all RNAs transcribed by a specific cell in a specific time. Hybridization-based procedures, sequence-based approaches, and RNA sequencing are among the various technologies utilised for transcriptomic studies. Each of these approaches has advantages and disadvantages. In order to identify the internal molecular mechanisms of genes, this technique is increasingly used to examine the mRNA expressions of those genes in response to a certain biological process.The identification and analysis of stress-induced critical genes is possible with the aid of RNA sequencing technologies. These can then be altered genetically to increase crops' ability to withstand stress and reveal fresh information about physiological changes at the transcriptional level (Tian *et al*., 2020). Transcriptomic studies for temperature stress tolerance have been taken in following ornamentals like Chrysanthemum (Wang *et al.,* 2018), Peony tree (Zhang *et al.,* 2015) and many. The transcriptome has opened the door to a thorough comprehension of how genes are expressed and interrelated. Transcriptomic data integration with other omics is providing a more comprehensive understanding of biological complexity, permitting all-encompassing methods to biomedical research.Although up until now, we have only talked about transcriptomics in relation to plants. Additionally, it applies to viruses and animals. Transcriptomics was utilized, for instance, in pandemic situations to profile the COVID19 virus, the viral-host interaction, and the variety of the virus population. Consequently, transcriptomics is regarded as a potent genetic tool in the twenty-first century.

An Assessment of Factors Determining Adaptability of Crop Growers towards Consequences of Climate Change in India

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ABSTRACT

Climate change is emerging as a major hazard to the human civilizations. Climate change is a long run process from shifting of weather patterns to rising sea levels including change in global mean temperature, erratic rainfall, and melting glaciers and so on which jeopardizes sustainable growth. Variation in weather patterns endanger food production, while rise of sea levels enhance the risk of catastrophic events like flooding, cyclones, storm surges that exacerbate extreme poverty, inequality, and famine in the world. Cyclone is one of the disastrous climatic events in the eastern India. Farmers suffer every year due to cyclones and floods in terms of production, and storage of the produce which retard their economic and social growth. Though a huge loss they have high adaptive capacity to cope up with the vagaries. This study enlightens the factors responsible for adaptive capacity of crop growers in climate vulnerable states like Odisha and Assam through an

ex-post facto study. Micro level study includes eight villages from two coastal districts of Odisha and eight village from two flood affected districts of Assam. Factors responsible for adaptive capacity of farmers were calculated by using Analytic Hierarchy Process (AHP), a psycho-mathematical tool for analyzing the complex decisions. It was found that 'Physical' factor (0.37) was more responsible for adaptive capacity followed by Human-social (0.28), Economic (0.21), and 'Environment' factor (0.14) in cyclone affected areas. Likewise 'Human-social' (0.39) as more responsible for adaptive capacity followed by Environment (0.26), Physical (0.18), and 'Economic' (0.17) in flood affected areas.

Keywords: Adaptive capacity, Assam, Cyclone, Flood, Odisha.

Role of Information Communication Technology (ICT) in Agricultural Development: An Analytical Study at Samastipur District of (Bihar).

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ABSTRACT

Nowadays, since morning till sunset we grow and respond to other in accordance with information received. No any work is possible without use of Information and Communication Technology. It has become part and parcel of our daily life. ICT have key role in the development sector mainly in the rural areas. For rural India, information is key issue and providing the right information at the right time to immense rural majority in a short period of time is of paramount importance. The present study entitled "Role of Information Communication Technology (ICT) in Agricultural Development-An Analytical Study at Samastipur District of Bihar", has been taken up with the following specific objectives: to study information gained from the ICT to develop the agriculture. The current study was conducted in the Samastipur district of Bihar. There are a total of 20 blocks in Samastipur district in which two villages selected from Pusa block Harpur and Morsand and from Kalyanpur block Ramouli and Fulhatta were chosen. There were 80 respondents altogether, including both progressive and non-progressive respondents who were selected for the study. Majority of the progressive and non-progressive farmers used radio and television as ICT tools to gain information for developing the agriculture. None of the respondents were using internet and mobile for gaining any type of information related to agriculture although everyone claims that various portals are available related to agriculture. The media continues to be the primary source of information for Agricultural Extension. Information gained from ICT related to agriculture for progressive farmers mean value (±standard error) was 74.05 (74.05±0.43) whereas, for non-progressive farmers it was 56.03 (56.03±0.47). The z- test explored that there was a significant difference between the mean value of progressive farmers i.e., 74.05 and mean value of non-progressive farmers i.e., 56.03 with 'Z' value 28.26 which was found to be positively significant at 1% level with p-value of 1*E-5. From this, it may be inferred that progressive farmers gained far more information about agriculture-related ICT than the non-progressive farmers. By accelerating development and bringing transparency to systems and operations, ICT hold the promise to offer creative solutions to the issues of poverty and inequality among the farmers so it should be given

new momentum. In recent India has the first position in UPI transaction all over the world. By the use of new UPI (Unified Payments Interface) service people can able to secure their cash from stolen, minimizing travelling for payments, save time and money of farmers. ChatGPT, is a great language model, claims to be competent to explore data and offer actionable insights agriculture. According to it, this data can be used for forecasting of crops, soil analysis, crop disease and pest identification, precision farming and irrigation scheduling. So, by launching different latest ICT tools and using these tools by farmers get maximum profit by minimum investment.

Keywords: Comparative study, Chat GPT ICTs, Progressive Farmers, Utilization Pattern, z-test.

Natural farming: The Best Method to Protect the Environment from the Negative Effect of Chemicals.

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ABSTRACT

Natural farming practices follow the natural world's laws and make effective use of natural resources and goods. It is founded on the idea that all living things are inter dependent. It seeks to have a beneficial effect on the environment, as opposed to the negative effects that frequently go along with modernized and commercialized agriculture. The natural cycle and using environmentally friendly agricultural methods in a contemporary environment renews traditional ideas about farming and offers an alternative to agriculture that uses a lot of technology. Natural farming makes use of locally available resources and acknowledges the bounty of the natural world. Its fundamental tenet is to avoid meddling with a life form's growth and development or pressuring crops to produce more than they can in order to maximize its inherent potential and its harmony with the environment. The most useful microorganisms for farming are those that have been present in the area for a long time since they are strong and efficient. Much better than artificially created microorganisms, which are cultured in some foreign or artificial environment, they have endured and can survive the intense climatic conditions of the local environment. They are regarded as the ideal inputs for conditioning the ground because they are already present in the field.

Keywords: Natural enemies, Beneficial insects, Microorganism, environment.

Integrated Child Development Services (ICDS): Game Changer for Children, Pregnant and Lactating Women in Bihar

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ABSTRACT

Integrated Child Development Services (ICDS) was launched in 33 Blocks on October 2, 1975, in response to the challenge of meeting the holistic needs of the child. Today, ICDS is one of the world's largest and most unique outreach Programmes for children.The ICDS provides six services, including supplementary nutrition, non-formal pre-school education (for children between 3-6 years age), immunization, health check-up, referral services and nutrition and health education for mothers. Currently, ICDS is running through 544 project offices in all 38 districts of Bihar. It is widely acknowledged that the young child is most vulnerable to malnutrition, morbidity, resultant disability and mortality. The early years are the most crucial period in life, as it is the time when the foundations for cognitive, social, emotional, language, physical/motor development and life-long learning are laid. Early childhood development constitutes the foundation of human development that the ICDS Programme was designed to promote all-round development of children under six years, through the strengthened capacity of care-givers and communities and improved access to basic services at the community level. The Programme is being implemented at 80,211 Anganwadi Centres (AWCs) through 544 Child Development Projects across the state. The Programme aims to benefit children below six years, pregnant and lactating women in the reproductive age group (15-45 years). The package of services delivered by the scheme includes: Supplementary nutrition, Immunization, Health check-up services, Referral services, Pre-school non-formal education, Nutrition & health education. Presently 79.408 lakh beneficiaries are covered under supplementary nutrition programme and are given supplementary nutrition for 300 days in a year as per following norms- supplementary foods is to be provided for 25 days a month to beneficiaries. Food is provided as take home rations and hot cooked meal served in AWC. Immunization of pregnant women and children is done to reduce the maternal and neonatal mortality. The children are immunized against six childhood diseases namely poliomyelitis, diphtheria, pertussis, tetanus, tuberculosis and measles. Health Check-ups include health care of children less than six years, antenatal care of expectant mothers and postnatal care of nursing mothers. The various health services provided for children by anganwadi workers and Primary Health Centre staff includes regular health check-ups, recording of weight, immunization, management of malnutrition, treatment of diarrhoea, de-worming and distribution of simple medicines etc.Referral Services are provided during health check-ups and growth monitoring, sick or malnourished children, in need of prompt medical attention, are referred to the Primary Health Centre or its sub-centre. To further strengthen Pre-School a new scheme providing financial support @ Rs.250 per child per year towards dress at children enrolled at all Anganwadi Centers has been introduced in the last financial year. This scheme is being continued in the current financial year also. An amount of 9167.70 lakh has been allocated during the current financial year towards this scheme. Health and nutrition education is imparted on Immunization day i.e. Wednesday & Friday in rural areas and Monday & Saturday in urban areas, according to micro plan made by joint venture of CDPO. VHSND (Village Health Sanitation & Nutrition Day) has been rolled out in all the AWCs from April 2011 onwards with the support of Health & Public Health and engineering Department. In which all the services are delivered at Anganwadi centres on a fixed day. Awareness is generated for hand-washing at Critical time that is before the meal and after using the toilet and also special stress is given to use home and Anganwadi toilets. Thus, this scheme is the boon for not so developed state like Bihar especially for Children, Pregnant and Lactating Women in Bihar.

Keywords: Anganwadi Centres, ICDS, Immunization, Lactating Women, Malnutrition, Pregnant Women.

Jan Aushadhi Suvidha Oxo-Biodegradable Sanitary Napkins: An Eco-Friendly Solution for Menstrual Waste in India

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ABSTRACT

In India, nearly 3.3 million tonnes of plastic garbage are produced each year, and commonly available sanitary napkins constitute 90% plastic. The contribution of menstrual waste to the country's annual plastic waste accumulation is thus less than 3% and the facilities to discard soiled sanitary napkins are very limited. Most of the women dispose soiled sanitary napkins in the dustbin, which eventually get dumped into landfills. The issue of plastic waste produced by sanitary napkins has significant adverse effects on the environment, animal health, and resource depletion. The Indian government has taken a significant step towards addressing this problem by launching the Jan Aushadhi Suvidha Oxo-Biodegradable Sanitary Napkin under the Suvidha scheme in 2019. The napkins are made from eco-friendly and biodegradable materials and come with a special additive that makes them biodegradable when discarded. The availability of Jan Aushadhi Suvidha Sanitary Napkins at a minimum price of Rs. 1/- per pad in more than 9000 Pradhan Mantri Bhartiya Janaushdhi Pariyojna-PMBJP Kendras across the country provides women with a sustainable and affordable option for menstrual management. The benefits of using these napkins include reducing waste, being eco-friendly, reducing the risk of infection, and promoting hygiene. The initiative taken by the Indian government to promote sustainable menstrual hygiene practices not only benefits women but also the environment. The use of biodegradable sanitary napkins reduces plastic waste and minimizes the adverse effects of non-biodegradable materials like dioxins, furans, and chlorines, which harm the environment and cause skin problems. In conclusion, the Jan Aushadhi Suvidha Sanitary Napkins offer a sustainable and eco-friendly option for menstrual management, reducing plastic waste and promoting hygiene while being affordable for all. The Indian government's initiative to promote sustainable menstrual hygiene practices is a significant step towards reducing the adverse effects of plastic waste on the environment and ensuring a sustainable future.

Keywords: Bio-degradable, Eco- friendly, Environment, JASSN, Menstrual waste, Sanitary Napkins.

Study on Farmers Attitude, Knowledge and Practices Related to Organic Farming in Ratnagiri District

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ABSTRACT

The study was conducted in Ratnagiri district of Konkan region. From Ratnagiri district Dapoli and Khedtahasil were selected purposively and Villages were selected with the help of list obtained from SDAO, Dapoli. According to list maximum number of organic farmers were located in Velavi and Dabhilvillages of Dapoli tahsil and Ayani and Vadi-malade villages in khed

tahsil. In all there were 180 organic farmers in the selected villages. From each village 25 respondents were selectedrandomly for the study. An interview schedule was specially designed, in line with the objectives, to collect the needed information. The data were collected by personally interviewing 100 selected organic farmers. The analysis of data revealed that majority of the respondents were middle age group, secondary education, medium family size, medium category annual income, small land holdings and followed by marginal land holdings, medium livestock possession, medium social participation, medium level mass media exposure, medium level innovativeness. Majority respondents had adopted organic farming practice at medium level and also medium level of knowledge about organic farming. Majority (69.00) per cent respondents favorable attitude towards organic farming, followed by 18.00 per cent respondents had most favorable and 13.00 per cent respondents had unfavorable attitude towards organic farming.A critical analysis of association between personal variables and attitude of farmers towards organic farming, showed that the variables such as age, education, livestock possession, mass media, social participation, innovativeness, knowledge and organic farming practices followed by the respondents had significant association with their attitude towards organic farming. The other variables such as size of family, farm size, annual income and organic farming experience had no association with their attitude towards organic farming. Majority of the respondents pointed out need of training on different components and aspects of bio-fertilizer technology, composting / vermi-composting methods, its application methods and rate of application and grading /packaging and marketing of organic produce. Major constraint faced by respondents in cultivation of organic farming werelack of knowledge about organic plant protection management,high cost of organic manures and biofertilizers,lack of demand for organic produce in local market, lack of skill regarding preparation and usage of organic inputs.

Keywords: Organic farming, Attitude, knowledge and practices related organic farming

Relational Analysis of Famers' Perception about Climate Change in Marathwada Region

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ABSTRACT

Climate and weather factors include rainfall and water, light, temperature, air, and wind. They are abiotic components, including topography and soil, of the environmental factors that have a profound influence on crop growth, development and yields, on the incidence of pests and diseases, on water needs, on nutrient requirements and also harvesting and marketing time of the produce. Agricultural activities are very sensitive to climate and weather; these are some of the biggest risk factors in growing conditions. Thus perception about climate changes and plays an important role to support farm-level decisions during the cropping cycle. The present study was an attempt to understand the impacts of climate change in the Marathwada region by taking into account farmer's perception, and to know how and to what extent they are adjusting and/or not adjusting to these changes. The study was conducted in three randomly selected districts in the Marathwada region of Maharashtra state. The study sample comprised of 120 farmers selected randomly. The findings showed that farmers have medium level of perception about climate change. Further, education, socio-economic status, innovativeness, social participation, extension contact, crop insurance and risk orientation were found to be significantly related with farmers' perception about climate change. Hence, an appropriate framework for mitigation and specific

strategies are needed for enhancing farmers' perception towards climate change and for promoting climate smart agriculture.

Keywords: *farmers' perceptions, climate change, climate mitigation, climate smart agriculture*

Organic Farming with free Residue free Production

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ABSTRACT

Organic farming can be defined as an agricultural process that uses biological fertilizers and pest control acquired from animal or plant waste. Organic farming was actually initiated as an answer to the environmental sufferings caused by the use of chemical pesticides and synthetic fertilisers

The concepts of organic agriculture were developed in the early 1900s by Sir Albert Howard, F.H. King, Rudolf Steiner, and others who believed that the use of animal manures (often made into compost), cover crops, crop rotation, and biologically based pest controls resulted in a better farming system. Howard, having worked in India as an agricultural researcher, gained much inspiration from the traditional and sustainable farming practices he encountered there and advocated for their adoption in the West. With the increase in population our compulsion would be not only to stabilize agricultural production but to increase it further in sustainable manner. The scientists have realized that the 'Green Revolution' with high input use has reached a plateau and is now sustained with diminishing return of falling dividends. Thus, a natural balance needs to be maintained at all cost for existence of life and property. The obvious choice for that would be more relevant in the present era, when these agrochemicals which are produced from fossil fuel and are not renewable and are diminishing in availability. It may also cost heavily on our foreign exchange in future.

Residual-free farming is a superior alternative in terms of production and environmental benefits. There has been a paradigmatic shift in consumer choices in recent years. This article discusses the factors influencing residual farming and the need of prioritizing it over organic farming.

As shown in a study, organic agricultural practices have such low production capacity that depending only on them will be inadequate to satisfy the demands of an ever-increasing population. Furthermore, organic things are costly to produce, and the mark-up on these products can be as high as 40% in some cases.

Residue-free processes, on the other hand, are cost-effective and do not reduce manufacturing volume. Poly-houses, grafting, bio-fertilizer management, and rainwater collection are among the current practices used. To tackle pesticide contamination in a variety of food products, the Centre has developed the All India Network Project on Pesticide Residues (AINP-PR). Many agritech companies are working with farmers to produce residue-free fruits and vegetables.

Keywords: Organic farming,policies,Residual-free farming,Green Revolution

Constraint Faced by the Farmers in Adoption of Climate Change and Management Strategies in Marathwada Region

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ABSTRACT
Climate is the primary important factor for agricultural production. Concerning the potential effects of climatic change on agriculture has motivated important change of research during the last decade. The research topics concentrate possible physical effects of climatic change on agriculture, such as changes in crop and livestock yields as well as the economic consequences of these potential yield changes. This study reviews constraints faced by the farmers in adoption to climate change and strategies planned to mitigate such constraints. The present study was undertaken in three districts of Marathwada region of Maharashtra. The study showed that personal, technical communication and institutional constraints were faced by the respondents in adoption of climate change. Management strategies also applied to tackle constraints faced by respondents in adoption to climate variability.
Keywords: Constraints, climate change, management strategies, mitigation

Integrated Farming Approach for Renaissance of Farming Community

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ABSTRACT
The global population is still increasing at a pace of around 140 people per minute, with births often outnumbering deaths. In India, the agricultural and associated industries support almost 60% of the population. The rapid urbanization, water shortages, air pollution, and land constraints that have plagued Indian agriculture for decades are only the tip of the iceberg. These difficulties make it more difficult to develop efficient horticulture systems. More than 86% of India's farmers are classified as small and marginal because they own less than 1.2 hectares of land. Due to population growth and shrinking available space, there is little room for horizontal growth in the horticulture industry. IFS is predicated on the idea that agricultural and animal components may strengthen one another. Combination occurs often in the agricultural system when the outputs (mostly by-products) of one enterprise are utilized as inputs for another. This has created a visible increase in the production of fish 0.2 - 3 t/ha, poultry 15 - 200 kg of meat and 80 - 600 eggs, vegetables 50 - 900 kg, duck meat 0 - 200 kg. goat / sheep meat 0 - 200 kg. Adoption of improved technology and the prudent use of resources have improved the income generation and man-days. The income has increased from Rs. 30,000/- to 1,80,000/- per unit by integrating diverse farm components like aquaculture combined with Horticultural crops cum poultry /Small ruminants etc. This integrated approach makes farming economically viable, sustainable, and environmentally sound. This in turn depends on implementing improved technologies and making wise use of available resources. It is evident that the modern-day approach of Integrated Farming System (IFS) places a strong emphasis on raising farm production through resource integration, increased diversity, and the development of market connections. Sustainability of the farm improves the

livelihood of the farmers. This improves the rural sector development and attracts towards agriculture and allied sectors.

Keywords: Integrated farming system; Fisheries; Agriculture; Horticulture; Animal Husbandry

Production Potential of Soybean - Chickpea Cropping System as Influenced by Tillage and Weed Management Practices in Vertisol

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ABSTRACT

The present investigation "production potential of soybean- chickpea cropping system as influenced by tillage and weed management practices in vertisol" was undertaken during *kharif* and *rabi* season of 2017-18 and 2018-19 on clayey soil at experimental farm of Department of Agronomy, VNMKV, Parbhani. Treatment consists of fifteen treatment combinations comprising five tillage practices T_1 (Conventional tillage), T_2 (Reduced tillage), T_3 (Minimum tillage), T_4 (Zero tillage) and T_5 (Rotary tillage) in main plot and three weed management practices i.e. W_1 (Weed free), W_2 (Pre and post emergence herbicides) and W_3 (Weedy check) as sub plot treatments during *kharif* and *rabi* seasons respectively were assigned in a split plot design with three replication. The soybean and chickpea crops were sown on 26/06/2017 and 24/06/2018 and 11/11/2017 and 03/11/2018, respectively. Fertilizers were applied as per the treatments and biometricobservations on growth parameters, yield attributes, and yields were recorded. Soil moisture content and weed studies were estimated. Soybean equivalent yield, system productivity and system profitability were also computed. Adaptation of CT-CT tillage practices increased the growth characters, yield attributes, yield and economics of soybean and chickpea. In weed studies, weed count and weed dry matter was lowest in CT-CT practices and weed control efficiency highest with this treatment. Soil moisture content of soybean and chickpea were significantly enhanced by CT-CT. Practices of CT-CT improved the soybean equivalent yield, system productivity (kg day^{-1} ha^{-1}) and system profitability (₹ day^{-1} ha^{-1}) of soybean-chickpea cropping system. The gross and net monetary returns were also found to be higher with this treatment but high benefit: cost ratio in CT-ROT (T_5). In weed management practices, application weed free (W_1) recorded highest plant height, maximum number of functional leaves $plant^{-1}$, leaf area $plant^{-1}$, number of branches $plant^{-1}$ and total dry matter accumulation $plant^{-1}$ followed by pre and post emergence herbicide (W_2). Also had significant effect on weed studies and soil moisture studies of soybean chickpea cropping system. The yield attributes like number of pods $plant^{-1}$, number of seeds $plant^{-1}$, weight of pods $plant^{-1}$, seed weight and weight of seed $plant^{-1}$ were found significantly higher in weed free. Weed free (W_1) gave significantly higher seed (kg ha^{-1}), straw (kg ha^{-1}) and biological yield (kg ha^{-1}) over rest of the treatments. Also significantly higher GMR, NMR was found in weed free but high benefit: cost ratio in pre and post emergence herbicide (W_2) of soybean chickpea cropping system.

Keywords: Conventional, Tillage, herbicides, moisture. weed density, weed index.)

Socio-Economic Impact of Agromet Advisory Services to Farmers in Koppal District of Karnataka

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ABSTRACT

The farmer's survey was conducted during *Kharif* 2020-21 to assess the socio-economic impact of agromet advisory services provided under Gramin Krishi Mausam Seva (GKMS) scheme, an operational scheme jointly implementing by IMD and ICAR in collaboration with other stakeholders like SAUs, State Agriculture Department etc. The survey was conducted with randomly selected 25 farmers distributed across different villages of Koppal district of Karnataka state, where one of the District Agrometerological Units (DAMU) under GKMS has been established in the premises of Krishi Vigyan Kendra to look after data collection, preparation of bulletin and timely dissemination of the information to the farmers in the district. The questionnaire related to climate anomaly, mode and time of dissemination etc., was prepared and collected information. The analysis shows that, agro advisory messages received through whatsapp group was most popular and easily accessible among all the modes of dissemination. About 68 per cent of farmers could get information regarding weather forecast and different agricultural activities through whatsapp. In addition, more than 75 per cent of the farmers were adopted weather based different agricultural activity like., field operations, crop and variety selection, irrigation management, pest and disease management and harvest and post-harvest measures on a real basis. Further, the study revealed that, one of the farmer have adopted the agromet advisories in their day to day operation have realized that 12.85 per cent higher grain yield and net profit of Rs.77,325 ha^{-1} as compared to non-AAS farmer of neighbouring plot. This farmers survey based study reveals that:- weather forecast and agro advisory services (AAS) were formed to be helpful to the farmers in managing climate risks effectively for sustainable and profitable agricultural production.

Keywords: AAS, DAMU, weather forecast, mass media, impact

Jan Aushadhi Suvidha Oxo-Biodegradable Sanitary Napkins: An Eco-Friendly Solution for Menstrual Waste in India

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ABSTRACT

In India, nearly 3.3 million tonnes of plastic garbage are produced each year, and commonly available sanitary napkins constitute 90% plastic. The contribution of menstrual waste to the country's annual plastic waste accumulation is thus less than 3% and the facilities to discard soiled sanitary napkins are very limited. Most of the women dispose soiled sanitary napkins in the dustbin, which eventually get dumped into landfills. The issue of plastic waste produced by sanitary napkins has significant adverse effects on the environment, animal health, and resource

depletion. The Indian government has taken a significant step towards addressing this problem by launching the Jan Aushadhi Suvidha Oxo-Biodegradable Sanitary Napkin under the Suvidha scheme in 2019. The napkins are made from eco-friendly and biodegradable materials and come with a special additive that makes them biodegradable when discarded. The availability of Jan Aushadhi Suvidha Sanitary Napkins at a minimum price of Rs. 1/- per pad in more than 9000 Pradhan Mantri Bhartiya Janaushdhi Pariyojna-PMBJP Kendras across the country provides women with a sustainable and affordable option for menstrual management. The benefits of using these napkins include reducing waste, being eco-friendly, reducing the risk of infection, and promoting hygiene. The initiative taken by the Indian government to promote sustainable menstrual hygiene practices not only benefits women but also the environment. The use of biodegradable sanitary napkins reduces plastic waste and minimizes the adverse effects of non-biodegradable materials like dioxins, furans, and chlorines, which harm the environment and cause skin problems. In conclusion, the Jan Aushadhi Suvidha Sanitary Napkins offer a sustainable and eco-friendly option for menstrual management, reducing plastic waste and promoting hygiene while being affordable for all. The Indian government's initiative to promote sustainable menstrual hygiene practices is a significant step towards reducing the adverse effects of plastic waste on the environment and ensuring a sustainable future.

Keywords: Bio-degradable, Eco- friendly, Environment, JASSN, Menstrual waste, Sanitary Napkins.

Effect of Exogenous Auxins Application on Fruit Cracking in Litchi *(Litchi chinensis Sonn.*) cv. *Dehradun* under Field Conditions of District Reasi Jammu J&K 182311

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ABSTRACT

Litchi (*Litchi chinensis Sonn.*) an arillate fruit species possess a unique structure compromising thin and leathery pericarp that enclose the aril as its edible part in Litichi. Fruit cracking is a serious physiological disorder that occurs in litchi with a period characterised by high day temperature (35-40^0 C) and low relative humidity. Besides climatic effects abnormal development of skin during early fruit growth promotes this disorder. In this context experiment was carried out at three locations of district Reasi and auxins viz different concentrations (20,30 and 40 ppm) were sprayed on anthesis and pea stage respectively. Study revealed that different concentrations of NAA showed significant effect on percentage of fruits carried to maturity. NAA 40 ppm controlled (7.75%) fruit cracking followed by 30ppm ppm(7.05%) significantly higher than control (14.91). NAA (20ppm) recorded minimum fruit cracking (10.58%) however significantly higher than control. Exogenous applications of NAA on litchi also showed significant effect in reducing the Number of days carried from fruit set to maturity.

Keywords: *Auxins , Litchi and Cracking, Maturity.*

The Application of Artificial Intelligence and Cloud Computing Technologies to Agricultural Processes for the Purpose of Optimizing Irrigation and Pesticide Application

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ABSTRACT
Agriculture contributes significantly to the economy. Agriculture automation is a major problem and a rising topic all over the world. The population is rapidly growing, and with it, the demand for food and work. The old methods utilized by farmers were insufficient to meet these criteria. As a result, new automated approaches were developed. These new methods met food demands while simultaneously providing work opportunities for billions of people. Agriculture has undergone a transformation as a result of artificial intelligence. This technology has protected crop yields from a variety of conditions including climate change, population increase, job troubles, and food security concerns. This paper's major goal is to examine the different applications of artificial intelligence in agricultural, such as irrigation, weeding, and spraying, using sensors and other means implanted in robots and drones. This paper examines the work of several scholars in order to provide a quick summary of the present deployment of automation in agriculture, namely weeding systems using robots and drones. The numerous soil water sensing technologies, as well as two automated weeding systems, are discussed. This study discusses the adoption of drones, as well as the numerous methods utilized by drones for spraying and crop monitoring.
Keywords: Artificial Intelligence; Cloud Computing Herbicide; Pesticide; Automation; Irrigation

Artificial Intelligence in Teacher Education: Role and Development
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ABSTRACT
As a result of the fact that the subject of artificial intelligence, sometimes referred to as "AI," seeks to construct intelligent robots that are capable of carrying out such obligations, the study of artificial intelligence is an incredibly significant issue in the area of computer science. In a variety of contexts, the intelligence that comes from human beings is absolutely necessary. Despite the fact that recent developments in machine learning and deep learning are causing a paradigm shift in the technology sector, the issue of artificial intelligence is interdisciplinary and can be approached from a broad variety of perspectives. This is because artificial intelligence encompasses a wide range of subfields and fields of study. It is generally accepted that John McCarthy was the one who coined the term "artificial intelligence" in 1955. This is the year the word was first used. His explanation of it was that it was the study and development of intelligent robots through the use of artificial intelligence. Because of this, a wide variety of people have started using the word as a direct consequence of this development. In this post, we will talk about a research that gives the most recent proof that AI may be useful in educational settings. The study was carried out by the National Science Foundation. The National Science Foundation was the organisation responsible for carrying out the study. The research presented in this paper was conducted by academics at the University of Toronto who are interested in the use of artificial intelligence to various educational methods. Please give a description of the research paper that you have been working on in this essay that you are now writing.

Prediction of Future Price of Arecanut using ARIMA Model for Shimoga Market, Karnataka, India

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ABSTRACT
Karnataka is the major producer of Areca nut in the India. Volatile demand and priceare the major challenges for the Areca nut growers in India. The use of time series models tomanage the price risk has become the interest of academicians today. This paper deals withdevelopinganappropriatemodeltopredictthepricesofarashiofArecanutofshimogamarketin Karnataka and predicted till December 2025. Box Jenkins ARIMA methodology is used to developthe model. Alongwith ARIM Aestimates, log-likelihood, Akaike'sinformationcriterion(AIC)statisticsarealsoestimatedtodecideontheappropriatemodel.ACFa ndPACFcorrelograms for residuals of ARIMA are used to do the diagnostic check of the selectedARIMAmodel. Appropriatemodel toforecast therashiArecanutpriceis ARIMA(0, 1,0).

Agroforestry Systems as a Means of Ensuring Livelihood Security in Baramulla District, Kashmir.

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ABSTRACT
This study investigated the role of agroforestry systems in ensuring livelihood security and sustainability in the northwestern Himalayas, with a focus on four blocks of Baramulla district in Jammu and Kashmir. A total of 180 households were randomly selected and surveyed on their agroforestry practices and socio-economic aspects. The results showed that agroforestry, including agriculture, horticulture, and forest resources, contributed most of the household income (63.65%). Poplar and willow were the most preferred forest tree species, while apple, pear, and walnut were the preferred fruit tree species for future plantation. The study also revealed that most respondents were in the high-income category (87.22%). The findings suggest the need to consider socio-economic factors in designing agroforestry models for the study area, and to promote fruit tree-based agroforestry systems such as Agri-Horti-silviculture and integrated mixed farming. There is also a need to improve current agroforestry practices by incorporating fruit, fodder, and timber trees based on farmers' preferences. Overall, this study highlights the potential of agroforestry systems for enhancing livelihoods and promoting sustainability in the northwestern Himalayas.
Keywords: Agroforestry, livelihood security, sustainability, income.

Nutritional and Anti-nutritional Components of *Vespa magnifica* (Hymenoptera: Apidae) and *Anoplophora glabripennis* (Coleoptera: Cerambycidae) two Potential Edible Insects of Manipur, Northeast India

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ABSTRACT
The practice of entomophagy as a food provides nutritional food security, family livelihood and a great source to supplement food items that would meet the people's present and future need. Edible insects are preferred as eggs, nymphs, larvae, pupa and adult insects, and eaten as fried, cooked along with other ingredients according to consumer's choice, roasted or are even consumed as raw repeatedly. The nutritive contents of two potential edible insects available in market commonly used as delicious food by different ethnic communities of Northeast India, especially in Manipur namely *Vespa magnifica* (Hymenoptera: Apidae) and *Anoplophora glabripennis* (Coleoptera: Cerambycidae) were evaluated. *V. magnifica* and *A. glabripennis* contained 40.9 and 27.8% protein, 22.0 and 42.3% fat, 1.67 and 1.59% carbohydrates, 0.69 and 3.07% fibre, 5.4 and 1.9% ash content respectively giving higher values compared with few conventional food items of animal origin like egg, chicken, pork, etc. Mineral analysis by Atomic Absorption Spectrophotometer showed that the insects can supplement rich amount of calcium, sodium, potassium, iron, magnesium and phosphorus to human diet. Both the studied edible insects showed non toxic level of antinutritional properties. The IC_{50}% of the studied insects were found to be 0.813 mg/ml (*V. magnifica*) and 0.618 mg/ml (*A. glabripennis*) showing higher values as compared to standard Ascorbic acid. The species with lesser IC_{50} % values had stronger antioxidant properties. Respective values of anti-nutrients like total phenol and tannin content (mg/g) in insect samples dry weight showed *V. magnifica* (38.7 & 50.0) and *A. glabripennis* (26.8 & 12.5). Documenting the significance of food insect becomes the foremost requirement in linking between people's livelihoods and economic prosperity.
Keywords: Edible insects, nutritional, anti-nutritional, food security, economic support.

Monitoring of traffic noise pollution in urban Patna, Bihar, India

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ABSTRACT
Road traffic noise is a major environmental issue that has been faced by many people around the world, including in Patna city. There is a need to investigate noise regularly because of the rapidly increasing traffic volume. This study focuses on the estimation of the urban traffic noise level in Patna, Bihar, India. Based on a preliminary survey of traffic volume, 12 stations were selected. A sound meter was used to measure the "A"-weighted noise level. Noise parameters like L10, L50, and L90 were evaluated from the collected noise data. And these noise parameters were used for the calculation of noise pollution indices like Noise Climate (NC), Equivalent Continuous Noise Level (Leq), Noise Pollution Level (NPL), and Traffic Noise Index (TNI). These noise indices compare with the standard limit of the Central Pollution Control Board (CPCB). The equivalent continuous noise level (Leq) measured at different locations in the commercial cum residential zones varies from 77.7 dBA to 92.5 dBA, which is higher than the prescribed noise level limit of the CPCB. Other noise indices, such as the NPL and TNI, are found to range from 88.2 dBA to 111.5 dBA and 77.9 dBA to 125.9 dBA, respectively, at various sampling locations and are also higher than the prescribed limit of the CPCB. The noise level of all stations was found to exceed the prescribed limit of the CPCB. There is a strong correlation exists between NPL with TNI and NC ($r > 0.5$). Also, there is a strong correlation exists between Leq with NPL ($r > 0.5$). Using NPL as a dependent variable and TNI, NC, and Leq as independent variables, the regression model was completely validated.

Climate Change and Animal Husbandry

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ABSTRACT

The climate is changing, unveiling higher temperatures, increasing precipitation variation (somewhere in a drought situation and somewhere in a flood situation), and more frequent extremes because of both natural and due to human exploitation. This is driven by increasing carbon dioxide (CO_2) concentrations in the atmosphere. Hereafter reviewing papers on climate change and livestock, there is already undeniable evidence that animals, birds, and plant life is being stricken by weather alternate and worldwide warming in each their distribution and behavior. Climate impacts farm animals' growth rates, milk, egg production, reproductive performance, morbidity, mortality, at the side of feed supply. Simultaneously, a farm animal is a weather extrade driver, producing generating 14.5% of overall anthropogenic Greenhouse Gas (GHG) emissions. Moreover, research carried out on the combined effect of average temperature and day length at Volcani Research Centre, Israel showed that average milk production was reduced by 0.38 kg / ^{0}C, average protein production was reduced by 0.01 kg / ^{0}C, elongation of daylight increased milk production by 1.2 kg/h and avg. protein production increased by 0.02 kg /h of daylight. To adopt livestock with climate-changing behavior there is a need to strengthen the research towards nutritional, supplementation of growth hormone, environmental modifications as the comfort of animal, genotype modification need to develop heat-tolerant breed, production adaptability measures (use of thermo neutral appliances). Accordingly, various management practices and decisions need to be implemented.

Kew words: Climate change, Livestock, Greenhouse gas, etc

Impact of Climate Change on Vegetable Production: Challenges and Opportunities

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ABSTRACT

Climate change is a significant global challenge that affects various sectors, including agriculture. Vegetable production is a critical aspect of global food security and a significant source of income for millions of smallholder farmers. Climate change poses both challenges and opportunities for vegetable production. One of the significant impacts of climate change on vegetable production is the alteration of growing conditions. Increased temperatures, changing rainfall patterns, and extreme weather events can affect crop growth, development, and yield. Changes in pest and disease patterns also pose a significant challenge to vegetable production. Additionally, changing weather patterns can result in water scarcity and soil degradation, which can affect the quality and quantity of vegetable production. The challenges posed by climate change on vegetable production

are numerous, but there are also opportunities for sustainable vegetable production. Farmers can adapt to changing weather patterns by adopting climate-smart agricultural practices such as crop diversification, intercropping, and agroforestry. These practices can help reduce the risk of crop failure and improve soil health, which can enhance the resilience of vegetable production systems. Moreover, farmers can adopt innovative technologies such as greenhouse production and precision irrigation to minimize the effects of changing weather patterns on vegetable production. In conclusion, the impact of climate change on vegetable production is a significant global challenge that poses both challenges and opportunities for sustainable vegetable production. The challenges faced by farmers include changes in weather patterns, pests and diseases, water scarcity, and soil degradation. However, farmers can adapt to these challenges by adopting climate-smart agricultural practices and innovative technologies. With appropriate policy support and investment, sustainable vegetable production can contribute to global food security and reduce the negative impact of climate change on vegetable production.

Keyword: climate change, vegetable production, challenges, opportunities, Insect and Pest

Impact of Abiotic and Biotic Stress Management in Vegetable Production

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ABSTRACT

Vegetable production is crucial for ensuring food security and meeting the nutritional needs of the growing population. However, vegetables are susceptible to various stress factors, including biotic and abiotic stress. Abiotic stress includes environmental factors such as drought, high temperature, salinity, and heavy metal toxicity, while biotic stressors include pests, diseases, and weeds. Effective management of these stress factors is crucial to ensure sustainable vegetable production. Abiotic stress management techniques such as irrigation systems, water-saving techniques, mulching, and conservation tillage can help mitigate the impact of drought, high temperature, and other environmental stressors. Similarly, biotic stress management strategies such as integrated pest management (IPM) can help control pests and diseases using biological, cultural, and chemical control methods. The use of stress management techniques can improve crop yield and quality, enhance food security, and increase farmers' income. Effective management of abiotic and biotic stressors can help maintain crop productivity despite adverse environmental conditions. This can contribute to food security and increase farmers' income, improving their livelihoods. Stress management can also reduce crop losses due to pests and diseases, increasing the efficiency of vegetable production and reducing the use of chemical inputs. Additionally, stress management can enhance the nutritional quality of vegetables by reducing stress-induced changes in nutrient content and composition. This can improve human health and well-being. In conclusion, the impacts of abiotic and biotic stress management in vegetable production are significant. The use of integrated management strategies can help ensure sustainable vegetable production, maintain crop yield and quality, increase farmers' income, and improve human health and well-being. Therefore, it is essential to promote the adoption of stress management techniques in vegetable production, and policymakers, researchers, and extension workers should collaborate to provide farmers with appropriate knowledge and technologies for stress management.

Keywords: Abiotic stress, biotic stress, vegetable production, stress management, integrated pest management, food security.

Organic Farming with Residue-Free Production in Horticulture Crops

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ABSTRACT

Organic farming with residue-free production is gaining popularity as a sustainable and environmentally-friendly method of agriculture, particularly in horticulture crops. This approach aims to reduce the use of synthetic chemicals and instead utilizes natural methods of soil fertility, pest control, and crop management. Organic farming is an agricultural method that emphasizes the use of natural resources and processes to maintain soil fertility and control pests and diseases. Residue-free production takes this a step further by avoiding the use of synthetic chemicals that can leave residues on the produce. In horticulture crops, this approach has many benefits, such as producing healthier and tastier fruits and vegetables, reducing environmental pollution, and improving soil quality. One of the main challenges of organic farming with residue-free production is the management of pests and diseases without using synthetic pesticides. Farmers must rely on natural methods such as crop rotation, companion planting, and the use of beneficial insects to control pests. In addition, they must ensure that their crops are well-nourished and healthy to prevent diseases from taking hold. This requires careful planning, monitoring, and record-keeping to ensure that the crops are growing optimally. Another challenge of organic farming with residue-free production is the need for labor-intensive management practices. Farmers must rely on manual weeding, pruning, and other tasks to maintain their crops, which can be time-consuming and expensive. However, some farmers have found innovative ways to reduce labor costs, such as using cover crops to suppress weeds and reduce the need for manual weeding. Despite these challenges, many farmers are embracing organic farming with residue-free production as a way to produce high-quality, sustainable crops. To implement this approach, farmers must adopt a holistic approach to farming that considers the entire ecosystem. This includes managing soil fertility, using natural pest control methods, and optimizing crop management practices. They must also have a deep understanding of the principles of organic farming and be willing to invest time and effort into learning and implementing these practices. In conclusion, organic farming with residue-free production is a promising approach to agriculture in horticulture crops. While it presents challenges, the benefits of producing healthier, more sustainable crops make it a worthwhile investment for farmers who are committed to sustainability and environmental stewardship. By adopting natural methods of soil fertility, pest control, and crop management, Organic farming with residue-free production in horticulture crops farmers can produce high-quality produce while minimizing the impact on the environment.

Keywords: organic farming, residue-free production, horticulture crops, sustainable agriculture, natural methods, soil fertility, pest control, crop management.

Seasonal Incidence of Melon Fruit fly, *Bactrocera cucurbitae* (Coquillett) of Cucumber in Relation to Weather Parameters

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ABSTRACT
Field experiment were carried out to study population fluctuation of melon fruit fly *Bactrocera cucurbitae* (Coquillett) in cucumber and its relation with different weather parameters during *Kharif*, *Rabi* and *Summer* 2021 cropping seasons in non-replicated design under unprotected conditions at Department of Agricultural Entomology, VNMKV, Parbhani (MH). The results revealed that the melon fruit fly population was more in *Summer* season followed by *Kharif* and lowest in *Rabi* seasons at fruiting stage due to variation in weather parameters. The highest population melon fruit flies were trapped during *Summer*season in 13th MW (92.00 fruit flies catches/trap). During *Kharif* season maximum population of fruit flies was noticed in 37th MW (90.00 fruit flies catches/trap). The highest incidence of fruit flies during *Rabi* 2021 was noticed in 52nd MW i.e., (73.00 fruit flies catches/trap). The correlation study, fruit fly population showed positive highly significant correlation with maximum temperature and minimum temperature. While negatively non-significant with rainfall and evening relative humidity whereas morning relative humidity was negatively significant with melon fruit fly during *Summer* 2021.During *Kharif* 2021 negatively non-significant correlation with maximum temperature and minimum temperature. While positively non-significant with morning relative humidity and evening relative humidity whereas rainfall was positively significant.Whereas during *Rabi* 2021 negatively highly significant correlation with maximum temperature and minimum temperature. While negatively non-significant with rainfall and evening relative humidity while morning relative humidity was positively significant with melon fruit fly population.
Keywords: Seasonal incidence, Cucumber, melon fruit fly, *Bactrocera cucurbitae*, weather parameters.

Incidence of Red Pumpkin Beetle, *Aulacophora foveicollis* (Lucas) of Cucumber in Relation to Weather Parameters

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ABSTRACT
Field experiment were carried out to study seasonal incidence of red pumpkin beetle, *Aulacophora foveicollis* (Lucas) in cucumber and its relation with different weather parameters during *Kharif*, *Rabi* and *Summer* 2021 cropping seasons in nonreplicated desing under unprotected conditions at Department of Agricultural Entomology, VNMKV, Parbhani (MH). The results revealed that maximum incidence of red pumpkin beetle was noticed in *Summer* and *Kharif* as compare to *Rabi* season. The highest incidence was noted in 8th SMW *i.e.*, (2.50 beetle/vine) during *Summer*season. During *Kharif* season the population steadily increased and reached to its peak in the 32nd SMW (2.50 beetle/vine). The highest incidence of red pumpkin beetle during *Rabi* 2021 was noticed in 1st SMW *i.e.*, (1.40 beetle/vine).During *Summer* 2021 the incidence of red pumpkin beetle in relation to maximum temperature, morning relative humidity and evening relative humidity were found positively non-significant. The other parameters like minimum temperature and rainfall found positively significant. It showed non-significant positive response with maximum

temperature and minimum temperature while non-significant negative response with rainfall morning relative humidity and evening relative humidity during *Kharif* 2021. The red pumpkin beetle population showed negative, highly significant correlation with maximum temperature and positive, highly significant correlation with morning relative humidity while minimum temperature and rainfall was showed negatively non-significant correlation whereas evening relative humidity was positively non-significant correlation during *Rabi* 2021.

Keywords: Seasonal incidence Cucumber, red pumpkin beetle *Aulacophora foveicollis,* weather parameter.

Green Technology for Attaining Sustainable Development

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ABSTRACT

In recent years, climatic changes, global warming, energy depletion and other environment-related concerns have led to the emergence of green technologies. Therefore, environmental protection has become a key concern worldwide. Researchers believe that the increase in the level of sustainable development will result in sustainable economics and societies. It will also have a very positive impact on sustainability in the future. Green Technology is one important concept which marketers are using these days as a key strategy for sustainable development. Technical advancements in the modern society mark human creativeness and innovations This research focuses on the concept of sustainability from a technology point of view. In this context, the researcher has presented a theoretical framework of sustainability in terms of marketing, meaning, and definition of green marketing. This also includes modification in the production method, packaging process, and promotional activity to create environmental consciousness among consumers. The terms that today's‟ consumers link with green technology are ecofriendly, reusable, recyclable, low carbon emission, energy saving. The reason behind this is to study the literature based on the development of green technology strategies that are implemented by the various organization for resolving numerous environmental issues such as depletion of ozone layer, acid rainfall, increase in carbon footprint and other issues to attain sustainable development (Chandler, 1990). Therefore, it has been summarized that the green technologies have a promising future in meeting the needs of economic sustainability. But environmental and social sustainability factors need to be reinforced in a mutual manner. Both environmental and economic impact and efficiency of a technology should be analyzed before the implementation of technologies.

To conclude, Today, the focus of our society is to attain sustainable development in all aspects. Green Technology is important for green products and brand that are environmentally safe to use. This builds the basis for analyzing the questions of the research. Finally, this research paper provides a review of successful theories and supports for identifying the factors that have to influence green technology for sustainable development. This research work provides some guidance for developing the conceptual model for interlinking green technology with sustainable development for the betterment of society. It should be a win-win situation when economic and sustainable growths are highly emphasized.

Keywords: Green Technologies; Sustainable Development; Sustainability, Green Product.

Contribution of Indigenous Knowledge towards Sustainable Development

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ABSTRACT
Indigenous Knowledge refers to the understandings, skills and philosophies developed by societies with a history of interaction in their native environment. This local knowledge is crucial for conserving both the cultural and biological diversity of the world for a locally suitable sustainable development amid the changing climate scenario. The initial impetus at international podium to recognize the expertise of native people with regards to the sustainable resource management and environmental conservation was accorded by the documents like *World Conservation Strategy, 1980* and *Our Common Future, 1987*. The *1992 Rio-declaration* and *Agenda 21*, outcome of the UNCED summit on sustainable development also acknowledged the importance of indigenous knowledge in holistic development based upon conservation and sustainability ethic. The contribution of indigenous people and knowledge systems has become imperative to accomplish UN's 2030 *Agenda for Sustainable Development* as they are instrumental in achieving the sustainable development goals (SDGs). The present study was based upon secondary information gathered from various books, review papers, research articles, and reports of numerous institutions. The application of traditional knowledge in areas such as climate change adaptation and mitigation, disaster risk reduction, ecosystem management, biodiversity conservation, medicine and sustainable agriculture improves food security and alleviates poverty, thus, leading to a balanced and inclusive growth that will bring together the marginalized and vulnerable tribal communities in the developmental process for sustainable and resilient future of the planet and its people.
Keywords: Indigenous knowledge, sustainable development, biodiversity conservation, climate change, resource management, sustainable agriculture.

Increase in Insect Pest Menacedue to Climate Change

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ABSTRACT
Climate change is of great concern in today's world and its impact is a topic of many debates, conferences and law making. Increased temperature, rising atmospheric CO_2 level and alteredprecipitation pattern are immediate effects of climate change. There are many evidences ofclimate change such as epidemic, endemic, declining in biodiversity, intense droughts, freshwaterscarcity,wildfires,risingsealevels,flooding,meltingpolarice,catastrophicstorms,etc.Changeinclimatehavesignificantimpactonagricultureproductivity,increaseinpestinfestation and epizootics, which has been reported frequently every year in different parts oftheworld.Itresultschangesingeographicaldistribution,increasedinthenumbersofgeneration, changes in crop pest infestation in different seasons, changes in interspecificinteractionandincreasedriskofinvasionbymigrantpest.Theconsequenceareseriousriskofcropeconomiclossandchallengetohumanfoodsecurity.Asamajordriverofpestpopulationdynamics, climate change requires adaptive management strategies to deal with the changingstatus of pests. Several priorities can be identified for future research on the effects of climatechanges on

agricultural insect pests. These includes modified integrated pest managementtactics, monitoring climate and pest populations, pest forecasting and the use of modellingpredictiontools.
Keyword: Globalwarming,climatechange,insectpest, management

Performance of New Molecule of Insecticides Against Leaf Miners, *Pegomya hyoscyami* (Panzer), on Fenugreek (*Trigonella foenumgraecum* L.)

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ABSTRACT
The field research was carried out to assess the performance of eight insecticides, with the exception of one, at MPKV, Rahuri among both 2019-20 and 2020-21. Chlorantraniliprole @ 30 g a.i. ha-1 outperformed over the all-selected insecticides in term of lowest per cent leaf miner infestation (19.16%) and highest per cent yield (58.38%) with ICBR of (1: 9.1) followed by cyantraniliprole @ 90 g a.i. ha-1, thiamethoxam @ 25 g a.i. ha-1 and chlorantraniliprole + thiamethoxam (soil drench) @ 150 g a.i. ha-1. Thiamethoxam @ 25 g a.i. ha-1 seemed to have the maximum ICBR while compared to chlorantraniliprole and cyantraniliprole due to its lower cost.
Keyword: Fenugreek (*Trigonella foenumgraecum* L.), Leaf miners, *Pegomya hyoscyami* (Panzer), Chlorantraniliprole, Cyantraniliprole, Thiamethoxam, Chlorantraniliprole + Thiamethoxam (Soil Drench).

Content Analysis of DEE PDKV TOT Application

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ABSTRACT
Mobile applications in Agriculture serve as smart decision support tools (DST) and are designed to help users make more effective decisions by leading them through clear decision stages. Mobile agricultural apps offer various kinds of services that helps the farmers to take informed decisions. Several mobile apps were developed in agriculture and its allied sectors like pure agriculture related apps, farm management including geotagging, fisheries, poultry sectors, livestock, animal husbandry, and food traceability sector etc.The present study entitled "Content Analysis of Agriculture and Allied Mobile Application" attempts to study the content of the selected mobile application (DEE PDKV TOT App) by doing content analysis. For the present study,120 farmers using the above-mentioned mobile application were selected from Akola district of Vidarbha region of Maharashtra state. An exploratory design of social research was used for the study. The data was collected personally with the help of pre-tested and well-structured interview schedule and then subjected to appropriate statistical analysis and results were obtained. Content Analysis of DEE PDKV TOT app was done under three forms as content inventory, content audit and content mapping. Content inventory revealed the various sections of the application and it showed that fewer sections of paddy, and soybean does not contain any information, content audit done using a set of twenty four statements brought out the opinion of the users towards the mobile application and majority of the respondents agreed that the app contains accurate information on package of practices of crops (85.00%), language used in the app is easy to understand (87.50%), the information provided in English is lesser than that in Marathi (94.17%), information regarding

post-harvest technology of the crops should also be mentioned in the app (92.00%) and contact numbers of all the concerned departments should be provided in the app to get information as per the needs of the farmer (90.00%) and linear type of content mapping showed the overall organization of the application and basic understanding of it. Content provided in English is lesser that that in Marathi was found through content mapping.

Keywords: Mobile agricultural apps, Content Analysis, DEE PDKV TOT App, Vidarbha region, Content audit, Content mapping, Content inventory

Management of Chickpea Wilt Caused by *Fusarium oxysporum* F. sp. *ciceri*

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ABSTRACT

Fusarium wilt caused by *Fusarium oxysporum* f. sp. *ciceri* causes heavy yield losses in chickpea crop around the world. The effect of fungicides, botanicals and bio-agents against *Fusarium oxysporum* F. sp. *ciceri* was evaluated for their inhibitory effect *in vitro.* Complete mycelial growth inhibition (100%) of *Fusarium oxysporum* F. sp. *ciceri* was recorded in Carboxin+ Thiram (0.30%), Thiram (0.30%), Mancozeb (0.25%). Cent per cent growth inhibition (100%) of *Fusarium oxysporum* F. sp. *ciceri* was observed in *Allium sativum* extract (10%) followed by *Hibiscus rosa-sinenesis* and *Lantana camera* (55.19% & 53.70%). Among different bioagents evaluated, highest growth inhibition was achieved in *Trichoderma harzianum* (68.89%) followed by *Pseudomonas fluorescens* and *Bacillus subtilis.* (49.47 & 21.33).

Keywords: Chickpea, *Fusarium*, Chemicals, Botanicals, Bioagents.

Molecular Variability of Indian Isolates of *Fusarium oxysporum* F.Sp. *ciceri* using Pathogenicity and Microsatellite DNA Marker Characterization

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ABSTRACT

Eighteen isolates of *Fusarium oxysporum* f.sp. *ciceri* causing wilt of chickpea representing nine states and eight Agro ecological regions of India were analysed for their virulence and genetic diversity. All the isolates were pathogenic to susceptible cv. JG-62. They show variable reaction on set of host differential cultivars of chickpea, namely JG-62, BG-212, L-550, JG-74, CPS-1, WR-315, DCP-92-3, KWR-108, JG-12, Annegiri, IPC-2004-52 and K-850. On the basis of their reaction on host differential, these isolates were classified into five races. The same set of isolates were further analysed by using simple sequence repeats (SSR) primers. All SSR primers were found to be polymorphic (73.72%). The unweighted paired group method with arithmetic average grouped the isolates into five clusters at a genetic similarities ranging from 59.12% to 94.16%. The molecular groups partially corresponded to the Agro ecological region/chickpea-growing region of the isolates as well as races of the pathogen characterized in this study.

Keywords: chickpea, *Fusarium oxysporum* f.sp. *ciceri*, genetic variability, wilt, SSR, etc.

***Carissa carandas* L.: A Miracle Plant for Arid and Semi-Arid Regions**

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ABSTRACT
Carissa carandas is a wild shrub that exhibits high adaptability to tropical and sub-tropical regions worldwide. The plant has a remarkable ability to thrive even in marginal and substandard soils. Its primary use is for the production of aesthetically pleasing and edible fruits, which vary in taste from sour to sweet. These fruits are an excellent source of minerals, especially calcium and iron, as well as vitamins, especially vitamin C. The entire plant has significant medicinal importance, with the ripe fruits being used to treat diarrhoea, fever, and stomach disorders, among other conditions. The roots have anthelmintic and laxative properties, while the leaves are believed to have anti-diabetic effects, and the seeds contain antioxidants with anti-cancer activity. Various parts of the *C. carandas* plant have demonstrated pharmacological properties such as spasmolytic, analgesic, anti-inflammatory, anti-hyperglycaemic, hepato-protective, antipyretic, and purgative effects. This plant has attracted increased attention as a potential source of medicine due to the presence of biologically active compounds such as saponins, phenolic components, cardiac glycosides, alkaloids, flavonoids, and triterpenoids. Besides its pharmacological applications, *C. carandas* also has other significant applications such as the production of metallic nanoparticles and the biosorption of heavy metals or pollutants from industrial waste water.
Keywords: Biosorption; Medicinal; Nanoparticles; Pharmacological

Exploring the Interactive Effects of Nitrogen and Spacing on Coriander (*Coriandrumsativum* L.) Crop Quality

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ABSTRACT
Coriander (*Coriandrum sativum* L.) is a highly valued spice crop globally due to its diverse medicinal properties. While its leaves are the primary focus of cultivation, its seeds are a prominent ingredient in many cuisines worldwide. Various studies have examined the impact of different nitrogen doses and spacing on coriander growth and development, offering valuable insights into optimal growing conditions. The current study investigates the effects of various nitrogen doses and spacing on coriander production under field conditions at the Research Farm of Vegetable Science, Chaudhary Charan Singh Haryana Agricultural University, Hisar (India) during *Rabi*, 2019-20. Treatment S_1N_3 (20×15; N@75 kg/ha) was found to be the most effective for plant height, S_3N_1 (40×15; N@0 kg/ha) for days to 50% flowering, S_1N_1 (20×15; N@0 kg/ha) for minimum maturation, and S_3N_3 (40×15; N@75 kg/ha) for the number of umbellets per umbel,

number of seeds per umbellets, number of seeds per umbel, seed yield per plant, and primary branches. Based on the findings of this study, the aforementioned treatments can be utilized for sustainable coriander production.
Keywords: Nitrogen; *Rabi;* Spacing; Sustainable

Standardization and Preparation of Therapeutic Wine from Butea Flower a New Startup for Sustainable Development for Vidarbha Region under Waste to Wealth Concept
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ABSTRACT
Consumption of therapeutic wine is a new concept after pandemic as consumer focus shifted towards smart, healthy food all over world. In this project we tried attempt to prepare and standardize the wine prepared from Palas flowers as a therapeutic wine that may be open new way of employment and startup for tribal youth and farming community of Vidarbha region under waste to wealth concept. *Butea monosperma* is commonly known as flame of forest, belongs to the family Fabaceae and locally called as Palash used since the Vedic era for different therapeutic purposes in various parts of India. Almost all the parts of plant including flowers, seeds, leaves and barks possess medicinal property. Flowers are rich in butrin, isobutrin, coreopsin, sulphurein, isocoreopsin, monospermoside, chalcones, isomonospermoside, steroids. The hills of Vidarbha region is full decorated under palash plantation. The blooms of flowers are completely dropped and waste in the month of March to April every year. If the waste bloom and fresh flowers are collected and converted in to a value-added product it will be the new startup for Vidarbha region to generate employment though entrepreneurship. Total five prepared wine with and without blend, the Wine A, Wine B, Wine D and Wine F categorized as table wine containing 9.2 to 9.9 percent alcohol (v/v), TSS 14.5 to 15.2°Brix, Specific gravity-1.060 to 1.073 with deep ruby, pale garnet, deep garnet and medium copper colour respectively Wine C categorized as Starter wine having deep purple colour containing 6% alcohol(v/v), TSS 13.2°Brix,pH-3.1 with 1.038 sp. gravity. Wine E categorized as a dessert wine recorded 12.2% alcohol (v/v), TSS 15.5°Brix, acidity 0.27% and 1.093 sp. gravity. All five wines are as per the standards of FSSAI and recorded zero microbial count, below detectable levels of heavy metals, higher total phenols, antioxidative activity and organoleptic score.
Keywords: Butea Monosperma, therapeutic wine, waste to wealth

Studies on Cost of Cultivation of *Bt* Cotton in Marathwada Region
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ABSTRACT
Maharashtra is one of the nine major Bt cotton-growing states in the country. Marathwada is the major cotton growing region of Maharashtra and i.e. 33 per cent of the total cotton area of Maharashtra and around 10 per cent of India. Cotton cultivation cost is increasing year after year and is one of the reasons for reduction in area under cultivation. Changing climatic conditions have increased cost on inputs as well as labour charges for different operations. A study was undertaken to collect information on input use pattern and cost of cultivation of *Bt* cotton under AICRP on Cotton during *kharif* 2022-23. Data on cotton cultivation cost was collected from 30

farmers across six cotton growing districts in Marathwada region. The total cost of cultivation was Rs. 86887/- per ha out of which inputs incurred Rs. 30990/- per ha (35.66 per cent) and labour charges paid by farmers were Rs. 55897/- per ha (64.33 per cent). Among inputs, fertilizer cost was highest (Rs. 10358/- per ha, 33.42 per cent of inputs) followed by plant protection chemicals (Rs. 9114/-, *i.e.* 29.67 per cent), manures (14.86 per cent) and seed cost (10.88 per cent) were major charges. The labour charges paid for picking were highest (Rs. 17978/-, 32.16 per cent of labour charges) followed by field preparation (Rs. 10135/-, 18.13 per cent), intercultural operations (Rs. 7174/-, 12.83 per cent) and stalk pulling (Rs. 6199/-, 11.09 per cent) are the operations for which prominent labour charges paid by farmers. The cost on family labours, management charges and other charges (Cost C3 - (inputs + labour charges paid)) were Rs. 22526/- per ha. The average seed cotton yield harvested was 17.67 quintals / ha with average market price received Rs. 8296/- per quintal and net monetary returns recorded were Rs. 71106/- per ha. The farm business income per ha from cotton was Rs. 53196/-, family labour income per ha was Rs. 44735/- and net income was Rs. 28134/- per ha. Thus, increasing labour charges are the major constraint in cotton cultivation.

Management of Leaf and Flower Blight of Marigold

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ABSTRACT
Marigold (*Tagetes eracta* L.) is a flowering plant belonging to the family *Asteraceae.* Marigold flowers are widely used in religious and social functions especially for internal decoration, bedding, in hanging baskets as well as loose flower for garlands and antagonistic crop for the management of root knot nematodes. Marigold is susceptible to a number of fungal, bacterial and viral diseases. Among the fungal diseases, leaf and flower blight caused by *Alternaria tenuissima* is very dangerous to the plant leading to heavy economic losses cause upto 50-60 per cent in flower yield. Keeping this view, the present investigationwas carried out to find out the efficacy of various fungicides against leaf and flower blightof marigold under field condition. During the three years of experiment for the management of leaf and flower blight of marigold. Three foliar spray of either hexaconazole 4 + zineb 68 WP 0.07 per cent (10 g/ 10 l.) or Mancozeb 75WP,0.02 per cent (30g/10 l.)ortebuconazole 50 + trifloxystrobin 25WG, 0.03 per cent (4g/ 10 l.) first at the initiation of the disease and subsequent two sprays at 15 days interval were found effective in managing leaf and flower blight disease in marigold which also reflected on flower yield as well. The treatment of hexaconazole 4 + zineb 68 WP registered highest ICBR1: 4.73 followed by mancozeb 75WP registered ICBR1:4.32 while tebuconazole 50 + trifloxystrobin 25WG registeredICBR1:3.87.

Green Plague (Sterility Mosaic Disease) of Pigeonpea : Status in North Eastern Karnataka

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ABSTRACT
Pigeonpea is a short lived perennial grain legume grown in India. Pigeonpea suffers from several diseases with substantial losses in yields. The investigation was carried out on sterility mosaic disease (SMD) of pigeonpea mainly on incidence in major pigeonpea growing areas of North

Eastern Karnataka (NEK) region, biochemical basis of resistance, management and screening of pigeonpea genotypes. Survey was carried out at three district of NEK regions, results revealed that maximum per cent disease incidence of SMD was noticed Bidar taluka (34.50%) of Bidar district and least was found in Shorapur taluk (8.53%) of Yadgir district. Biochemical studies revealed that phenol content increased after pathogen infection but more phenol accumulation was found in diseased samples than that of the healthy leaves. The sterility mosaic resistant genotypes were found to contain high amount of peroxidase (PO), Poly phenol oxidase (PPO), Phenyl alanine ammonia lyase (PAL) compared to susceptible varieties. PO, PPO and PAL activity increased after infection in resistant and susceptible varieties but increase was higher in resistant and moderately resistant varieties. For management of the disease, wettable sulphur 50 WP @ 3 g/1it and dicofol 18.5 EC @ 2.5 ml/1it were highly effective and significantly superior to all treatments in the management of the disease. These treatments recorded higher yield, (16.25 q/ha and 15.06 q/ha respectively), maximum disease reduction (86.51% and 83.44%, respectively) and rest of the treatments had disease reduction of 35.55 to 86.51 per cent.

Keywords: Pigeonpea, SMD, Resistance Screening, Biochemical Parameters

Impact of Climate Change on Insect Pest and their IPM

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ABSTRACT

Climate change, an emerging global concern have serious effects in every aspect of agriculture. Changed patterns in climatic factors like temperature, precipitation, humidity and other meteorological components are affecting the quality and quantity of agricultural commodities production. Global climate change caused by increased giving out of greenhouse gases affect the agro-ecosystems in many ways, outcome of which depend on the combined effects of environmental temperature, precipitation and other global changing factors. Insects respond to climate change by different ways i.e., changes in an insect population's physiology, biochemistry, biogeography and population dynamics. An insect population's response to a rapidly changing climate may also be erratic when insects interact with different competitors, predators and parasitoids. Due to the climate change, there is a raise in the number of insect pest population, out breaks of insect, increased number of generations and development of resistant biotypes. Climate changes cause negative impact on the natural enemies' population. This also can manipulate the overall food production system that can be at critical risk from the impacts of climate change. Each additional degree of temperature rise could cause yield losses from insect pests to increase by a further 10-25%. Climate change has increased pest population and their damage potential by expanding distribution, enhancing survivability and allowing to develop the adaptability of insect pest. Rising temperature, modified precipitation patterns, disturbed gaseous composition of atmosphere etc. are causing the change in population, mobility, behaviour of insect pest. This change has been affecting the global agricultural production figure.

Keywords: Agriculture, Carbon Dioxide, Precipitation, Natural enemies bution, Temperature, Rainfall.

Nutritional Quality of Teff as Influenced by Different Establishment Methods and Nutrient Levels

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ABSTRACT
A field experiment was conducted at ICAR-Krishi Vigyan Kendra, Hanumanamatti, Haveri on red sandy loam soil. The experiment was laid out in Randomized Complete Block Design with Factorial concept, consisting two factors *viz.*, establishment methods (M_1: line sowing and M_2: transplanting) and nutrient levels [N_1: control, N_2: 100 % organics (6 t FYM ha^{-1}), N_3: 20:10:10 kg $N:P_2O_5:K_2O$ ha^{-1}, N_4: 30:15:15kg $N:P_2O_5:K_2O$ ha^{-1} and N_5: 40:20:20 kg $N:P_2O_5:K_2O$ ha^{-1} (6 t FYM ha^{-1} commonly applied to all the three fertilizer treatments)] and replicated thrice. Results revealed that method of establishment had no significant effect on the nutrient composition of teff grains. Yet, relatively higher protein (11.58%), fat (2.51%), ash (2.84%) and moisture (10.64%) content of teff grain was observed under transplanted teff than line sowing. Among different nutrient management practices, application of 40:20:20 kg $N:P_2O_5:K_2Oha^{-1}$ along with 6 t FYM ha^{-1} recorded significantly higher grain protein (12.60%), fat (2.64%), ash (2.98%) and moisture (11.51%) which was on par with application of 30:15:15 and 20:10:10 kg $N:P_2O_5:K_2O$ ha^{-1} along with 6 t FYM ha^{-1}. Though, transplanted teff supplied with 40:20:20 kg $N:P_2O_5:K_2Oha^{-1}$ recorded numerically higher values of grain nutrient content, the interaction effect didn't show any significant influence on the performance of teff crop.
Keywords: ash, fat, moisture, protein, teff

Role of Nanotechnology in Agriculture Waste Management

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ABSTRACT
Nanotechnology has the potential to play a significant role in the management of agricultural waste by improving the efficiency of waste treatment processes and creating value-added products from agricultural waste materials. One possible application of nanotechnology in agriculture waste management is in the development of nanomaterial-based adsorbents, which can be used to remove contaminants from wastewater and other agricultural waste streams. These adsorbents have a large surface area, which allows them to efficiently capture and remove pollutants. Nanotechnology can also be used to create nano-filters for water treatment, which can be effective in removing impurities and harmful substances from agricultural wastewater, such as pesticides, heavy metals, and pathogens. Additionally, nanotechnology can help convert agricultural waste into value-added products, such as biofuels, fertilizers, and animal feed. Nanoparticles can be used to enhance the efficiency of anaerobic digestion, which is a process used to convert organic waste into biogas. Nanoparticles can also be used to improve the nutrient content of agricultural waste, making it a more valuable source of animal feed and fertilizer. Overall, nanotechnology has the potential to improve the efficiency of waste treatment processes, create new value-added products from agricultural waste, and promote sustainable agriculture practices. However, it is important to consider the potential risks associated with the use of nanomaterials in agricultural waste management and to ensure that appropriate safety measures are in place to protect human health and the environment.
Kyewords: Organic waste, nanotechnology, value added products

Water Soluble Fertilizers - The Future Fertilizers

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ABSTRACT
Water-soluble fertilizers are a type of fertilizer that can be dissolved in water and applied to plants through irrigation or foliar spray. These fertilizers provide a quick and efficient method of delivering essential nutrients to plants, as they dissolve readily in water and are easily taken up by plant roots or foliage. Water-soluble fertilizers are available in a variety of formulations, with varying levels of nitrogen, phosphorus, and potassium, as well as micronutrients such as iron, zinc, and manganese. They are commonly used in commercial agriculture, greenhouse production, and hydroponic systems. One of the main advantages of water-soluble fertilizers is their versatility. They can be applied in a variety of ways, such as through drip irrigation, foliar spray, or fertigation (the application of fertilizer through irrigation water). This flexibility makes them a popular choice for both small-scale and large-scale growers. Another benefit of water-soluble fertilizers is their efficiency. Since the nutrients are readily available to the plants, they can be absorbed quickly, leading to faster growth and higher yields. Additionally, water-soluble fertilizers can be customized to meet the specific needs of different crops, ensuring that they receive the right balance of nutrients. However, there are also some potential drawbacks to using water-soluble fertilizers. They can be expensive compared to other types of fertilizers, and they require careful monitoring and management to avoid over-fertilization, which can lead to environmental pollution and crop damage. In conclusion, water-soluble fertilizers are a valuable tool for modern agriculture and horticulture, providing a quick and efficient way to deliver essential nutrients to plants. However, their use requires careful management to ensure that they are used effectively and responsibly.
Keywords: Soluble fertilizers, nutrient use efficiency, losses

Effect of Sowing Windows and Planting Geometry on Growth of Quinoa (*Chinopodium quinoa* Willd.) under Protective Irrigation

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ABSTRACT
A field experiment was carried out during *Kharif* 2019 at Main Research Station Hebbal, University of Agriculture Sciences, GKVK, Bangalore to find out optimum date of sowing and crop geometry for quinoa crop. The experiment was laid out in split plot design with three replications. The dates of sowing in main plots (D_1: July second fortnight, D_2: August first fortnight, D_3: August second fortnight and D_4: September first fortnight) and crop geometries (S_1: 30 × 15 cm, S_2: 45 × 15 cm, S_3: 60 × 15 cm and S_4: 75 × 15 cm) in subplots. The results revealed that crop sown during July second fortnight recorded significantly higher plant height (175.33 cm), number branches (22.22), number leaves (648), leaf area per plant (551.88 cm^2 $plant^{-1}$) and dry matter production (22.95 g $plant^{-1}$). Crop sown with 45 x 15 cm spacing has recorded significantly higher plant height (159.37 cm), number branches (17.40), number leaves (539) and leaf area per plant (504.04 cm^2 $plant^{-1}$). Therefore, sowing during July second fortnight sowing

with 45 x 15 cm is economical for growing quinoa crop during *Kharif* season in Eastern Dry Zone (Zone V) of Karnataka.

Keywords: *Sowing window, planting geometry, quinoa, growth*

Hydrogel - The Liquid Gold for Dryland Agriculture

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ABSTRACT

Expanding world demand for water, combined with the impacts of climate change led to the problem of water scarcity worldwide. Nowadays, managing water is the key challenge faced countries in arid and semi-arid regions. In fact, by 2030, global water demand is probable to be 50% higher than today causing severe water scarcity mainly for agricultural sector which demands 70% of the available freshwater on the earth. Though, micro-irrigation methods and automated irrigation can save the water application losses, their adoption is still limited to irrigated ecosystems. Hence, there is an urgent need for an efficient water saving technology for dryland agriculture to sustain in future. Hydrogel polymer, a 3D network of hydrophilic polymer material that quickly absorbs and retains water and other fluids act as "miniature water reservoir" in the soil due to its incredibly versatile, environmentally sensitive and multifunctional nature. It might absorb and store water hundred (>100) times of their weight and work as a tank to forestall water waste and increase irrigation potency, also as superabsorbent polymers improve soil porosity and water holding capacity. As soil amendment or conditioner, it creates a water reservoir near the root zone of plants, decreases osmotic pressure and increases plant available water in soil ultimately causing enhanced plant growth and yield at lower crop production costs. Polymer hydrogel acts as a slow-release carriers of nutrients in the soil and considered as a key approach for improving fertilizers efficiency through reducing the nutrient losses by leaching, reducing the cost and decrease environment pollution. The hydrogel polymer coat provides protection from the stress imposed by accelerated age, which includes pathogen invasion and pest attack during establishment. Due to chemical and physical structures of hydrogels, it can be used as an absorbent in environment preservation in the agricultural sector as water retention, soil conditioners and nutrient carriers ultimately enhances water and fertilizer use efficiencies in the dryland ecosystems.

Keywords: Dryland agriculture, Hydrogel, Efficiency, Water scarcity and Water saving

Effect of Climatic Change on Horticultural Crops in Bundelkhand region

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ABSTRACT

Climatic change is a significant challenge that adversely impacts the growth and yield of horticultural crops across the globe. The Bundelkhand region in India too has experienced the effects of climate change on its agricultural production.The Bundelkhand region is particularly vulnerable to the adverse effects of climate change, as it is a drought-prone region with limited

access to water resources. This study aims to cover the impact of climatic change on horticultural crops in the Bundelkhand region of India. That involves collecting data from various sources such as the Indian Meteorological Department, agriculture centers, and field observations, metrology department, of the Banda University of Agriculture and Technology Banda. The analysis of the obtained data suggests that the region is experiencing adverse weather conditions such as prolonged droughts, erratic rainfall, and increase in temperature, which is detrimental to the growth and yield of horticultural crops such as mangoes, guava, ber, woodapple, and brinjal, okra, and Cucurbitaceae vegetables etc. The region has experienced a gradual increase in temperature, accompanied by a decline in precipitation, resulting in more frequent and prolonged droughts. These conditions have led to a decline in crop productivity, quality, and shelf-life, as well as an increase in the incidence of pests and diseases. The findings of this study emphasize the need for the adoption of sustainable agricultural practices and the use of proper irrigation techniques to minimize the overall impact of climatic change on horticultural crops in the Bundelkhand region.The findings of this study highlight the urgent need for action to address the adverse effects of climate change on horticultural crops in Bundelkhand and other similar regions.

Keywords: Bundelkhand, Climate Change, Quality, Shelf life,Temperature Change

Association between Extent of Adoption about Crop Production Technology and Profile FF FLD Farmers and Non-Fld Farmers

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ABSTRACT

Mungbean (*Vignaradiata* L.) belongs to the family leguminaceae and sub-family papilionaceae. Banaskantha district has larger mungbean crop grown area. The lack of transfer of technology from research system to the client system is the main problem in increasing agricultural production in the developing world. The present rate of agricultural production can be doubled if; the available mungbean production technologies are brought to bear with production process and programme. Keeping this fact in view, the Government of India launched front line demonstration programmes for increasing crops production. It has played significant role in increasing the knowledge and adoption of recommended mungbean production technologies by the mungbean growers. So considering this, a study was conducted to know the Association between extent of adoption about crop production technology and profile of FLD farmers and non-FLD farmers. The study was conducted in Danta taluka of Banaskantha district because a greater number of FLDs on mungbean crop were conducted in this taluka by KVK, Deesa. The study reveal that education, land holding, social participation, extension participation, sources of information, irrigation potentiality and cropping intensity of FLD respondents had positive and significant correlation with the extent of adoption bout mungbean production technologies. While extension participation, irrigation potentiality and cropping intensity of non-FLD respondents had positive and significant correlation with the extent of adoption of farmers about mungbean production technology.

Keywords: Mungbean Production Technology, Adoption & FLD and Non-FLD Farmers

Genotypic Evaluation and Post-Harvest Studies of Garlic (Allium sativum l.) under North Eastern Dry Zone of Karnataka

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ABSTRACT
An investigation on "Genotypic evaluation and post-harvest studies of garlic (Allium sativum L.) under North Eastern dry zone of Karnataka" was made during 2020-2021 and 2021-2022 at Department of Horticulture, College of Agriculture, UAS Raichur. The present investigations were made to know the performance of different genotypes, genetic variability for yield and yield contributing characters, association between different characters and direct and indirect effect of yield components on yield, including the study on effect of different curing methods on physicochemical properties and microbial load in addition to the effect of UV-C light on physicochemical properties and microbial load of garlic bulbs. Yield attributing characters like bulb yield, bulb diameter, bulb length, clove length, clove diameter, hundred clove weight were found highest with genotypes GG-2, Godavari, Gulbarga Local, DOGR-18, DOGR-552, DOGR-531, DOGR-112, Bhima Purple, AC-50 and DOGR-695 which indicated high yielders and suitable for selection of good genotypes. The performance of the genotypes with regards to higher yield was influenced by higher magnitude of yield attributing characters. For the quality parameters the genotypes DOGR-377, DOGR-323, GG-2, DOGR-552, DOGR-531 and DOGR-24 were found superior and indicated suitable for selection. Tray drying method for curing of bulbs was found superior with physical and chemical characters with lower microbial load which helps in extending the shelf-life of bulbs and can be stored for longer period by retaining their nutritional quality.The next best method was solar tunnel drying which also maintains high temperature to cure bulbs and protects bulbs from unfavorable atmospheric conditions hence, it was found better than traditional method. Treatment with higher light intensity and higher exposure time (L_3T_3: 180 W for 5 min) was found superior for reduction in physiological loss in weight, decay loss, colour retention, lesser microbial load followed by the treatment L_3T_2 (180 W for 4 min), L_3T_1 (180 W for 3 min) and L_2T_3 (108 W for 5 min). Treatment with L_3T_3 proved to have significant effect on sulphur content followed by L_3T_2 and L_3T_1.

Global Warming and Its Possible Impact on Agriculture in India

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ABSTRACT
Significant progress has been made in climate science regarding the impact of climate on agricultural productivity, but with the world's population likely to reach 10 billion by 2050, the demand for food crops will outpace that of other crops. Climate change caused by the increasing concentration of greenhouse gases is expected to cause global warming, which could raise global surface air temperatures by 4.0-5.8 °C over the next few decades. This increase in temperature may offset the benefits of increasing atmospheric carbon dioxide concentrations on crop plants. Climate change is expected to create new environmental conditions that could significantly affect agriculture's productivity by altering the intensity, frequency, and spatial and temporal distribution of weather and climate processes. India has already experienced climate variability, with a

warming trend comparable to global mean increases over the past century, and changes in rainfall patterns that are expected to make dry areas drier and wet areas wetter. India's population is projected to reach 1.4 billion by 2025 and exceed China's in the 2040s. Agriculture is the foundation of India's livelihood system, so climate change could increase crop failure and pest infestations, putting food security and livelihoods at risk. Therefore, the challenges of the future will be more complex and demanding.

Keywords: Agriculture, Climate Change, Global Warming, Greenhouse

Role of Potassium Solubilizing Microbes in Plant Nutrition

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ABSTRACT

Potassium (K) is an essential macronutrient and plays important role in growth, metabolism and development of plant. Although, it constitutes about 2.5 per cent of the lithosphere but actual soil concentrations of this nutrient vary widely ranging from 0.04 to 3.0 per cent (Sparks and Huang, 1985). Plants absorb potassium mainly in three forms from the soil and out of these three forms, soil minerals make up more than 90 to 98 per cent of soil potassium (Sparks, 1987). With the introduction of high yielding crop varieties and the imbalanced fertilizer application, soils are getting depleted in potassium reserve at a faster rate. Moreover potassium deficiency is becoming one of the major constraints in crop production forcing to find an alternative indigenous source of K for plant uptake (Supanjani*et al*; 2006; Sindhu *et al*; 2012). In this context, potassium solubilising microorganisms present in the soil could provide an alternative means to make potassium available for plants (Groudev, 1987; Rogers *et al*; 1998). A wide range of microbes i.e. *Pseudomonas, Burkholderia, Acidothiobacillusferrooxidans, Bacillus mucilaginosus, B. edaphicus, B. circulans*and *Paenibacillus*sp. etc. release potassium in accessible form from potassium-bearing minerals by secreting the organic acids . Among these, *Bacillus mucilaginosus* strain released large amount of K from different minerals and increased the groundnut crop production (Sugumaran and Janarthanam, 2007). K content in soil and crop shoots was also improved due to the application of KSB(Bagyalakshmi*et al*., 2012). In addition, KSB also play an important role not only in maintaining soil structure by the formation and stabilization of water-stable soil aggregates but also produce the substance that stimulate plant growth or inhibit root pathogens (Egamberdiveya, 2006). Therefore, it can be concluded that efficient potassium solubilizing microbial biofertilizers could be further exploited for plant growth and nutrition and reducing the outflow of foreign currency from the country.

Keywords: KSB, Microbial mediated nutrient, Plant pathogens, Fungi, PGPR

Impacts of Heavy Metals Contamination on Soil

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ABSTRACT

Heavy Metal Contamination in the soil is a peculiar challenge in developing countries, due to the industrialization and lack of proper disposal management. This could lead to accumulation and

magnification of contaminates in biological system which further not only effect crop productivity but human health is also a major concern. Metal pollution has emerged as the most pressing issue of our day, it puts life's existence at threat, contaminants either organic or inorganic. Organic pollutants comprise dye, oil contaminants, soaps, and detergents, whereas inorganic pollutants include elements like Mercury (Hg), Arsenic (As), and Chromium (Cr), as well as automotive emissions and petroleum company effluents. Heavy metals show toxic impacts on soil biology by affect key microbial-mediated metabolic activities. Even a very low concentration of heavy metals may halt the metabolism of plants. Furthermore, the assimilation of toxic metals by plants and subsequent bioaccumulation along the food chain is certainly a potential threat to animals and human health. This also stimulates the production of reactive oxygen species (ROS) in aquatic life and can disturb the normal physiological processes. In this paper, investigation has been done to explore the fate and occurrence of soil metal contamination; the risks posed to human health and sustainable solutions for the remediation of contaminated land. The multiple challenges associated with the remediation of polluted soils have been overcome by the use of soil amendments, thermal desorption, soil washing, electro-kinetic remediation, and bioremediation.

Keywords: Biomagnification, Heavy metals, Electrokinetic remediation, Thermal desorption

Analysis of Role of Agencies Associated with Smart City Mission in Kolkata, India

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ABSTRACT

This article sheds light on different aspects of the smart city mission in a detailed manner. It has been found that in developing smart cities, several agencies play a significant role. It has been highlighted in this article that smart city missions are mainly associated with dynamic economic growth. This mission in Kolkata incorporates different government schemes to improve the healthcare system, education system, and sanitation conditions. Moreover, this mission aids the balance in the ecosystem by enhancing different components of the environment. This article has followed the secondary qualitative method to get in-depth information on the role of agencies in transforming Kolkata into a smart city.

Keywords: Smart city, agencies, government, economy, environment, urbanization

Role of Vertical Farming in Vegetable Production in India

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ABSTRACT

Vertical farming is a sustainable and efficient method of vegetable production that has the potential to address many of the challenges facing modern agriculture, such as climate change, food insecurity, and environmental degradation. India is the second-largest producer of fruits and vegetables in the world, with a production of 307.2 million tonnes in 2020-21. However, the

country faces several challenges in vegetable production, such as low yields, poor quality, and high post-harvest losses. Traditional farming practices are often unsustainable, with farmers relying heavily on chemical inputs to boost productivity, leading to soil degradation and water pollution. Vertical farming can address many of these challenges and offer several benefits to vegetable production in India. In India, where water scarcity is a significant issue, vertical farming can use up to 70% less water than traditional farming practices. Vertical farms can be designed to use less water than traditional farms, as the water used for irrigation can be recycled and reused. Vertical farming is a revolutionary horticultural technique that has been gaining popularity in recent years, especially in urban areas where space for traditional farming is limited. Vertical farming is a modern agricultural technique that involves growing crops in vertically stacked layers using artificial lighting, controlled environment, and nutrient-rich water solutions instead of soil. This innovative method of farming is especially useful for producing vegetables, as it allows for year-round production of fresh produce, regardless of weather conditions. This innovative approach to farming has the potential to revolutionize the way we grow and consume vegetables, particularly in countries like India, where agriculture is a primary source of livelihood and the demand for fresh, healthy produce is growing rapidly. One of the most significant advantages of vertical farming in vegetable production is that it enables farmers to grow more crops per square meter of land than traditional farming methods. This is because the crops are grown in layers, with each layer receiving an equal amount of light, water, and nutrients. This means that farmers can produce significantly higher yields of vegetables per unit of land, which is essential in urban areas where land is scarce and expensive. Another advantage of vertical farming is that it is a highly efficient and sustainable method of vegetable production. In India, where land is limited and soil quality is often poor, vertical farming offers a promising solution to the challenges facing traditional agriculture. One of the key benefits of vertical farming is the ability to control the environment in which the crops grow. By using LED lights and a nutrient-rich water solution, farmers can provide the perfect growing conditions for their plants. This means that crops can be grown year-round, regardless of the weather outside, and can be harvested multiple times throughout the year. Additionally, vertical farming requires less water than traditional agriculture and eliminates the need for harmful pesticides and herbicides, making it an environmentally sustainable option. Another advantage of vertical farming is the ability to grow crops in a more hygienic environment. In India, where food safety is a concern, vertical farming can help to eliminate the risk of contamination from soil, water, or pests. This is particularly important for leafy greens, which are often eaten raw and can carry harmful bacteria if not grown and harvested in a clean environment. Vertical farming can also be used to grow a wide variety of vegetables, including leafy greens, tomatoes, peppers, and herbs. This can help diversify the vegetable production in India and provide consumers with a wider range of fresh produce. Vertical farming can also help to reduce the cost of transporting and storing fresh produce. By growing crops closer to where they are consumed, farmers can reduce the distance food has to travel, which can reduce transportation costs and help to preserve the freshness of the produce. Additionally, since crops can be grown year-round, farmers can avoid the seasonal fluctuations in supply and demand that can drive up prices. In recent years, there has been a growing interest in vertical farming in India. Several startups have emerged, offering vertical farming solutions to farmers and entrepreneurs. For example, Bangalore-based startup Infarm uses modular vertical farms to grow herbs and leafy greens in supermarkets, while Chennai-based startup Naireeta Services offers vertical farming solutions to farmers looking to grow vegetables in urban areas. While vertical farming offers many benefits, there are also some challenges that need to be addressed. One of the main challenges is

the high cost of setting up and maintaining a vertical farm.The high initial investment required for setting up a vertical farm is one of the biggest hurdles. This includes the cost of equipment, infrastructure, and skilled labour. Additionally, vertical farming requires high-tech equipment and expertise, which may not be readily available in rural areas where most of the country's farming takes place. Another significant challenge is the cost of electricity, which is essential for running vertical farms. In India, electricity prices are often high, and power outages are common, making it difficult to maintain a stable growing environment for the vegetables. This could potentially drive up the cost of vertical farming, making it less competitive with traditional farming practices. This can make it difficult for small-scale farmers to adopt this technology. Additionally, there is still much research to be done on the best growing techniques, crop yields, and energy consumption of vertical farming.

In conclusion, vertical farming has the potential to transform vegetable production in India. By providing a more efficient, sustainable, and hygienic way to grow crops, vertical farming can help to meet the growing demand for fresh produce and provide a new source of income for farmers. While there are still some challenges to overcome, the future of vertical farming in India looks promising.

Integrated Farming Approach for Renaissance of Farming Community

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ABSTRACT

The global population is still increasing at a pace of around 140 people per minute, with births often outnumbering deaths. In India, the agricultural and associated industries support almost 60% of the population. The rapid urbanization, water shortages, air pollution, and land constraints that have plagued Indian agriculture for decades are only the tip of the iceberg. These difficulties make it more difficult to develop efficient horticulture systems. More than 86% of India's farmers are classified as small and marginal because they own less than 1.2 hectares of land. Due to population growth and shrinking available space, there is little room for horizontal growth in the horticulture industry. IFS is predicated on the idea that agricultural and animal components may strengthen one another. Combination occurs often in the agricultural system when the outputs (mostly by-products) of one enterprise are utilized as inputs for another. This has created a visible increase in the production of fish 0.2 - 3 t/ha, poultry 15 - 200 kg of meat and 80 - 600 eggs, vegetables 50 - 900 kg, duck meat 0 - 200 kg. goat / sheep meat 0 - 200 kg. Adoption of improved technology and the prudent use of resources have improved the income generation and man-days. The income has increased from Rs. 30,000/- to 1,80,000/- per unit by integrating diverse farm components like aquaculture combined with Horticultural crops cum poultry /Small ruminants etc. This integrated approach makes farming economically viable, sustainable, and environmentally sound. This in turn depends on implementing improved technologies and making wise use of available resources. It is evident that the modern-day approach of Integrated Farming System

(IFS) places a strong emphasis on raising farm production through resource integration, increased diversity, and the development of market connections. Sustainability of the farm improves the livelihood of the farmers. This improves the rural sector development and attracts towards agriculture and allied sectors.

Keywords: Integrated farming system; Fisheries; Agriculture; Horticulture; Animal Husbandry

Ethyl Methane Sulphonate (EMS) Induced Mutagenesis and Determination of Lethal Dose (LD_{50}) for Mutation Breeding of White Jute

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ABSTRACT

The self-pollination nature is responsible for the lower extent of variability and barrier of genetic improvement in White Jute (*Corchorus capsularis* L.). Mutation breeding is an effective way to enrich genetic variability in crop plants. The chemical mutagen ethyl methane sulfonate (EMS) is widely used for induced mutation in plants as it causes a high frequency of nucleotide substitutions. But the lethal action of EMS should be explored to get high frequency of mutations with minimum lethality for the desired plant species. Therefore, the study was undertaken to know the effects of EMS induced mutagenesis in white jute variety named BJRI Deshi pat 10 (C-12221), and to identify the lethal dose (LD_{50}) of EMS for its mutation breeding. Healthy seeds were sourced from the Breeding Division of BJRI and 6000 seeds (18g) were sterilized in 100ml 30% alcohol for 2 mins and then presoaked in 100ml D.H_2O for 6.0 hours to facilitate chemical reaction. After air drying of seeds on tissue paper, 10ml solution (D.H_2O, 2% Dimethylsulfoxide and EMS) was added carefully to 100 seeds in falcon tube keeping six replicates for each of eight treatments (100, 200, 300, 400, 500, 600, 700, 800mM) and one control (0.0mM EMS or D.H_2O). After 16h treatment by shaking (350rpm), EMS solution was removed carefully and treated seeds were washed 3 times with 100mM sodium thiosulphate (ST) solution and 3 times with D.H_2O to remove EMS hazardous effects. After air drying of seeds on tissue paper, seeds of three replicates were allowed to germinate on Whatman blotting paper in Petri dish and other three replicates in pot soil for each treatment. Results revealed the significant effects of EMS dosages on seed germination, root length (RL), shoot length (SL) and fresh weight (FW) of seedlings. The percent germination was reduced due to increase of EMS concentration but significant effects were found after 400mM EMS concentration. From the graphical calculation, 50% seeds were found dead (not germinated) at an accumulated dose of 565mM EMS which indicates the lethal dose 50 (LD_{50}) for this variety. Minimum germination (3.67%) was found for 800mM EMS treatment. RL, SL and FW of seedlings were reduced in mutants than controls. The highest RL (27.67mm), SL (26.33mm) and FW seedling^{-1} (50.70mg) were found at 600mM compared to other treatments except control. The treatments from 100 to 500mM showed no significant differences in these parameters. But, vigorous seedlings with higher plant height were observed for 300mM treatment than control grown in pot soil at 20 days after sowing. The morphological growth performance for higher fiber yield will be observed from the plants grown in earthen pot followed by subsequent selection process. This information would be highly useful for initiating mutation breeding program in white jute.

Effects of Chemically (EMS) Induced Mutagenesis and Determination of Lethal Dose (LD_{50}) for Mutation Breeding of Tossa Jute

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ABSTRACT

Tossa Jute (*Corchorus olitorius* L.) is a self-pollinated natural fiber crop and thus its genetic improvement is difficult compared to cross pollinated plants. Mutation breeding is an effective way to improve genetic variability in crop plants. The widely used chemical mutagen ethyl methane sulfonate (EMS) can be used for induced mutation in tossa jute as it causes a high frequency of nucleotide substitutions. The optimum lethal dose of EMS should be identified to get high frequency of mutations with minimum lethality for tossa jute species. Therefore, an exotic variety of tossa jute (JRO-524) was studied to know the effects of EMS induced mutagenesis and to identify the lethal dose (LD_{50}) of EMS for its mutation breeding. Healthy seeds were sourced from the Breeding Division of BJRI and 6000 seeds (11g) were purified in 100ml 30% alcohol for 2 mins and then presoaked in 100ml D.H_2O for 6.0 hours to facilitate chemical reaction. After air drying of seeds on tissue paper, 10ml solution (D.H_2O, 2% Dimethylsulfoxide and EMS) was added carefully to 100 seeds in falcon tube keeping six replicates for each of eight treatments (100, 200, 300, 400, 500, 600, 700, 800mM) and one control (0.0mM EMS or D.H_2O). Treatments were applied by shaking (350rpm) the solution for 16h. EMS solution was removed carefully and seeds were washed 3 times with 100mM sodium thiosulphate (ST) solution and 3 times with D.H_2O to remove hazardous effects of EMS. After air drying of seeds on tissue paper, seeds of three replicates were allowed to germinate on Whatman blotting paper in Petri dish and other three replicates in pot soil for each treatment. Results revealed the significant effects of EMS dosages on seed germination, root length (RL), shoot length (SL) and fresh weight (FW) of seedlings. The percent germination was reduced with increase of EMS concentration. Germination was started to reduce gradually at 100mM which remains insignificant up to 300mM treatment. Significant effects were observed in germination from 300mM to 800mM treatments. From the graphical calculation, 50% seeds were found dead (not germinated) at an accumulated dose of 460mM EMS which indicates the lethal dose 50 (LD_{50}) for this variety. Minimum germination (4%) was found for 700mM treatment and no seeds were germinated for 800mM treatment. RL, SL and FW were reduced in mutant seedlings than controls. Among the EMS treated seedlings except control, significant reductions were started in RL for 300mM, SL for 400mM and FW for 600mM. The highest RL (20.0mm) and FW (10.44mg) were found except control (25.33mm, 11.28mg) for the treatment of 300mM, and higher RL (18.0mm) was found for 400mM treatment except control (25.0mm). But, vigorous seedlings with higher plant height were observed for 100mM treatment than control grown in pot soil at 20 days after sowing. The morphological growth performance for higher fiber yield will be observed from the plants grown in earthen pot followed by subsequent selection process. The information would be highly useful for initiating mutation breeding program in tossa jute.

Determination of Lethal Dose (LD_{50}) and Effects of Chemically (EMS) Induced Mutagenesis in Kenaf (*Hibiscus cannabinus* L.)

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ABSTRACT

Kenaf (*Hibiscus cannabinus* L.) is an annual multipurpose fibre crop producing biomass and widely used for the production of paper, biocomposites, fiber boards and bioplastics and as well as source of material in the textile industry. Chemical and physical mutagenesis has been widely used to improve genetic variability with higher biomass content in various crop plants as it causes a high frequency of nucleotide substitutions. The study was undertaken to identify the lethal dose (LD_{50}) and to create the elite mutants with higher biomass content produced through ethyl methane sulfonate (EMS) induced mutagenesis in a kenaf variety (HC-95).Healthy seeds were sourced from the Breeding Division of BJRI and 3000 seeds (75g) were purified in 300ml 30% alcohol for 2 mins and then presoaked in 300ml $D.H_2O$ for 6.0 hours to facilitate chemical reaction.After air drying of seeds on tissue paper, 15ml solution ($D.H_2O$, 2% Dimethylsulfoxide and EMS) was added carefully to 50 seeds in falcon tube keeping six replicates for each of eight treatments (100, 200, 300, 400, 500, 600, 700, 800mM) and one control (0.0mM EMS or $D.H_2O$).Treatments were applied by shaking (350rpm) the solution for 16h. EMS solution was removed carefully and seeds were washed 3 times with 100mM sodium thiosulphate (ST) solution and 3 times with $D.H_2O$ to remove hazardous effects of EMS. After air drying of seeds on tissue paper, seeds of three replicates were allowed to germinate on Whatman blotting paper in Petri dish and other three replicates in pot soil for each treatment. Results revealed the significant effects of EMS dosages on seed germination, root length (RL), shoot length (SL) and fresh weight (FW) of kenaf seedlings. The percent germination RL, SL and FW were gradually reduced in mutant seedlings than controls with increase of EMS concentration. From the graphical calculation, 50% seeds were found dead (not germinated) at an accumulated dose of 160mM treatment which indicates the lethal dose 50 (LD_{50}) of EMS for this kenaf variety. Minimum germination (1.33%) was found for 700mM treatment and seeds were found dead for 800mM EMS treatment. Vigorous seedlings with higher plant height were observed for 100mM treatment than other mutants grown in pot soil at 20 days after sowing. The morphological growth performance for higher fiber yield will be observed from the plants grown in earthen pot followed by subsequent selection process. The information would be highly useful for initiating mutation breeding program in Kenaf.

Effects of Chemically (EMS) Induced Mutagenesis and Determination of Lethal Dose (LD_{50}) for Mutation Breeding of Mesta (*Hibiscus sabdariffa* L.)

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ABSTRACT

Mesta or Roselle (*Hibiscus sabdariffa* L.) is used for medicine, food items and fiber purposes. The leaves are used to prepare soup, salad, curry; dry flower and the fleshy red or green-coloured calyces are used to make tea, jam, pickle, cosmetic items and some beverages. Its self-pollination nature causes low genetic diversity. Chemical and physical mutagenesis has been widely used to improve genetic variability in various crop plants as it causes a high frequency of nucleotide substitutions. A vegetable type mesta variety named BJRI Mesta 2 (VM-1) was used to study the effects of ethyl methane sulfonate (EMS) induced mutagenesis for high biomass and to identify the lethal dose (LD_{50}) for high frequency of mutations with minimum lethality. Healthy seeds were sourced from the Breeding Division of BJRI and 3000 seeds (60g) were purified in 300ml 30% alcohol for 2 mins and then presoaked in 300ml $D.H_2O$ for 6.0 hours to facilitate chemical reaction.After air drying of seeds on tissue paper, 15ml solution ($D.H_2O$, 2% Dimethylsulfoxide

and EMS) was added carefully to 50 seeds in falcon tube keeping six replicates for each of eight treatments (100, 200, 300, 400, 500, 600, 700, 800mM) and one control (0.0mM EMS or D.H_2O).Treatments were applied by shaking (350rpm) the solution for 16h. EMS solution was removed carefully and seeds were washed 3 times with 100mM sodium thiosulphate (ST) solution and 3 times with D.H_2O to remove hazardous effects of EMS. After air drying of seeds on tissue paper, seeds of three replicates were allowed to germinate on Whatman blotting paper in Petri dish and other three replicates in pot soil for each treatment. Results revealed the significant effects of EMS dosages on seed germination, root length (RL), shoot length (SL) and fresh weight (FW) of Mesta seedlings. The percent germination RL, SL and FW were gradually reduced in mutant seedlings than controls with increase of EMS concentration. From the graphical calculation, 50% seeds were found dead (not germinated) at an accumulated dose of 135mM treatment which indicates the lethal dose 50 (LD_{50}) of EMS for this Mesta variety. Minimum germination (3.67%) was found for 600mM treatment and seeds were found dead from 700mM EMS treatment. But, vigorous seedlings with higher plant height were observed for 200mM treatment than control grown in pot soil at 20 days after sowing. The morphological growth performance for genetic variability and higher fiber yield will be observed from the plants grown in earthen pot followed by subsequent selection process. The information would be highly useful for initiating mutation breeding program in Mesta.

Molecular Characterization of Sponge Guard [*Luffacylindrica* (L.) Roem.] Parental Line Using RAPD Markers

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ABSTRCAT

The twenty-four RAPD Primers were used in the study produced scorable, un-ambiguous markers and the number of amplified products was in the range of 2-6. And all twenty primers show polymorphic bands. The DNA-polymorphisams were detected by band presence v/s band absence and may be caused by failure to prime a site in some individuals due to nucleotide sequence differences/ by incertions /deletions between priming sites. Among the twenty-four primers OPB-14 and OPC-13 produced maximum number of polymorphic bands that indicated a high level of polymorphism. Dendogram generated by twenty-four RAPD molecular data with nine genotypes were grouped in three clusters. Cluster-I, Cluster-II and Cluster-III contained genotypes. New genotypes were grouped into three clusters at 0.78 jaccards similarity coefficient. Cluster-I had four genotypes, cluster-II had two genotypes and cluster-III had three genotypes. Cluster-I was the largest comprising of Four genotypes whereas, cluster-II was smallest comprising of only Two genotypes, genotype between the clusters is genetically high diversified in nature and much suitable for the hybridization programme where the genetically diverse parents often times contributes heterosis it may be due to collections were made from different regions. Hence, these genotypes can be used as parents in hybridization programme to get the heterotic hybrids. This study revealed that the considerable amount of molecular diversity exists in sponge guard genotypes.

Phytochemical analysis and antibacterial activities of stem bark extracts of Vitellaria paradox's C.F. GAERTA

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ABSTRCAT
Vitellaria paradoxa is used in Traditional medicine for treatment of microbial infections. This research work is aimed at evaluating the antibacterial activity of various extract of the stem bark of *Vitellaria paradoxa*. The powdered sample was extracted successively by maceration using n-hexane, ethyl acetate, and ethanol. The extracts were subjected to phytochemical screening using standard method in the test for the presence of carbohydrate, saponins, tannins, flavonoids and alkaloids. The extract tested against two bacterial isolates: *Staphylococcus aureus* and *Escherichia coli* using the agar well diffusion method. Ethyl acetate shows highest activity with 26.5mm, zone of inhibition. The column chromatography yielded compound A which appeared to be pure and was subjected spectroscopic studies for characterization. The compound was screened for antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*. The compound inhibited the growth of all the bacteria with highest zone of inhibition (37.5mm) on *Staphylococcus Aureus*. The spectroscopic studies revealed that isolate A consist of four compounds i.e. benzene, 1, 3-dimethyl tridecane, dodecanoic acid, 1, 2-benzenedicarboxylic acid, bis (2-ethylhexyl) ester. The research has provided the scientific basis for the use of *Vitellaria paradoxa* by traditional healers in treatment of microbial infections.

Effect of environmental stresses on protein folding and dynamics

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ABSTRCAT
Protein misfolding is a common problem and found to be associated with various neurodegenerative diseases including, Parkinson's, Alzheimer's, Creutzfeldt–Jakob, Gaucher's, cystic fibrosis and Huntington's diseases. To develop a newer strategy for therapeutic intervention, the underlying mechanism of protein folding must be understood. Most of the studies done to understand protein folding and misfolding has been carried out in dilute solutions; whereas, the situation is very different in a cell. A cell is crowded with DNA, RNA, proteins, cytoskeleton, ribosomes and other small molecules. The process that regulates the function of the protein in physiological environments occurs in the presence of congested factors. *Generally, in vivo* function and structural changes are studied by probing proteins in a dilute solution under *in vitro* conditions which is believed to be mimicking proteins in intracellular milieu. However, there are a large number of biomolecules that are accountable for the extremely crowded intracellular environment which is totally different from the dilute solutions, i.e., the idealized conditions. Such crowded environment due to the presence of macromolecules of different sizes, shapes and composition governs the level of crowding inside a cell. Thus, we investigated the effect of different sizes and shapes of molecular crowders (glucose, fructose, sucrose, raffinose, trehalose and stachiose) and macromolecular crowders (ficoll 70, polyethylene glycol, dextran 70 and dextran 40), which are polysaccharide in nature, on the thermodynamic stability, structure and functional activity of model proteins using UV-Vis, fluorescence and FTIR spectroscopy, DSC, ITC and circular dichroism techniques. We measured the extent of stabilization of proteins, their

structure and activity in the presence of theses molecular and macromolecular crowders. We also measured chemical-induced denaturation of myoglobin in the presence of ficoll 70 and dextran at different pH's (acidic: 6.0, almost neutral:7.0 and basic: 8.0). Further, we studied interaction of crowding agents with proteins using isothermal titration calorimetry and molecular docking in order to delineate the mechanism of interactions. The main observations from molecular crowding studies are as follows: (i) Thermodynamic stability of both the proteins increases with increasing the concentration of each sugar at different pH values and stabilizing effect of sugars is entropic in origin. (ii) The degree of stabilization of proteins proportionally related to degree of oligomerization (*n*) of sugars, i.e., thermodynamic stability of proteins increases with increasing the size of sugar from mono– to tetra– saccharides. (iii) Degree of stabilization of proteins increase for each sugar as we deviate from the pI of protein. (iv) Degree of stabilizations of proteins is more in the presence of eqimolar mixture of monosaccharides than the constitutive disaccharides. (v) Sugar osmolytes do not perturb the function of protein and the increased stability of protein by sugars does not cause the rigidity of enzyme. In the presence of crowding agents, excluded volume effect increases the stability of protein with compact native structure and this compaction brings the rigidity in native conformation. These studies reported that structural contents increased in the presence of crowding agents which provide strong evidence of increased compaction in the crowded environments. Unlike these high molecular crowding agents, the low molecular osmolytes provide the increased stability to proteins without affecting their extent of unfolding as well as of their native structure.

From the macromolecular crowding agents' study, we also observed that polyethylene glycol 400 Da (PEG 400) induces molten globule state in cytochrome *c* at pH 7.0 and 25 °C. This PEG-induced intermediate state has: (i) native tertiary structure partially perturbed, (ii) unperturbed native secondary structure, (iii) newly exposed hydrophobic patches, and (iv) 1.58 times more hydrodynamic volume than that of the native protein. We concluded that lysozyme and alpha lactalbumin get stabilised by molecular crowding agents by volume exclusion while myoglobin gets destabilized by the due to soft interactions. PEG 400 induces molten globule in cytochrome c. At least in case of heme proteins, soft interactions dominate over the excluded-volume effect, and leads to the formation of molten globule via formation of hydrogen bonds between the heme and the crowding agents. In brief, our study shows a remarkable and significant effect of crowding on the structure of proteins, which declares that exploring the relevance of molten globule formation in crowded environment, could be a novel work.

Occurrence of Major Fungal Species of Maize (*Zea mays* L.) at Post-harvest Storage Structure

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ABSTRCAT

Maize is an important staple cereal food crops produced in high-land and low-land parts of Ethiopia. Somali National Regional state is known by livestock production, however, Gode district is the potential maize production in the region, and the crop is playing an important role in food security and providing livestock feeds. Mold developments at post-harvest stages are the major threatening the commodity for use, likely dragging the storage products out of markets and home consumptions. The previous report in the region was lack, therefore the present study focused on the identification of post-harvest fungi of maize grains in traditional storage containers harvested

in Gode in 2022. Direct plating on a PDA was used to examine the frequency and incidence of internal mycoflora in 30 maize samples. The most frequent fungal genera isolated in maize grain were species of Aspergillus and Fusarium. The other genera included Penicillium, Rhizopus, Mucor, Chaetomium, Helminthosporium, Rhizoctonia bataticola and Trichoderma were isolated in less frequency. The data revealed the high incidence of A. flavus (12.40%) and A. niger (8.75%) among the nine fungal genera recorded. The result was immense value for assessing the possible health hazards in humans and animals upon consumption of such contaminated food grains likely produce secondary metabolites such as toxigenic mycotoxins. Future research was focused on the levels of mycotoxins in the maize grains in the mold hot spot areas of Somali National Regional State of Ethiopia.

Keywords: Aspergillus, Fusarium, Frequency, Incidence, Maize, Occurrence, Traditional storage structure.

Agroforestry to help achieve net zero carbon emissions goal of India

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ABSTRCAT

India is the world's fourth biggest emitter of carbon dioxide after China, United States and EU27 and the total carbon emissions 2648 million tons of India in 2021(Crippa *et al.,* 2022). According to the report "State of Global Climate 2022" published by the World Meteorological Organization, in 2023, greenhouse gas concentrations reached new highs, with globally averaged mole fractions of carbon dioxide (CO_2) at 415.5 ppm, methane (CH_4) at 1908 ppb and nitrous oxide (N_2O) at 334 ppb, respectively, which are increase 149%, 262% and 124% respectively from pre-industrial (before 1750) levels.

Prime Minister of India announced at COP-26 held in Glasgow, United Kingdom in 2021 and committed to a net zero carbon emissions target by 2070. The net zero commitment is part of a strategy of *Panchamrit* (Achieving net zero carbon by 2070; Reducing carbon intensity 45% by 2030; 50% energy requirement to be met by renewable sources by 2030; Non fossil fuel capacity to 500 GW by 2030 and Reduce 1billion tons carbon emissions by 2030) and recognizing that lifestyle has a big role in climate change, proposed a 'One-Word Movement' to the global community. This one word is LIFE…L, I, F, E, i.e. Lifestyle For Environment. Two out of five of these are short term goals that would cover the way for achieving a net zero emissions target by 2070. The immediate goals are: reducing 1 billion tons CO_2 emissions by 2030 and reducing carbon intensity below 45 percent by 2030 at 2005 level. Due to climate change, resulting in losses equivalent to at least 5% of global GDP each year and indicated a probability of 10-40% loss in crop production in India due to droughts & floods. The State of the World's Forests 2022 explores the potential of three forest pathways - halting deforestation and maintaining forests; restoring degraded lands and expanding agroforestry; and sustainably using forests and building green value chains - for achieving green recovery and tackling environmental crises, including climate change and biodiversity loss. Forest sequesters a huge amount of carbon in above ground biomass, below ground biomass and soil carbon, which plays an important role in regulating the carbon cycle. The forest sector is both a source as well as a sink for natural carbon, and various forest policies and programs have implications on the standing carbon stock in the forests. While forest deforestation, degradation and destruction caused almost 17 % emissions of CO_2 and other

GHGs. According to the India's State of Forest Report (ISFR), data indicate that total forest carbon stocks increased during the period from 2011 to 2021, from 6663 Mt in 2011 to 7204 Mt in 2021. Total carbon stocks increased 541 Mt in 10 years, it means average annual increment 54.1 Mt of carbon stock. The total carbon sequestration annually by the forest in India 54.1 x 3.666 = 198.33 Mt of CO_2. India emphasized the role of agroforestry in sustainable development, starting important policies like National Agroforestry Policy, 2014; Sub-Mission on Agroforestry (SMAF), 2016; National Forest Policy 2018 (Draft); Restructured National Bamboo Mission 2018 (Draft); Indian Forest (Amendment) Act, 2019 (Draft); Forest (Conservation) Rules, 2022 etc. emphasized the role of forestry for sustained productivity, to achieve the goal of 33% forest cover and net zero carbon emission. In 2022, Trees Outside Forests in India (TOFI) is a joint initiative of India and the United States to increase green cover outside forest lands in India. It aims to expand tree coverage by 2.8 mha through agroforestry, enhance 420 mt carbon dioxide equivalent (CO_2-eq) sequestrations, benefit of 13.1 m people from improves livelihood and environmental services, support local peoples, and strengthen the climate resilience agriculture. According to Kumar *et al.* (2020) reported that the net carbon emission per ha in two years was significantly lower in agro forestry system (-40.998 tha^{-1}) as compared to open farming (-37.263 tha^{-1}) in spite of higher emission (1.052 tha^{-1} as compared to 0.998 tha^{-1} in open farming) due to more carbon sequestered by trees in the system (42.049 tha^{-1} as compared to 38.261 tha^{-1} in open farming), shown in Table 1.

Table 1- CO2-e emission, carbon sequestration and net emission at the end of experiment (two years) under open farming and poplar based agro forestry system.

Treatments	CO_2-e emission (tha^{-1})	Carbon sequestration (tha^{-1})	Net emission (tha^{-1})
Farming systems			
Open farming	0.998	38.261	-37.263
Agroforestry system	1.052	42.049	-40.998
SEm ±	-	0.711	0.711
CD (5%)	-	2.158	2.158
Wheat varieties			
PBW-343	1.025	40.550	-39.525
PBW-373	1.025	38.902	-37.877
UP-262	1.025	38.851	-37.827
VL-907	1.023	42.317	-41.292
SEm ±	-	1.006	1.006
CD (5%)	-	NS	NS
Interaction	-	NS	NS
CV %	-	6.453	6.631

From the present study it may be concluded that agro forestry have very high potential of carbon sequestration in long term basis, it will be milestone for achieved goal a net zero carbon emissions goal of India, control or reduce climate change, global warming, greenhouse gases, environment protection and other benefits.

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Influence of organic manures and biofertilizers on growth and bulb behaviour of tuberose (*Polianthustuberosa* L.) cv. Prajwal

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ABSTRCAT

Aim: To analyse the effect of organic manures and bio-fertilizers for growth and bulb behaviour in tuberose (*Polianthes tuberose* L.) cv. Prajwal. The experiment was perform in pots in completely randomized design (CRD) with 11 treatments having four replications to study the response of organic manures, chemical fertilizers and biofertilizers on growth and bulb behavior of tuberose (*Polianthestuberosa* L.) cv. Prajwal. The treatment containing sand + vermicompost (4:1) + Biofertilizers (*Azotobacter* &*Pseudomonas* sp.) was significantly superior in terms of plant height (70.50cm), length of leaf (36.98cm), Number of leaf (25.67), diameter of stem (1.096cm), spike weight (75.33g), bulb number per clump (21), bulb diameter (1.20cm), bulb weight (3.98g). While lowest values of these parameters were observe in control (sand). Minimum days taken to bulb sprouting (21.75days), days taken to complete bulb sprouting (24.50days), was observed in sand + inorganic manures.

Variability among the Isolates of Macrophomina Spp. Causing Charcoal Rot of Soybean

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ABSTRCAT

The investigation was carried out in the Dept. of Plant Pathology laboratory, Dr. PDKV, Akola and Vasantarao Naik College of Agricultural Biotechnology, Yavatmal.The charcoal rot of soybean causes about 30-50% loss in yield. The eighteen isolates of *Macrophomina phaseolina* were collected from different districtsofMaharashtra *viz*., Akola, Amravati, Kolhapur, Nagpur,

Nanded, Wardha, Hingoli, Yavatmal, Chandrapur,–Bhandara,Washim, Beed, Jalgaon, Buldhana, Jalana and Latur.

The cultural variability studies on three different media showed significant variation in radial growth, which ranges from 59.53 mm (Mp-12) to 89.86 mm (Mp-5), from 52.06 mm (Mp-12) to 89.83 mm (Mp-10) and from 65.96 mm (Mp-18) to 89.43 mm (Mp-10). In concerned with the morphological variability of *M. phaseolina*, the size of sclerotia were ranged from 71.58 x 72.66 µm (Mp-4) to 137.36 x 119.26 µm (Mp-1) on PDA medium, from 64.49 x 51.35 µm (Mp-12) to 121.81 x 120.05 µm (Mp-8) on CZA medium, from 63.23 x 60.92 µm (Mp-18) to 131.53 x 104.79 µm (Mp-14) on MEA medium.

The molecular variability was studied among the eighteenisolates of *M. phaseolina* by using six RAPD primers. Six primers produced 56 bands. Out of 56 bands, 40 were polymorphic, and the average levelofpolymorphism observed was71.42%. The primer OPA-10 showed 100% polymorphic bands and among the used six primers. In the UPGMA dendrogram, it was observed that Mp-13 (Washim) has a higher value of similarity coefficient with Mp-11 (Pauni) whereas Mp-15 (Jalgaon) has a lower value of similarity coefficient with Mp-10 (Chandrapur).

Environment Friendly Effective Spray Technique for the Management of Fall Armyworm, *Spodoptera Frugiperda* Onmaize

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ABSTRCAT

Experiment conducted to study the efficacy of newer molecules against fall army worm during *Kharif*, 2019 and 2020. The results revealed that, the lowest mean number of larvae 0.47 larvae per plant was recorded in emamectin benzoate 5 SG @ 0.2 g/l + wetting agent @ 1.5 ml/l followed by chlorantraniliprole 18.5 SC @ 0.2 ml + wetting agent @ 1.5 ml (0.70 larvae/ plant), spinetoram 11.7 SC @ 0.5 ml + Wetting agent @ 1.5 ml/lit (0.71 larvae / plant) and metarhizium riley @ 2 g + wetting agent @ 1.5 ml (0.82 larvae/ plant) compared to un treated control (2.86 larvae / plant). Similar trend was noticed in egg mass per plant and per cent defoliation. The maximum grain yield was found in emamectin benzoate 5 SG @ 0.2 g/l + wetting agent @ 1.5 ml/l (51.01 q/ha) followed by spinetoram 11.7 SC @ 0.5 ml + Wetting agent @ 1.5 ml/lit (49.72 q/ha), chlorantraniliprole 18.5 SC @ 0.2 ml + wetting agent @ 1.5 ml (48.20 q/ha), and metarhizium riley @ 2 g + wetting agent @ 1.5 ml (41.07 q/ha) when compared to control (22.02 q/ha). With respect to the evaluation of environment friendly effective spray technique for the management of FAW noticed that, lowest number of larvae per plant recorded in emamectin benzoate 5 SG @ 0.2 g/lit with Flood jet nozzle (0.53 larvae/ plant) followed by emamectin benzoate 5 SG @ 0.2 g/lit with solid cone nozzle (0.56 larvae / plant) and emamectin benzoate 5 SG @ 0.2 g/lit with hallow cone nozzle (0.63 larvae / plant). The same trend was noticed in case of parameters like egg mass per plant and per cent leaf defoliation and grain yield. Therefore the flood jet nozzle is found better with respect to the coverage and no drift of chemicals for the management of fall armyworm in maize.

Can Agro met Advisory Services be a panacea for climate sensitive agrarian practices in Kerala?

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ABSTRCAT
Changes in meteorological factors such as temperature, rainfall, cloud cover, and wind speed have an impact on a farmer's crop management decisions, encompassing field preparation, seed sowing, fertilizer application, plant protection measures, harvesting, storage, and transportation. Therefore the present study was undertaken to ascertain the impact of Agromet Advisory Services (AAS) on farmers' decision making for various farm operations in Thiruvananthapuram District of Kerala state. The study was conducted in two randomly selected blocks of the district i.e., Athiyanoor and Nemom.Two villages were chosen as experimental villages and two villages were chosen as control villages from each block after ensuring that the villages were not receiving any services from the Agromet Field Unit (AMFU) in Thiruvananthapuram. From each experimental village, 15 farmers were selected as beneficiaries and Agromet Advisory Bulletins were distributed twice a week (Tuesday and Friday) for 6 months through a Whatsapp group, and 15 non-beneficiary farmers were selected from each control village producing a sample of 120 respondents. Using difference in difference design and regression model, the impact of AAS on farmers' operational decisions in banana, vegetable, and coconut cultivation were assessed.The study revealed that despite having a positive average treatment impact on almost all the farm operations, significant treatment impact was found only on land preparation, seed sowing, scheduling of irrigation, fertilizer application and spray scheduling of pesticides.The study also indicated the necessity for frequent training and awareness programmes to educate farmers on the importance and utility of AAS in managing different farm activities, as well as an efficient mechanism for the AMFU to bring block level AAS to farmers' doorsteps.
Keywords: Agromet Advisory Services (AAS), Difference in difference design, Regression model

Long Term Effects of Fertilizers and Manuring on Soil Health, Sustainable yield Index and Productivity of Soybean (*Glycine max* L) and Safflower (*Carthamus Tinctorius*) In Vertisol

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ABSTRACT
Long-term effects of chemical fertilizers and farmyard manure (FYM) in Soybean (*Glycine max*. L.) – Safflower (*Carthamus Tinctorius*) cropping system were monitored for two consecutive years of 2019-20 and 2020-21 on productivity, sustainable yield Index and soil health of Vertisols. The study encompasses varying chemical fertilizer levels of optimum fertilizer rate (30, 60 and 30 kg ha^{-1} N, P and K, and 60 and 40 N and P kg ha^{-1} respectively, for both the crops. The treatments were application of 50% NPK, 100% NPK, 150% NPK, 100% NPK + hand weeding (HW), 100% NPK + Zn, 100% NP, 100% N, 100% NPK + 5 t FYM ha−1, 100% NPK(-S) and unfertilized control. The pooled data on yields of soybean (1694.82 Kg ha-1) and safflower (1082.81 kg ha-1) were highest with 100% NPK + FYM @ 5 t ha^{-1}. This treatment also gave maximum and

significantly more counts of bacteria, fungi and actinomycetes in soil than all the other treatments after crop harvest. The soil microbial biomass C (329.25 µg g−1 soil) and urase activity (27.68 µg g−1 of soil) after soybean and safflower, respectively, were highest with 100% NPK + 15 t FYM ha−1, which were significantly higher over all the other treatments. The activities of soil enzymes like dehydrogenase, acid and alkaline phosphatase, soil quality index and sustainable yield index were found to be significantly highest over other than treatments after sixteenth years of crop cycle with 100% NPK + 5 t FYM ha^{-1} in soybean – safflower cropping sequence. Fertilizer treatments with 100% NPK and 150% NPK were comparable and significantly better than application of 50% NPK, 100% N, 100% NP and 100% NPK(-S) in various studied for physico chemical and soil biological properties. Integrated use of 100% NPK with FYM sustained the higher yields, physico chemical soil biological properties under soybean – safflower cropping system in Vertisols. Application of Zn and hand weeding with 100% NPK were found better over 100% NPK alone in soybean and safflower productivity.

Keywords: Fertilizers, Manuring, Soil health, Productivity of soybean -safflower

Applications of Artificial Intelligence, Machine Learning and Drone Technology

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ABSTRACT

Artificial intelligence is based on the principle that human intelligence can be defined in a way that a machine can easily mimic it and execute tasks, from the simplest to those that are even more complex. Machine learning is a branch of artificial intelligence (AI) and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy. An agricultural drone is an unmanned aerial vehicle used in agriculture operations, mostly in yield optimization and in monitoring crop growth and crop production. The industry is turning to Artificial Intelligence technologies in agriculture to help yield healthier crops, control pests, monitor soil, and growing conditions, organize data for farmers, help with the workload, and improve a wide range of agriculture-related tasks in the entire food supply chain, use of weather forecasting , soil and crop health monitoring system, analysing crop health by drones, precision Farming and Predictive Analytics, Agricultural Robotics, AI-enabled system to detect pests. Machine learning is useful for yield prediction, disease detection, weed detection, crop recognition, and crop quality. Drone technology is used in soil and field analysis, crop monitoring, plantation, livestock management, crop spraying, crop check health, monitor growth.

Keywords: Artificial intelligence, Machine, Learning, Drone, Technology, Agriculture

Analysis of Combining Ability in Mungbean [Vigna *Radiata* (L.) Wilczek] Cultivars Rathod

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ABSTRCAT

Combining ability analysis for yield and yield components of mungbean (*Vigna radiata* L. Wilczek) was attempted using an 8 x 8 diallel mating system both in F_1 and F_2 generations. Both gca and sca mean squares were significant for all the eleven characters in F_1 and F_2 generations,

former being more pronounced for clusters per plant, pods per cluster, pods per plant, pod length, seeds per pod, 100-seed weight and seed yield per plant in F_1 and for all the characters except days to maturity, seeds per pod and 100-seed weight in F_2. The parent K 851 was a good general combiner for seed yield per plant, days to maturity, plant height, primary branches per plant, and clusters per plant, pods per plant and seeds per pod in both generations. While Pant-M 4 was good general combiner for seed yield per plant, plant height, pods per cluster and pods per plant over generations. Parents RMG 62 and Asha were the best combiners for early flowering. GM 4 had good general combining ability for seed yield in F1, but for pod length and 100-seed weight in F_1 and F_2. The crosses showing high sca effects for seed yield also had significant and positive effects for at least two important yield components.

Keyword: *Diallel, Combining ability, Heterosis, Mungbean.*

Residual Effect of Phosphorus Management on Economics and Nutrient Balance of Chickpea-Fodder Sorghum Cropping Sequence

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ABSTRCAT

The Field experiments were conducted at the College Farm, N.M. College of Agriculture, Navsari Agricultural University, and Navsari during Rabi and summer seasons of 2014-15 and 2015-16. The treatments comprised for chickpea were two levels and two sources of phosphorus (25 and 50 kg P2O5/ha from SSP and rock phosphate) along with and without VAM (Vesicular arbuscular mycorrhizae) @ 2.0 kg/ha as soil inoculants and one control (No phosphorus and VAM to chickpea). Total of 10 treatment combinations, laid out in a randomized block design, replicated three times. The succeeding fodder sorghum crop was superimposed on the same layout, keeping chickpea treatments as main plots and two fertility levels as sub-plots (75 % of the recommended dose (60 kg N + 30 kg P2O5/h) and 100% of the recommended dose (80 kg N + 40 kg P2O5/ha) with total twenty treatment combinations in a split plot design with three replications. The experiments were conducted on the same site during both the years without changing the randomization of treatments. The higher chickpea equivalent yield, net realization obtained from the treatment combination of 50 kg P2O5/ha from SSP + with VAM (T8) to preceding chickpea and application of 100 per cent RDF to succeeding fodder sorghum under chickpea-fodder sorghum cropping system. The balance sheet of soil available N, P and S after two years of cropping cycles were positive with all treatments except N balance observed under chickpea [grown with no P and VAM and 25 kg P2O5/ha from RP alone]-fodder sorghum cropping system. The positive balance of these nutrients increased with increasing levels of phosphorus management to chickpea. The soil available K balance showed a negative balance in all treatments under chickpea-fodder sorghum cropping system.

Keywords: Chickpea, Economics, Fodder Sorghum, Rock phosphate, SSP, VAM

Climate Change Vulnerability in livestock sector of India: a review analysis of Surfacing Situation

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ABSTRACT

According to FAO, it is the highest producer of milk with a contribution of 22% of total world's share. In addition, it also holds 1st position in cattle and buffalo population, buffalo meat export

and is the largest exporter of sheep and goat meat. Statistics reveals that livestock sector holds a firm position in the economy of the nation. Studies and several reports have founded the climatic vulnerability throughout the India. In the upcoming years, there will likely be extreme variations in climate, such as variation in precipitation, average temperature, the frequency of heat and cold waves etc., according to the climate report recommended by the IPCC and UNEP. The livestock enterprises have been ignored as the studies have been more concentrated in the agricultural sector. Results reviewed from different articles and publications from different regions of the country have shown affecting the livestock sector resulting in reduction of in milk yield, emergence of animal diseases, increase in stress, reduction in health performance, productive and reproductive disorders etc. Climate change affects livestock farmers on a socio-economic level as well, necessitating greater maintenance work for livestock as well as a shortage of feed and fodder. The reviews indicate that it is past time to realize climate change is affecting the livestock industry and to address the following issue so that appropriate adaptive measures can be taken to address it. There should be policies and procedures in place to inform and educate livestock farmers, mitigation and adaptive strategies should be brought forward in order to combat the situation.

Keywords: Climate Change, Vulnerability, Livestock Industry, Livestock Farmers, Adaptive and mitigation strategies.

Bio-Efficacy of Various Plant Products against *Helicoverpa armigera* in Chickpea

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ABSTRCAT

Experiment was conducted to evaluate the bio-efficacy of various plant products against *Helicoverpa armigera* in chickpea at Rajasthan College of Agriculture, Udaipur during Rabi, 2021-22. The treatments comprised of various organic formulations made up of seed and leaf extract of plants possessing insecticidal properties *viz.*, Custard apple (*Annona squamosa*) and Neem (*Azadirachta indica*). Standard procedures used by the previous worker were used for making formulations having different concentrations. The treatments were Custard apple seed extract @ 2 %, Custard apple seed extract @ 4 %, Custard apple seed extract @ 6 %, Custard apple leaf extract @ 3 %, Custard apple leaf extract @ 5 %, NSKE @ 5 %, Azadirachtin 10000 ppm and a control. Result on the bio-efficacy of various treatments shows that the maximum per cent reduction in the *H. armigera* larval population was recorded with the treatment application of Azadirachtin 10000 ppm with a mean per cent reduction of 52.85 per cent after both the sprays. The least effective treatment was the Custard apple leaf extract @ 3 % which causes a mean percent reduction of 26.15 per cent after both the sprays. The second-best treatment was NSKE @ 5% with a mean per cent reduction of 43.72 per cent.

Keywords: Bio-efficacy, Plant products, Custard apple, NSKE

Sub - Lethal Effects of Novel Insecticides against Tobacco Caterpillar, *Spodoptera litura* (Fabricius)

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ABSTRCAT
The experiment was conducted on effect of sublethal concentrations of chlorpyrifos + fipronil, fipronil and chlorpyrifos on growth and development parameters against 6d old larvae (average larval weight = 0.0184g) of *S. litura* by leaf smear method on castor (*R. communis*) under laboratory conditions (Temp. = 28^{o}C, R.H. = 83%, Time = 9:00AM). The results revealed that chlorpyrifos @ 0.01% proved more detrimental for growth and development, with highest reduction (21.03%) in mean weight gain over control with 33.33% mortality in the test population at 4 days after feeding (DAF). The highest pupation percentage (80.95%) was found in the lowest concentration of chlorpyrifos 0.0001% followed by fipronil 0.0001% (76.19%). In comparison to control (0.214g/pupa), 1.57 times lower pupal weight was observed in chlorpyrifos 0.01% (0.136g/pupa). A comparison on terminal mortality indicated that at the highest concentration (0.01%) chlorpyrifos caused highest larval mortality of 52.38% followed by fipronil (47.61%) and chlorpyrifos + fipronil (33.33%) while chlorpyrifos + fipronil and fipronil (28.57%) caused same larval mortality at 0.001%. It is concluded that chlorpyrifos at the sublethal concentration of 0.01% proved most detrimental for growth and development of 6d old larvae of *S. litura* by leaf dip method.
Keywords: Sub-lethal effect, chlorpyrifos + fipronil, Fipronil, Chlorpyrifos *Spodoptera litura*, Smear method

Effect of time of planting on the performance of Carnation varieties under greenhouse condition

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ABSTRACT
The performance of carnation varieties varies with region, season, genotypes, growing environment and planting time. Many varieties are grown in the world, however, only a few varieties are under commercial cultivation in India. A detailed study of planting time and cultivar would facilitate the breeders to select suitable genotypes for a planned breeding programme. Further, there is a need of suitable varieties which is suitable to our conditions. Selection of suitable planting time and variety for producing the desired quantity and quality of flowers for domestic as well as the export market is of greater importance. Selection of best planting time and cultivar reduce the production cost by reducing the crop time and also produce elite flowers with increased market value for a longer period. Testing the suitable planting time and available varieties for suitability and adaptability concerning flowering, flower quality and yield parameters are of prime importance. The experiment was conducted at Agri-tourism Centre, CCS HAU, Hisar (Haryana) during the year 2021-2022.Within three planting time, the Carnation planted during first fortnight of October give better result in terms of maximum number of shoots (7.30) followed by 2nd fortnight of October (4.34), flower bud length (2.62cm) followed by 2nd fortnight of October (2.47cm), flower bud diameter (20.22mm) followed by 2nd fortnight of October (19.75mm), number of flowers/m^2 (209.20) followed by 2nd fortnight of October (184.84). Among the varieties, Star performed overall best with respect to highest number of shoots (5,95) followed by Cervantes (5.24), flower bud length (2.60cm) followed by Cervantes(2.43cm), flower bud diameter (20.46) followed by Cervantes(19.70), number of lowers/m^2 (237.15) followed by Cervantes (198.97).

Keywords: Carnation, Planting Time, Varieties, Green house

Integrated nitrogen management in sweet sorghum

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ABSTRACT

India is the second largest country in the world by population, which is increasing day by day. However, the rate of increase in food grain production is not matching to meet the requirement of food. India is major sorghum growing country in the world. Maharashtra is the largest sorghum growing state in the country. Sweet sorghum is special type of sorghum that accumulates sugars (Sucrose, glycose and fructose) in stalk. Now day sorghum is gaining importance as "Health Food" because of its higher dietary fiber (7.6% to 9.2%). It contains 72.6 % carbohydrate, 10-12% protein, 1.6% mineral matter and 1.9% fat. The continuous use of chemical fertilizers over long period may cause imbalance of microflora and thereby directly affecting biological properties. To sustain crop yield and increase land productivity, combination of organic manure and fertilizers not only increase crop yield of sorghum but also improves physical and biological properties of soil. Integrated nitrogen management is the alternative to increase the productivity through proper management. So keeping this point in view present investigation was carried out on integrated nitrogen management in sweet sorghum. A field experiment was conducted during *kharif* season of 2019 at farm of Agronomy Section, College of Agriculture, Latur (Maharashtra). The present investigation consisted of ten treatments and laid out in Randomized Block Design *viz,*T_1 – Control,T_2 – RDN through inorganic, T_3 –75% RDN through inorganic +25% N through FYM, T_4-75% RDN through inorganic +25% N through vermicompost,T_5- 50% RDN through inorganic +50% N through FYM,T_6-50% RDN through inorganic +50% N through vermicompost, T_7-50% RDN through inorganic +50% N through FYM + biofertilizer,T_8- 50% RDN through inorganic +50% N through vermicompost + biofertilizer, T_9-75% RDN through inorganic +25% N through FYM + biofertilizer,T_{10} –75% RDN through inorganic +25% N through vermicompost+ biofertilizer. The results revealed that the application of 75% RDN through inorganic +25% N through vermicompost+ biofertilizer(T_{10}) recorded significantly higher values of growth characters at harvest *viz.,* Plant height (294.93 cm), number of functional leaves per plant (14.07), dry matter accumulation per plant (152.33 g), leaf area (66.53 dm^{-2}), number of internodes (12.70), stem girth (8.37 cm) and higher values of yield attributes *viz.*,Length of earhead (44.93 cm), breadth of earhead (17.97 cm), weight of earhead per plant (88.67 gm), number of grains per earhead(1377) , weight of grain per plant (34.5 g) weight of earhead (10893.44 kg/ha) and test weight and significantly maximum grain yield of sweet sorghum (2199.17 kg ha^{-1}) which was at par with application of 75% RDN through inorganic +25% N through FYM + biofertilizer (T_9). Control treatment (T_{10}) produced significantly lower grain yield (1083.33 kg ha^{-1}). Application of 75% RDN through inorganic +25% N through vermicompost+ biofertilizer (T_{10}) recorded significantly higher net monetary returns (Rs. 48459/ha) and B: C ratio (2.44) which was superior over rest of the treatments. Treatment (T_1) Control recorded significantly lowest net monetary return (Rs. 14596/ha).

Development and intra specific variation in plant parasitic nematodes

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ABSTRCAT
A single species of nematodes represents a gene pool. When populations of nematodes belonging to the same species are exposed to diverse environmental conditions, a portion of the population may survive and genetically adapt it and get tuned with the new set of environmental conditions due to inherent genetic makeup or through mutation. This leads to the emergence of a new set of individuals (population), which behaves differently from those of other populations. Mutation and genetic drift maintain diversity in the species of nematodes and gene flow operates at different rates among partly isolated portions of them. Identification of intraspecific nematode populations with distinctive host ranges becomes important in the present scenario. The first report on the occurrence of races among plant parasitic nematodes (PPNs) pertains to *Ditylenchus dipsaci*. Increased inconsistencies in host responses for the same species led to the development of North Carolina (NC) differential host test and the discovery of host races, which is based on the ability of a species or race to reproduce on a given host, was successfully used to separate the four main *Meloidogyne* spp. *viz., M. arenaria, M. incognita, M. javanica* and *M. hapla*. Race identification of *M. incognita* and *M. arenaria* on the basis of North Carolina host differentials revealed the presence of race 2 and 4 of *M. incognita* and race 2 of *M. arenaria*. *M. javanica* populations did not reproduce on groundnut host differentials and thus belonged to race-l. Two pathotypes of *Heterodera avenae,* the population from Rajasthan and Haryana constituting one pathotype and those from Punjab representing second. Potato cyst nematode is restricted to Nilgiri and Palani hills in South India where five pathotypes-Ro1, Ro2 of *Globodera rostochiensis* and Pal, Pa2 and Pa3 of *G. pallida* have been detected.The occurrence of host races in *H. cajani,* using vetiver and maize populations of *H. zeae* from Haryana.Three host races of *H. zeae* based on multiplication on maize, vetiver and both. There is the existence of two races i.e. A (Cowpea, Cotton, Castor) and B (Cowpea) in *Rotylenchulus reniformis*. 10 races of *Rodopholus similis* is reported in South India. Four biotypes of *Tylenchulus semipenetrans* are distributed worldwide: the "Poncirus biotype", the "Citrus biotype", the "Mediterranean biotype" and the "Grass biotype. All the plants, except tomato were found susceptible to all the five populations (Assam, Bihar, Delhi, Haryana and Punjab) of *M. graminicola,* although variation occurred in nematode population in soil.
Keyword: Host, Race, *Meloidogyne*, Population, Variation

Screening of brinjal genotype against major insect pests for relative resistance based on morphological parameters

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ABSTRCAT
A field experiment was conducted to study the response of 10 brinjal genotypes against the major insect pests. The study revealed that the genotype HE-103-1 was best in reducing the whitefly population (3.48/ leaf) and HE-101-4 proved superlative against leafhopper population (0.80/ leaf). Considering the shoot damage, maximum damage was recorded in genotype BR-112 (18.60), while the lowest was recorded in genotype HE-101-3 (9.25). On overall basis, the most

resistant genotype against shoot and fruit borer was HE-101-3, while the most susceptible genotypes were BR-112 and HE-202-9. Similarly, with regards to fruit damage by shoot and fruit borer in different genotypes studied, the most resistant genotype was HE-101-3 (23.69), while the most susceptible were BR-112 (41.46) and HE-202-9 (39.02). Further the study on morphological characters revealed that in different genotypes, the length of leaf varied from 9.4 to 16.5 cm but not found associated with the sucking insect pests. Similarly, the leaf width in different genotypes ranges from 4.7 to 13.6 cm and shows negative significant correlation (r = 0.74) with the whitefly population. Fruit length among different genotype studied varied from 6.4 to 19.3cm, while the maximum fruit diameter of 7.9 and 7.4 cm was recorded in genotypes H-8 and BR 112, respectively and minimum was recorded from HE-101-3 (3.3 cm). The fruit diameter was found positively and highly correlated with the fruit infestation by *Leucinodesorbonalis.* Among different genotypes studied, the narrow, intermediate and wide pericarp thickness was reported from genotype HE-202-9 (0.40 cm), HE-210-1, HE- 101-3 and HE-209-1 (0.48, 0.50 and 0.52 cm, respectively) and BR 112 (0.85 cm), respectively and the pericarp thickness was also found positively and highly correlated with the fruit infestation by *Leucinodesorbonalis.* The highest per cent fruit infestation was noticed in the genotypes BR 112 and H-8 having purple-coloured fruits, while moderate fruit infestation was observed in genotype HE-202-9 having green purple fruits. The wide variation in fruit colour was noticed in genotypes HE-103-1. However, fruit colour was not correlated with the fruit infestation.

Keywords: Brinjal, Leucinodesorbonalis, Genotypes

Characterization of grass pea (*Lathyrus sativus* L.) varieties under low moisture stress

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ABSTRACT

The experiment was conducted to study the effects of polyethylene glycol (PEG) treatment on root morphology and associated physiological traits in five varieties viz., Ratan, Prateek, Mahateora, Pusa-24 (P-24), and Nirmal. The observations revealed considerable phenotypic and molecular diversity among the accessions for morpho- physiological traits like germination percentage, and mean germination time along with root length, shoot length fresh weight, and dry weight of the seedlings, besides variety x treatment interactions. The proline content was evaluated after 9 days of PEG treatment. Considering these traits the variety Ratan was found to be a promising variety based on its performance for moisture stress resistance. Similarly, next to Ratan varieties P-24 and Prateek were also identified as superior varieties over the remaining Mahateora and nirmal varieties. Molecular characterization of five Lathyrus varieties was carried out using ISSR markers which resulted in three clusters CI (Ratan), CII (pusa-24 and Mahateora), and CIII (Prateek and Nirmal) based on the genetic similarity coefficient. High PIC and genetic diversity values helped in the identification of the most informative markers i.e. UBC836, UBC842, and UBC841of 0.30 and 0.34. Unique bands helped in the identification of diverse germplasm lines i.e. cultivar barcoding. The ISSR markers showed a good amount of genetic diversity amplifying 33 alleles ranging from 3 to 5 with a mean of 2.75 alleles per loci. The yield of this better-performing variety will probably have a highly significant and positive association under moisture stress conditions.

Keywords: Lathyrus, Polyethylene glycol, Moisture stress, ISSR marker, Polymorphism

Molecular Variability and Physiological Studies in Drechslera oryzae [(Breda de Haan) Subramanian and Jain] in Kashmir

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ABSTRCAT
The present investigation on "Molecular Variability and Physiological Studies in *Drechsleraoryzae* [(Breda de Haan) Subramanian and Jain] in Kashmir" was carried out to ascertain the molecular variability in *Drechslera oryzae*using molecular markers and to study the physiological behaviour of the pathogen. Thirty-six isolates of*Drechslera oryzae* were sampled from three rice growing districts (Baramulla, Budgam and Kulgam) of Kashmir. Molecular variability among the isolates was studied using five Inter-Simple Sequence Repeat (ISSR) primers. The total number of scorable bands ranged from 5-8 and all the primers showed 100 per cent polymorphism. In cluster analysis, four clusters (cluster I, cluster II, cluster III and cluster IV) and six independent lineages were formed at 50 per cent similarity coefficient indicating a high level of molecular variability in *D. oryzae* in Kashmir valley. The isolates were grouped irrespective of their geographical locations. The pathogen *D. oryzae* was subjected to different cultural conditions *viz*., media, temperature, and nutrient source *in vitro*. The maximum and minimum mycelial growth was recorded on rice leaf decoction agar (84.48 mm) and malt extract agar (28.30 mm), respectively. The sporulation was found in traces in rice leaf decoction agar and potato dextrose agar. In case of different temperature levels, maximum mycelial growth of 75.64 mm was recorded at 30°C while minimum mycelial growth of 15 mm was recorded at 15°C and sporulation was found in traces in the pathogen isolate incubated at 25°C and 30°C. Among different carbon sources tested, maximum dry mycelial weight was recorded in glucose (552.20 mg) and minimum in sucrose (98.32 mg) while the sporulation was found in traces in glucose only. Among different nitrogen sources tested, peptone (353.20 mg) recorded maximum dry mycelial weight and minimum growth was found in ammonium nitrate (47.60 mg). However, sporulation was found in traces in peptone only.

Method validation and residue determination of mineral oil Arbofine in apple and soil using gas chromatography–flame ionisation detection under temperate conditions of Kashmir, India

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ABSTRACT
This innovative study was carried out to determine the presence of the mineral oil Arbofine in apple and soil at four locations. Arbofine kills the vast majority of dormant insects and mites (mite and asphid eggs, scales and psyllids) on fruit trees (cherry, apple, plum and peach) and thus reduces the plant diseases in summer. In this study, the mineral oil was sprayed at recommended doses of 2.0 and 0.75%, and the doses were doubled to 4.0 and 1.5% in dormant and summer seasons, respectively. The soil samples were taken for observation during the dormant season, whereas both soil and apple samples were taken during the summer season after treatment for 0, 1, 3 and 5 days. The recovery study of all the 11 paraffinic constituents (n-pentane, n-hexane, n-

heptane, n-octane, n-nonane, n-decane, n-undecane, n-dodecane, n-tridecane, n-tetradecane and n-pentadecane) in soil and apple samples which constitutes 60% of mineral oil in soil and apple was carried out at the fortification level of 1.0 µg/mL, which was found to be between 72.1% and 99.0%. No residue of all the 11 paraffinic compounds of Arbofine mineral oil was detected in soil and apple samples at day 0 after the recommended doses, and doubles the recommended doses in both the seasons at four locations. Therefore, mineral oil can be used on apples without any risk.

Effect of Irrigation and Nitrogen Levels on Growth, Yield and Quality of cauliflower (*Brassica oleracea var*. botrytis L.) in Arid Region of Rajasthan

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ABSTRCAT

A field experiment was conducted to study the effect of irrigation and nitrogen levels on the growth and yield of cauliflower (*Brassica oleracea var. botrytis L.)*in Arid Region of Rajasthan"was carried out in the experimental Farm of College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner during the *Rabi* season, 2021-22 to 2022-23. The experiment was designed as split plot arrangement having three replications. Four irrigation levels I_1, I_2, I_3 and I_4 (0.60 PE, 0.80 PE, 1.00 PE and 1.20 PE of Management Allowed) were applied. Similarly, three nitrogen (N) levels N_0, N_1, N_2 and N_3 were applied as 0, 60, 80, 120 and 150 kg ha^{-1} respectively. Results showed that different irrigation levels significantly affected number of leaves per plant, leaf weight, plant height, days to curd initiation, Curd maturity, Curd diameter, biological yield, curd yield, water use efficiency, nitrogen use efficiency and harvest index. Maximum number of leaves per plant, leaf length (28 cm), leaf weight (458 g), days to curd initiation (93), curd maturity (16), curd diameter (26 cm), plant height (58 cm), biological yield (50 tons ha^{-1}), curd yield (41 tons ha^{-1}), water use efficiency (210 $kgha^{-1}mm^{-1}$) and harvest index (8.50 %) were recorded at I_1 irrigation level. Different nitrogen levels had significantly affected leaf weight, days to curd initiation, curd maturity, plant height, curd diameter, curd yield, curd weight, water use efficiency, nitrogen use efficiency, and biological yield and harvest index. Maximum leaf length (26 cm), leaf weight (378 g), plant height (53 cm), days to curd initiation (101 days), maturity (17 days), biological yield (47 tons ha^{-1}), water use efficiency (175 $kgha^{-1}mm^{-1}$) and curd yield (39 tons ha^{-1}) was recorded at 60 kg N ha^{-1}. The above results showed that full irrigation through drip system with nitrogen application of 60 kg ha^{-1} is recommended for higher cauliflower yield.

Keywords: Cauliflower, Drip Irrigation, Nitrogen and water use efficiency.

Knowledge Adoption of Different Agro-Technologies among farmers of Siwan district, Bihar under Climate Resilient Agriculture Programme

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ABSTRCAT

Climate change is affecting paddy cultivation in many ways, including changes in temperature, rainfall patterns, and extreme weather events such as floods and droughts. One of the most significant impacts of climate change on paddy production is the increase in temperature, which

affects plant growth and development. Paddy plants are particularly sensitive to high temperatures during the reproductive stage, which can result in reduced grain yield and quality. In addition, increased temperatures can lead to water stress, which can further reduce yields. To address this issue, the Government of Bihar launched the Climate Resilient Agriculture (CRA) Programme in 2019-20. This programme aims to improve the resilience of agriculture to climate change through the demonstration of various technological interventions. Present study was conducted to assess impact of climate resilient technologies in five adopted CRA villages of Siwan district of Bihar. For impact assessment 530 farmers were surveyed from all the five selected villages. The results showed that a majority of farmers had adopted varying levels of technological interventions such as direct seeded rice (73.58 %), Alternate wetting/ drying irrigation in rice (11.32%), Water harvesting & community irrigation in rice (10.38%) and Nutrient expert based nutrient management by leaf colour chart (4.72%) related to climate resilience, respectively. Institutional interventions (29.17%) and traveling seminar (16.67%) also had high and medium levels of adoption among farmers. Flood-tolerant and long duration rice varieties (Rajshree and R. Mahsuri) were demonstrated in flood-prone areas and their yield was increased up to 15.38 and 11.54 per cent, respectively and the introduction of less water-demanding short duration varieties like R. Bhagwati, R. Neelam, R. Sweta and R. Suwasni and contingency crops like mustard (Uttara) resulted in increased yields in drought prone high lands which helped farmers to cope up failure of paddy crop under partial drought conditions. High yielding hybrid variety Swarna gold has showed an increased yield of 71.11 per cent and high adoption among farmers due to its adoptability and high yielding capacity in the northern plain regions of Bihar.

Keywords: Impact assessment, Direct seeded rice, Climate resilient technology and Technological intervention, Water harvesting.

Fruit enzymes: Their chemistry and effect on human health-A Review

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ABSTRCAT

This review depicts the health benefits of enzymes obtained from fruits associated with human health. Consumption of fruit is essential which allows to provide helathy nutritious value to the body since the fruits are a great source of the phytochemicals and many essential nutrients. Enzymes are said to be those proteins which act as the catalyst whithin the living cell, whereas the catalysts are responsible to change the rate of reactions. Fruits have enzymes which are beneficial for human health in a lot many ways. Bromeline obtained from pineapple is believed to have properties which promote the digestion, heal wounds and also act as an anti-inflammatory agent. It has also been reported as having anti-cancer properties. Additionaly, actinidaine axtracted from kiwifruits is believed to be have properties which can cure cardivascular diseases and work on obesity significantly. It can also fulfill the 85% of the daily requirement of ascorbic acid. Furthermore, Papain extracted from papaya has a cysteine protease enzyme that aids in protein digestion more extensively. Also, glutathione peroxidase (GPx) obtained from coconut water has many health benefits like it prevents UTI infections, prevents kidney and urethral stones. Consuming fruits may improve human health is an intriguing hypothesis that has been researched all across the world. Fruits hence are regularly marketed as being healthful. The discussion suggests an association between fruit consumption and decreased risk of developing serious

chronic diseases. The article summarizes current knowledge and understanding of enzymes from fruit crops associated with human health.

Keywords: Fruit, enzymes, health, chemistry, Phytochemicals

Response of Rice to Age of Seedlings, Crop Geometry and Nano-Fertilizers in Terms of Growth, Yield under Konkan Region of Maharashtra

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ABSTRCAT

The present investigation entitled "Effect of Age of Seedlings, Crop Geometry and Nano-fertilizers on Performance of *Kharif* Rice in Konkan Region of Maharashtra" was carried out at Agronomy Farm, College of Agriculture, Dapoli, and Dist. Ratnagiri (M.S.) during *Kharif* season of 2017. The experiment was laid out in split plot design with replicated thricely. The treatments included three age of seedlings at transplanting viz., 10 days old seedlings (A_1), 20 days old seedlings (A_2), 30 days old seedlings (A_3) and two crop geometries 20 cm x 15 cm (S_1), 25 cm x 25 cm (S_2) in main plot and different nano-fertilizer sprays viz., no spray (W0), spray of nano P (W_1), spray of nano K (W_2) and spray of nano P + nano K (W_3) in sub plots. Soil of the experimental field was sandy clay loam in texture, slightly acidic in reaction (pH 5.80) and high in organic carbon content. The values of available N, P2O5 and K2O were 257.15, 29.90 and 251.17 kg ha^{-1} respectively. The experimental results revealed that the transplanting of 10 days old seedlings produced higher growth attributes as well as higher number of panicles $hill^{-1}$, number of filled grains $panicle^{-1}$. The 25 cm x 25 cm recorded higher values of growth attributes. While 20 cm x 15 cm recorded significantly taller plants, significantly higher number of unfilled grains $panicle^{-1}$ and higher grain and straw yield. In case of growth attributing and yield attributing characters, the spray of nano P + nano K recorded predominantly higher values than rest of the treatments. Due to higher growth attributing and yield attributing values, the grain and straw yield was higher under spray of nano P + nano K.

Keyword: Rice, Seedling age, spacing, Nano-fertilizer, growth and yield.

Response of Pearl Millet to Iron and Zinc on Vertisol

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ABSTRCAT

A field experiment "response of pearl millet to iron and zinc on Vertisol" was carried out during kharif 2016. The treatments comprised of foliar and soil application of iron and zinc sources of EDTA and sulphate form at two critical growth stages of pearl millet crop. The data revealed that significantly maximum, plant height (234.80 cm), total number of effective tillers (1.87), 1000 grain weight (12.52 g), yield of grain (42.71 q ha^{-1}) and stover (77.73 q ha^{-1}) and maximum N, P and K uptake by pearl millet grain (53.38, 23.92 and 14.95 kg ha^{-1}, respectively) and stover (37.32, 29.25 and 175.24 kg ha^{-1}, respectively) were recorded in the treatment receiving GRDF + Soil application of 25 kg ha^{-1} $FeSO_4$ + 20 kg ha^{-1} $ZnSO_4$ followed by soil application of 20 kg ha^{-1} $ZnSO_4$ + GRDF. However, foliar application of 0.1% chelated Fe and Zn along with GRDF also produced the higher grain and stover yield (40.04 and 72.67 q ha^{-1}, respectively). Among foliar application, the treatment receiving GRDF + foliar application of both chelated Fe + Zn @ 0.1% at

two crop growth stages recorded the higher nutrient uptake by grain and stover. The availability of Fe, Mn, Zn and Cu also significantly increases with application of Fe and Zn thorough soil and foliar.

Keywords: macro and micro nutrients, pearl millet and nutrient uptake.

Method validation and quantification of cypermethrin in/on green pea by GC-ECD using modified QuEChERS method

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ABSTRCAT

The present work describes the persistence, dissipation behaviour, half-life, risk assessment and novel gas chromatography method for the residue estimation of cypermethrin in green pea by spraying cypermethrin 10EC 50 g a.i.ha^{-1} at fruiting stage followed by another application at 10-day interval. The sample extraction and cleanup was followed by modified quick, easy, cheap, effective, rugged, and safe (QuEChERS) method, and the residues of cypermethrin were estimated by validated gas chromatography-electron capture detector. The initial deposits were found to be 1.21 mg kg^{-1} following the application of insecticide at 50 g a.i. ha^{-1}. Cypermethrin residues reached below detection limit of 0.05 mg kg^{-1} after 15 days at recommended dosage. The half-life of cypermethrin was found to be 2.66 days at 50 g a.i. ha^{-1}. For risk assessment studies, the waiting period of 15 day will be safe for consumption and the insecticide could be safely used against pests.

Unravelling the Dynamics of Wheat Leaf Blight Complex under Climate change scenario in Indian Conditions

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ABSTRACT

Wheat is consumed as a staple food by 35 per cent of the world's population and hence is at a greater risk due to climate change, which can nearly cause 19.3 percent yield loss by 2050. Wheat production is globally threatened by Helminthosporium leaf blight (HLB) complex, with *Bipolaris sorokiniana* (spot blotch) being the dominating species, responsible for causing devastating crop losses under favorable environmental conditions. The present study intends to explore the pathogenic flora associated with the foliar blight complex of wheat under the changed climatic scenario, their interactions and the impact of soil-borne inoculum on disease development. Through implementation of morphological and molecular approach, *Bipolaris spicifera*, *Exserohilum rostratum, B. oryzae*were found to be the pathogenic species associated with leaf blight complex of Wheat. The soil population dynamics studies using real time absolute quantification from the rhizosphere of wheat varieties revealed that the amount and survival period of inoculum was lower in case of resistant variety HD2733 as compared to the susceptible variety Sonalika. Interaction studies revealed a higher disease severity with combined inoculation of four pathogenic species, indicating their synergistic action. The study highlights the role of identified

pathogenic species in reduction of quality and productivity of wheat in India under changing climatic conditions.

Insecticide Induced Hormoligosis in Whitefly, *Bemisia Tabaci* (Gennadius) on Brinjal

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ABSTRACT
The studies on "Insecticide induced hormoligosis in whitefly, *Bemisia tabaci* (Gennadius) on brinjal" have been carried out at Haryana Agricultural University, Hisar, Haryana, (India), during 2019 and 2020. The repeated application of diafenthiuron 50% WP (150, 210, 300 g a.i./ha), fenpropathrin 30% EC (50, 70, 100 g a.i./ha), thiamethoxam 25% WG (25, 35, 50 g a.i./ha) and deltamethrin 2.8% EC (7.5, 10.5, 15 g a.i./ha) were evaluated for hormoligosis effect in terms of duration and survival of immature stages of whitefly, fecundity, adult longevity, reproductive period, egg hatchability, reproductive viability, plant growth, oviposition preference, and biochemical content. The results revealed that diafenthiuron at 300 g a.i./ha resulted in significant decrease in nymphal survival, adult longevity, egg hatchability and reproductive viability. There was prolongation of nymphal duration as compared to untreated control. Maximum pre oviposition period was observed in diafenthiuron 50% WP treated plant at 150 g a.i./ha (2.38 days) and 210 g a.i./ha (2.37 days), while maximum oviposition and post oviposition period was recorded in deltamethrin 2.8% EC treated plant. Fenpropathrin 30% EC and deltamethrin 2.8% EC at sub lethal doses increased the fecundity whereas diafenthiuron 50% WP in all the doses caused reduction in fecundity of *B. tabaci*. Plant height in all treatments varied from 57.97 to 66.66 but without significant differences among all the treatments. Fenpropathrin 30% EC treated plant at 100 g a.i./ha (26.07 leaves) exhibited maximum number of leaves while, maximum increase in leaf area was observed in diafenthiuron 50% WP treated plant at 150 g a.i./ha (115.51 cm^2). Maximum translaminar effect was observed in thiamethoxam 25% WG treated plant at 50 g a.i./ha (50.72%). Fenpropathrin 30% EC treated plants were more preferred by whitefly for oviposition. Insecticide application decrease sugar content, amino acid content, phenol content and chlorophyll content and increases crude protein content. Insecticidal treatments did not affect the pH of brinjal leaf. The overall results confirmed hormoligosis effect of fenpropathrin 30% EC and deltamethrin 2.8% EC in *B. tabaci*.
Keywords: Hormoligosis, *Bemesia tabaci*, Insecticides, Brinjal

Enhancing Biodiversity through Sustainable Utilization of Agricultural Waste for Managing Southern Blight in China aster caused by *Sclerotium rolfsii* Sacc.

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ABSTRACT
Sclerotium rolfsii Sacc. is one of the most devastating soil borne pathogen affecting a wide variety of economically important crops in India. China aster is an emerging ornamental crop in the

country because of greater diversity in forms, colours and long vase life of this flower. Consequently, expanding the production area entails an inherent greater risk of diseases. Southern blight caused by *S. rolfsii* is becoming a serious problem in the cultivation of China aster because of its destructive nature, wide host range and persistence in the soil for a long period of time. Additionally, the disposal of agricultural waste including crop residues is a major concern in sustainable crop production. Therefore, an investigation on Southern blight of China aster was undertaken in relation to its management with the use of various waste products including organic soil amendments and crucifer crop residues along with soil solarization. Among crucifer crop residues (CR) evaluated under pot conditions, radish CR was found to be most effective with mycelial inhibition of 63.00 per cent followed by cabbage CR with mycelial inhibition of 61.00 per cent. However, cauliflower CR was shown to have antisporulant activity with lowest production of sclerotia (4.33). In case of organic soil amendments tested under pot culture, mustard cake recorded maximum mycelial inhibition of 71.95 per cent with no sclerotia production followed by cotton cake with mycelial inhibition of 52.29 per cent. The most effective treatments under pot conditions were selected for an integrated disease management trial for integration with soil solarization which revealed that cotton cake was found to be most superior to all the other treatments with disease incidence of 16.30 per cent individually and no disease when integrated with soil solarization, which was followed by soil solarization+ cabbage CR with an incidence of 16.26 per cent. The study highlights effective utilization of crop residues and organic amendments for sustainable management of Southern blight of China aster.

Chitosan-based nanofertilizer: potential solution for nutritional challenges

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ABSTRCAT

Large-scale problems in the agro-ecosystem are currently being caused by improper application of commercially available chemical fertilizers. In fact, these chemical fertilizers are notorious for having poor nutrient use efficiency. In advance of application, a little over 40%-50% of applied chemicals are realized to be discharged into the atmosphere either as hazardous leachates or unpleasant fumes, which causes pollution. Furthermore, excessive use of these inefficient fertilizers imparts immobilization of mineral nutrients in the soil, resulting in nutrient fixation and reduced bioavailability resulting in multi-nutrient deficiency in agricultural crops. Therefore, to reduce the application of indign conventional chemical fertilizers, modern agriculture requires potential alternatives. In this scenario, nano enabled slow-release fertilizers are thought to be an endeavouring option for nutritional security as well as environmental sustainability. Since few years back, use of nanomaterials (NMs) in terms of next-generation fertilizers especially the biopolymer-based formulations at optimal dose have been appreciated to increase the nutrient utilization efficiency through a more controlled, and slower nutrient release phenomenon that could better match the sustained nutrient needs of crops across the time. In this line, chitosan being biocompatible and biodegradable in nature is now being explored for crop protection and growth in agriculture. Chitosan is a linear biopolymer of randomly distributed β-(1→4)-linked D-glucosamine (deacetylated unit) and N-acetyl-D-glucosamine (acetylated unit), derived from the biowaste of seafood industry. It acts as an abundant nutrient source of C (54.4–47.9 wt %), O (42.3–30.19 wt %), N (7.6–5.8 wt %), and P (6.1–3.4 wt %) to plants. In addition, chitosan

possesses enough functional groups (-NH_2 and -OH) which can be used to functionalize with active ingredients (AIs) like macro-/micro-nutrients. Foliar compatible chitosan-based nanofertilizer has piqued the invention of next-generation agrochemicals to ennoble modern agriculture. It offers long-term nutrient supplementation to the plants in an efficient way without impeding the environment.

Keywords: Conventional chemical fertilizer, Slow-release fertilizer, Nanomaterials, chitosan, Active ingredient

Growth performance of broiler chicken fed diet with single cell protein

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ABSTRCAT

The present study was designed to study the effect of Single cell protein (SCP) on growth performances in broiler chicken. 600-day old chicks were distributed in six groups and each group was consisting of four replicates with 25 birds in each. Soybean meal was replaced by SCP at the level of 0 (control), 2% (T_1), 4% (T_2), 6% (T_3), 8% (T_4) and 10% (T_5). Total duration of the trial was 42 days. There was decrease ($P<0.05$) in body weight, feed intake, performance index and increase in FCR with higher inclusion level but at the 2% level the results were comparable with control. Dressing%, breast yield% and abdominal fat% were decreased ($P<0.05$) as the replacement of the soybean meal increased. However hot carcass weight%, neck%, wing%, drumstick%, thigh%, back% showed no difference ($P>0.05$). Hemoglobin, total protein, albumin, globulin, glucose, ALT and AST level decreased significantly ($P<0.05$) as the inclusion level increases but the level of uric acid increased. It can be concluded that SCP with 2% replacement of the soybean meal can be included in the commercial broiler ration without any adverse effect.

Nutraceutical Importance of Underutilized Fruit Crops

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ABSTRACT

India's fruit diversity is vast, with 344 species found in the Hindustani center alone. Northeast India is a meeting ground for two bio-geographical areas and one of the 18 mega-biodiversity centers in the world, contributing to fruit genera such as *Citrus*, *Musa*, *Mangifera*, *Docynia*, *Elaeocarpus*, *Myrica*, *Morus*, *Artocarpus*, and more. Rural areas possess numerous indigenous and underutilized fruit crops, which are rich in vitamins, minerals, and antioxidants, and serve as protective food with curative properties used in ethnomedicine. These fruits are also tasty and contain good juice content, making them suitable for value additions. Despite this, many of these underutilized fruit species have not been utilized to their potential. Neglected and underutilized natural resources, which have high nutritional, economical, and sociocultural values, can be a valuable opportunity for local growers to access specialized markets. Integration of biological knowledge into functional product development can support informed decision making and

innovative product development. Underutilized fruit crops can provide nutrition to the poor and needy tribals, who suffer from multiple nutrient-deficiency disorders, by meeting the nutrient requirements of vulnerable groups. Underutilized fruits, nuts, and vegetables are a rich source of carbohydrates, fats, proteins, energy, vitamins, minerals, and fiber, with the potential to reduce the risk of chronic diseases due to their health-protective compounds.
Keywords: Underutilized, Nutraceuticals, Carbohydrates, and Minerals.

A Novel Approaches for Mitigation of Abiotic Stresses in Fruit Crops
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ABSTRACT
Climate change is the long-term alteration of the Earth's climate system, caused by both natural and human activities. While the negative impacts on human health have been extensively studied, the effects on plant species have also gained attention. Climate change can directly and indirectly affect plants through altered growing seasons, precipitation patterns, and extreme weather events, and drought stress is one of the most significant consequences, leading to reduced growth, productivity, and even death. Transcriptomics has emerged as a promising approach to developing stress-tolerant plants and a recent study used Transcriptomics analysis to investigate the molecular response of Populus simonii to drought stress. The study identified differentially expressed genes involved in stress response, including those related to hormone signaling, transcription factors, and metabolic pathways, as well as several hub genes that may play critical roles in regulating drought stress response (Zhang et al., 2021). Transcriptomics has the potential to improve crop yields under drought conditions and develop stress-tolerant plants. The study identified differentially expressed genes involved in stress response, including those related to hormone signaling, transcription factors, and metabolic pathways, as well as several hub genes that may play critical roles in regulating drought stress response (Zhang et al., 2021). Transcriptomics has the potential to improve crop yields under drought conditions and develop stress-tolerant plants. Transcriptomics analysis of fruit crops under drought stress showed that various signaling pathways were activated, and genes involved in stress response, osmotic adjustment, and defense responses were up-regulated, indicating the complex and coordinated response of plants to drought stress. A study on grapevines showed the activation of various signaling pathways and up-regulation of genes related to defense responses and ion transport. (Savoi S. et al 2016). Another study on peach trees showed that genes involved in stress signaling, osmotic adjustment, and antioxidant defense were up-regulated under drought stress. (Farinati S. et al 2017). These studies provide important insights into the molecular mechanisms underlying drought stress response in fruit crops and can aid in the development of drought-tolerant cultivars.Transcriptomics provides a valuable tool for studying plant response to drought stress, and future use of this technology can improve our understanding of the molecular mechanisms underlying stress response, leading to the development of more resilient crop varieties and more effective drought mitigation strategies.
Keywords: Transcription, Stress, Metabolic pathway, Gene, Antioxidant

Innovative Approaches in Soil Health, Land Resources, and Land Use Planning and Management
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ABSTRCAT

Soil health is critical to agricultural production and ecosystem sustainability, as it supports nutrient cycling, water supply, and mechanical support for crop plants. Soil health-based management practices aim to increase nutrient use efficiency, reduce erosion, improve soil structure, and sustain or increase yields. However, pest and disease management are less frequently considered as components of a soil health management system. The crop protection industry can play a critical role in advancing soil health by developing systems of crop protection innovation that simultaneously target soil health outcomes, either through direct impact on soil or by enabling practices that promote soil health outcomes. This requires a shift towards sustainable, long-term solutions that avoid unintended trade-offs between short-term pest control and long-term soil health. Diversification of nutrient sources, conservation agriculture, enhancement of soil microbial diversity, efficient resource recycling, and amendment addition for correcting soil reactions are potential options for improving soil health. By adopting these practices, the agricultural industry can help promote sustainable production and preserve ecosystem services.

Keywords: Soil health, crop protection, sustainable agriculture, conservation agriculture, nutrient cycling.

Effect of Different Tillage and Irrigation Practices on Yield and Yield Attributes of Chickpea

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ABSTRCAT

A field experiment was conducted during the winter (*Rabi*) season of 2019-20 at *Dhab* research farm, Rajendra Prasad Central Agricultural University, Pusa, Bihar, India, to study the effect of different tillage and irrigation practices on the yield of Chickpea. The treatment consisted of two tillage practices, including conventional and conservation tillage, and two irrigation methods, *viz*., flood and sprinkler irrigation. The treatments were allocated in a split-plot design with three replications. The results indicated that concerning tillage practices, conventional tillage produced significantly enhanced yield attributes, *viz*., the number of seeds plant^{-1} (27.0), seeds pod^{-1} (1) and 100-seed weight (24.8 g) than the conservation tillage practices. Also, the conventional tillage produced a greatly higher grain yield of 1530 kg/ha, stover yield of 2475 kg/ha and harvest index of 38.12 than the conservation tillage. In the case of irrigation methods, sprinkler irrigation was the most effective, producing significantly higher no. of seeds plant^{-1} (24.0), seeds pod^{-1} (1) and 100- seed weight (23.5 g), grain yield (1487 kg/ha), stover yield (2438 kg/ha) and harvest index (37). The research investigation concluded that conventional tillage practice and sprinkler irrigation method significantly enhanced yield and yield attributes of chickpea than other tillage and irrigation practices.

Keywords: Conventional tillage, Conservation tillage, Conventional irrigation, Sprinkler irrigation, Yield, and Yield attributes.

Assessment of different sowing methods of wheat for profitability

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ABSTRACT
An On farm trial (experiment) was conducted on different sowing methods of wheat. Three treatments were experiment on nine farmers' field with RBD experimental design during Rabi 2021-2022. The trial was conducted for timely sowing of wheat with proper crop residue management. Timely sowing of wheat saves crops from terminal heat effect & other pest infestation. The experiment was conducted in clay silt loam whose latitude25.099^0 N and longitude 86.61^{0}E. The details of treatment were T1: Sowing by conventional broad casting method, T2: Sowing by zero tillage, T3: Sowing by happy seeder. The treatment T3(Sowing by happy seeder) was found the best treatment comprising of maximum yield (45 q/ha), 25% more yield , maximum net profit (Rs 61700 /ha), maximum B-C ratio (2.49) and increased soil fertility eco friendly(without burning of crop residue's nutrients) followed by treatment T2 & T1 respectively. Saving of labour, input cost with increased yield was found in treatment T3 in comparison to farmers' practice (T1).

Assessment of Paclobutrazol breaking alternate bearing in Mango cultivation

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ABSTRACT
An On farm trial (experiment) was conducted on Assessment of Paclobutrazol breaking alternate bearing in Mango cultivation. Three treatments were experimented on seven farmers' field with RBD experimental design during Kharif 2020-2021 and 2021-2022. The experiment was conducted for breaking the alternate bearing in Langra Mango. Seven farmers were selected for this experiment in Haveli Kharagpur block of Munger district in 1st year and 2nd year in Jamalpur Block. The details of treatment was T1: No use of Paclobutrazol, T2: application of full dose of RDF 1000:500:500 gm NPK with 25 kg of FYM per tree and Paclobutrazol@1.0 gm a.i./m^2 effective canopy(20-30 gm/tree) in soil. T3: application of full dose of RDF 1000:500:500 gm NPK with 25 kg of FYM per tree and Paclobutrazol@1.5 gm a.i./m^2 effective canopy(30-45 gm/tree) in soil. The treatment T3 (application of full dose of RDF 1000:500:500 gm NPK with 25 kg of FYM per tree and Paclobutrazol@1.5 gm a.i. /m^2 effective canopy (30-45 gm/tree) in soil) was found the best treatment comprising with maximum yield (97.29 q/ha), maximum net profit (Rs 257870 /ha), maximum B-C ratio (8.58) in the year 2020-21. The treatment T3 was again found the best treatment comprising with maximum yield, maximum net profit, and maximum B-C ratio in the year 2021-22.

Murrah Buffalo Farmers Willingness to Pay (WTP) for Climate Services in Haryana

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ABSTRCAT

The phenomenon of global climate change has been directly affecting the livestock production system world over. Climatic factors like temperature, relative humidity, solar radiation, precipitation and wind speed have a direct bearing on milk production and reproductive performance of Murrah buffaloes. By aiding farmers make informed decisions about their farm management in a timely manner, forecast information and climate services are effective tools for addressing present climate risks and building climate resilience. Therefore, weekly module on the climate information and THI based climate services on Murrah buffalo rearing were prepared and disseminated to 270 farmers across the 18 villages of Hisar, Jind and Rohtak districts of Haryana. Contingent Valuation Method (CVM) and interval regression model was used to determine farmer's willingness to pay for climate services. From each block, three villages i.e., one each village receiving weekly THI based climate services randomly through either of WhatsApp, Text SMS and standardise exclusive Mobile Application were chosen randomly. Results of the study found that 80 percent of respondents from Text SMS treatment group, 83.33 percent from WhatsApp group and 92.22 percent from Mobile Application group were willing to pay an average price of Rs. 94.33, Rs.106.00 and Rs.137.22 respectively for an annual package of weekly climate services for 50 weeks. Results from the interval regression model has found that cropping intensity, standard animal unit, extreme climatic events experienced are the common positively contributing whereas climate information, risk orientation and age are the common negatively contributing variables from 3 treatment groups to the farmers WTP for climate services. Farmers acceptance of climate services in terms of their WTP underlines that farmers have realized the pivotal role of weather forecasting based advisory services in day-to-day operational decision making of their farms hence necessary policy may be drafted for timely advisory services for livestock farmers to cope up with changing climatic scenario.

Keywords: Climate change, Climate services, WTP, THI, Murrah buffalo

Assessment of different planting distance on yield and economics of Rabi maize

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ABSTRCAT

The On-Farm Trial was conducted during *Rabi* season 2016-17 and 2017-18 for Assessment of different planting distance on yield and economics of rabi maize in diara area of Munger at 06 farmers fields with four planting distance *viz.* farmers practice (30cm x20cm row distance), planting distance - 40cm x 20 cm, planting distance - 50cm x 20cm and planting distance - 60cm x 20cm. Planting distance on 50cm x 20cm was significantly recorded higher grain yield (79.4 q/haand 75.3 q/ha) and dry fodder (144.1 q/haand 141.6/ha),biological yield (223.4 qt/ha and 216.91qt/ha), plant height (240.1 cm and 237.3cm),number of grain row per cob (18.3 and17.3), cob length (18.7 and 16.5cm), 1000 grain weight (274 g and 272.3g) number of grain row per cob (37.3 and 36.5) and maximum cob weight (331.6 g and 328.7g) over farmers practice and during both the years. However, the highest gross return (Rs.114748 / haand 109240/ha), net return of (Rs.70982 /haand 68220 /ha) and B:C ratio (3.69 and 3.41) was obtained with sowing of hybrid

rabi maize under 50cm x 20cm row spacing of over farmers practice (30cm x 20 cm), 40cm x 20 cm row distance, and 60cm x 20cm row spacing during both the years in diara area of Munger.

Assessment of Integrated Nutrient Management on Productivity and Profitability on paddy crop

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ABSTRCAT
The On-farm trial was conducted during *Kharif* season 2021-22 and 2022-23 for "Assessment of integrated nutrient management on productivity and profitability of paddy crop" at farmers fields of Munger district. The On-farm trial was conducted in randomized block design with three technological options *viz*. TO1 :100 % RDF (120:60:40 kg NPK ha^{-1}), TO2: 75 % RDF (90:50:30 kg NPK ha^{-1}) + Blue green algae 10 kg $ha^{-1}$and TO3: 75 % RDF (90:50:30 kg NPK ha^{-1}) + Azotobactor@5ml/kg seed + PSB @5ml/kg seed and FP: farmers practice(150:60:40 kg NPK ha^{-1}) under different locations (7 farmers fields))of Munger district. Integrated application of 75 % RDF (90:50:30 kg NPK ha^{-1}) + Blue green algae 10 kg ha^{-1} was recorded significantly higher grain yield (45.1 and 40.8 qt/ha), straw and biological yield, growth and yield attributes of paddy over farmers practice during both the years. However, maximum gross returns (Rs.77650 and 83246 per ha), net return (Rs.43450 and 47106 per ha) and B:C ratio (2.27 and 2.30) was recorded with integrated application of 75 % RDF (90:50:30 kg NPK ha^{-1}) + Blue green algae 10 kg ha^{-1} over farmers practice during both years.

Changing frameworks of climate change vulnerability and risk assessment

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ABSTRCAT
Climate change and its impact has become more vivid in past few years. The effect of climate change is being felt across all the sectors and business of life. Therefore, climate change vulnerability and impact assessment studies have been on a rising trend. But, over the years and throughout the different fields of science and business, vulnerability definitions have been changing based on the context. Due to this, the framework for research on vulnerability is also being varied. Even the most commonly used definition and framework of vulnerability give by IPCC has transformed over the years. Till its Fourth Assessment Report (2007) (AR4) the term vulnerability is defined with respect to the system i.e., as a function of exposure, sensitivity, and adaptive capacity of the system itself. However, since 2012 i.e., Fifth Assessment Report onwards the term vulnerability meant the predisposition to be adversely affected. It is only explained by the sensitivity and adaptive capacity of the system. The exposure component had been disassociated as it is the stress external to the system. And all these components together constitute the risk to climate change. Along with this several researchers and different organizations taking up climate change vulnerability research have also suggested various frameworks for the same. A detailed overlook of the differences in such research approaches can enlighten future researchers on designing their research by inclusion or exclusion of certain indicators or factors of climate change vulnerability. Keeping in view these changes in vulnerability assessment, a composite framework

has been proposed to reflect both the vulnerability and risk frameworks of IPCC. Certain indicators were included and modified so that, the different concepts of the frameworks can be represented in the study. Along with this, spatial analysis can also be conducted which can be overlapped with the vulnerability analysis to identify vulnerable hotspot to suggest location specific recommendations. Thus, the study is expected to give a new insight to climate change vulnerability assessment.

Keywords: Assessment, Climate Change, Framework, Indicators, IPCC, Risk, Vulnerability.

Natural products in drug discovery: advances and opportunities of Osthol

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ABSTRACT

Nature has richly endowed mankind with a rich wealth of medicinal herbs that have been a source of traditional medicine for the treatment of various human diseases since ancient times. Plants produce an enormous variety of natural products (NPs) with diverse pharmacological properties. The rich structural and chemical diversity, biochemical specificity, pharmacological and other molecular properties make NPs favourable leads for drug discovery. About 45% of today's best selling drugs originating from natural products or their derivatives. In the area of cancer, about 80% of clinically important anti-cancer agents originate from natural products. In other areas including anti-infective, cardiovascular, neurology, immunology, inflammation and related diseases, the influence of natural products is quite marked. The use of combinatorial chemistry approaches are also based on natural product scaffolds to create screening libraries that closely resemble drug-like compounds. The new screening approaches are being developed to improve the ease with which natural products can be used in drug discovery. It is hoped that the more efficient and effective application of natural products will improve the drug discovery process.

Growth and yield performance of Hybrid Maize (*Zea mays*) grown under different organic manure over the inorganic fertilizer at Unakoti Tripura for Sustainable Development

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ABSTRACT
Worldwide, maize (*Zea mays* L.) is considered an important food and fodder crop. Compost as a soil amendment could enhance the maize yield. Therefore, field experiments were carried out in seasons 2020 to study the effects of compost at three levels and fertilization on the yellow maize hybrid 'Bio 9544' yield components. To conduct the field trials, a factorial RBD system in three replications was established. Three compost Farm yard manure (FYM), Spent Mushroom Substrate (SMS) municipal solid waste compost (MSWC) and one without any compost were in the main plots, and in combination with without fertilizer (N: P: K _0:0:0 kg ha^{-1}), recommended doses of fertilizer (N: P: K _140:100:60) and half doses of recommended fertilizer (N: P: K _70:50:30 kg ha^{-1}) were in the subplots. Total 12 different combination of nutrient management practices are applied with plot size of 162 m^2, with 36 ridges with 3 m length and 1.5 m width. The results indicated that the application of all compost with full recommended doses of fertilizer (140:100:60 kg ha^{-1} of N: P: K) are significantly affected the Plant height at 20 DAS, Plant height at 60 DAS, Plant Height at Maturity, number of $cobs^{-1}$, Cob length, Cob diameter, Number of row cob^{-1}, Number of grain row^{-1}, Number of grains $cobs^{-1}$, 1000 grain weight and Yield kg/ha^{-1}. 100% RDF with different composition of compost like FYM, SMS and MSWC showed the better result than the without compost. In combination of recommended dose of fertilizer (RDF) with different organic compost significantly affected maize yield. Our results indicate that integrated use of organic and inorganic nutrient sources enhances the productivity of Hybrid maize.
Key word: Maize, Organic Manure, Municipal Solid Waste, Farm Yard Manure and Spent Mushroom Substrate

Complementing the Need Assessment and Situational Analyses in Extension Research through Integration with the Vulnerability Assessment Studies

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ABSTRACT
Vulnerability assessment studies have been used in various research domains like environmental sciences, disaster management studies and climate change. Due to more attention to climate change in Agriculture, vulnerability studies are being carried out from socio-climatological perspective. But limiting the vulnerability studies to this specific domain is undermining its full-fledged potential that can be gained in extension research in general and Agricultural extension research in particular. There is a greater scope to widen the horizon of research areas in which these can be used. Since vulnerability assessments try to diagnose the situation of any individual, community or geographical vicinity from a multidimensional perspective, it facilitates the researcher to gain a complete and holistic picture of any scenario. Hence at the preliminary stage of problem formulation it can use for situational analyses and diagnostic purposes. This can help in better need assessment of the organization, community or individual from multiple perspectives and hence can lead to vigorous problem formulation. Moreover, this can help in better formulation of problems based on needs. Moreover, vulnerability assessments can give a comprehensive picture of the population and help choosing appropriate population as well as sample for the study. Not only can this improve the quality of the study but also enhance the relevance of it. Moreover, these assessments can help in better interpretation of results as they can provide facts and help in better triangulation of the situation. Thus, better policy formulations can be done. Ultimately, the needs of the population under concern can be

addressed. Thus, full potential of the vulnerability assessment studies can be tapped in extension research at various stages.

Keywords: Agriculture, Extension Research, Need assessment, Vulnerability assessment

Integrated Agricultural Approach to Tackle Climate Change: Climate Smart Agriculture

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ABSTRCAT

Climate change is rapidly emerging as a global critical development issue. Climate change poses a significant threat to agriculture and food security in many ways. Some of the problems that climate change creates for agriculture include increasing temperatures, changes in rainfall patterns, and increased pests and diseases, climate change can create favorable conditions for pests and diseases, leading to increased outbreaks that can reduce crop yields and quality. Sea-level rise and loss of biodiversity, leads to a decline in ecosystem services that support agriculture, such as pollination and pest control. These problems threaten global food security and the livelihoods of millions of farmers. It's essential to address climate change's impacts on agriculture through the adoption of climate-smart practices, such as crop diversification, conservation agriculture, and improved irrigation techniques. Climate-smart agriculture (CSA) is a holistic approach to agriculture that aims to address the challenges of climate change while enhancing agricultural productivity and improving livelihoods. It involves the adoption of sustainable and climate-resilient practices in farming, livestock, forestry, and fisheries. CSA practices include using drought-resistant crops and livestock breeds, improving soil health through conservation agriculture and agroforestry, using renewable energy sources such as solar power and biogas, and reducing greenhouse gas emissions through improved land management and livestock production. The goal of CSA is to ensure food security and increase the resilience of rural communities in the face of climate change. It also aims to reduce the carbon footprint of agriculture, which is a major contributor to greenhouse gas emissions. CSA is an important approach to ensure sustainable development and a healthy planet for future generations.

Keywords: Climate, Sustainability and agriculture

Climate Change's Effect on Plant Diseases – A Review

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ABSTRACT

An unanticipated danger to the ecology of the planet and worldwide society is climate change. Biodiversity and cropping systems all across the world will be impacted by climate change. Additionally, it poses a special problem for plant health. The appearance, frequency, and intensity of plant diseases are affected by climate change. As a result, the relationship between plants and diseases will be impacted in a variety of ways. Different plant diseases may be influenced in some manner or not affected by climate change. Duration, choice, and efficacy of using physical, chemical, and biological means of control and their application within integrated pest management (IPM) strategies will also be impacted by this. It is crucial to maintain both controlled and uncontrolled ecosystem products and services, including food, in the face of climate change.

Recent climatic changes have necessitated modifications to plant protection methods, but future modifications will become much more essential if forecasted climate change scenarios come to pass. One of the essential elements required to ensure present and future food security is prophylactic and therapeutic plant protection. To establish an initial understanding of various disease systems, additional study is required. The majority of plant disease models operates at a different geographical and temporal scale than the global climate models and use different climatic variables. Methodological advancements are required to accurately estimate the effects of disease on a worldwide scale. Utilizing cutting-edge technologies as suitable instruments, crop protection techniques should be devised that are effective in adapting to changing climatic conditions.
Keywords: Climate change, Agriculture, Plant diseases, IPM, Management

Molecular phylogenetics and DNA barcoding of *Lipaphis erysimi pseudobrassicae* (Aphididae: Homoptera): a dominant specialist aphid on Rapeseed-mustard, India

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ABSTRCAT
Lipaphis erysimi (*Lipaphis erysimi erysimi* and *Lipaphis erysimi pseudobrassicae*) group, often known as the mustard or turnip aphid, is one of the most devastating specialist aphid of Rapeseed-mustard, causing yield losses of 9 to 96%. This study was carried out with a goal of precisely identifying the dominant specialist aphid of Rapeseed-mustard and to address the issues such as genetic differentiation from different Rapeseed-mustard growing regions (16 locations) covering all the six zones of India. The dendrogram, Principal component analysis (PCA) and phylogenetic relationships with RAPD and SSR primers revealed that populations of Jorhat (North Eastern India) were highly diverged. Phylogenetic relationship produced by Tamura 3-parameter with Gamma distribution (T92 + G) model using mtCOI demonstrated the presence of *L. e. pseudobrassicae* in all of the surveyed locations in India including Chintapalli (Andhra Pradesh) a Southern India, where it was reported for the first time. Neutrality tests viz. Tajima and Fisher test supported neutral theory of evolution. DNA barcoding of 16 locations with universal primer (LCO1490- Forward and RHCO2- Reverse) employed were amplified at 657 bp of mtCOI gene in *L. e. pseudobrassicae.* Furthermore, our findings in mapping the distribution of *L. e. pseudobrassicae* in various locations will pave the way for future research and the development of area-wide management tactics for *L. e. pseudobrassicae* in India.
Keywords: *Lipaphis erysimi pseudobrassicae*, RAPD, SSR, mtCOI, Phylogenetic relationships

Chlorpyrifos Exposure-Induced Alterations in Acetylcholinesterase Activity and Oxidative Stress Parameters in Channa punctatus Fish: A Comprehensive Investigation

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ABSTRCAT
This study investigated the impact of chlorpyrifos exposure on various biological parameters in Channa punctatus fish, including acetylcholinesterase (AChE) activity, lipid peroxidation, glutathione metabolism, and antioxidant enzyme activities in kidney, liver, and gill tissues. The

fish were subjected to three sub-lethal concentrations of chlorpyrifos (0.6 ppm, 0.3 ppm, and 0.16 ppm) along with a control group for comparison. The findings revealed a significant dose-dependent and time-dependent reduction in AChE activity in all three tissues of fish exposed to chlorpyrifos. Moreover, elevated levels of malondialdehyde (MDA), an indicator of lipid peroxidation, were observed in all tissues of chlorpyrifos-exposed fish, exhibiting dose-dependent and time-dependent effects. Increased concentrations of reduced glutathione (GSH) and oxidized glutathione (GSSG) were found, indicating oxidative stress in the kidney, liver, and gills of fish exposed to chlorpyrifos. Additionally, glutathione peroxidase (GPx) activity exhibited significant alterations across all tissues, with higher doses and prolonged exposure leading to more pronounced effects. Glutathione S transferase (GST) activity was significantly increased in all treatment groups, with the highest activity observed in the high dose group at all-time points. These results suggest that chlorpyrifos exposure significantly inhibits AChE activity and induces oxidative stress in multiple tissues of C. punctatus fish. These findings highlight the potential adverse effects on fish health and survival, emphasizing the importance of monitoring and regulating pesticide use in aquatic environments.

Keywords: Channa punctatus, Chlorpyrifos, AChE, Lipid peroxidation, Glutathione

Plant growth promoter produced by *Trichoderma virens* and its effect on mungbean (*Vigna radiata* (L.) Wilczek) seedling

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ABSTRACT

Trichoderma virens is extremely effective as a potential biocontrol agent. The ability of up to seven *T. virens* strains to stimulate mungbean growth is examined in this study. These strains are useful for controlling soil-borne pathogens. In vitro testing revealed that every strain was capable of producing a sizable amount of Indole-3-acetic acid (IAA) and exerting efficient phosphate solubilizing activity. In Czapek dox agar, IAA production ranged from 5.2 g mL-1 to 71.5 g mL-1. After two days of incubation, phosphate solubilizing activity became apparent, and six days later, a plate assay detected the highest level of activity. The amount of phosphate that could be dissolved per millilitre ranged from 0.82 to 4.69. *In vitro* study showed that *T. virens* Tv3 and Tv4 triggered the increase of IAA synthase in mungbean seedling as well as plant height and root length. A positive correlation was observed between IAA synthase of roots and several growth parameters (root fresh weight, plant height, and root length).Therefore, these two strains of *T. virens* could be suggested as plant growth promoters on mungbean.

Keywords: Trichoderma, IAA Synthatase, Incubation, Czapek dox agar

Arsenic acquisition pattern in different plant parts of aromatic rice cultivars

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ABSTRCAT
A field trial was conducted in arsenic affected area of Nadia district, West Bengal during (*kharif*) season of 2020 to assess arsenic (As) accumulation in different plant parts of aromatic rice cultivars. The field trial was laid out in Randomized Block Design (RBD) with 15 treatments (aromatic rice cultivars) and three replications. Results revealed that the aromatic rice cultivar 'Poreiton', a cultivar collected from Manipur, showed maximum arsenic accumulation in grain and husk i.e. 1.68 mg/kg 0.93 mg/kg respectively; being statistically at par with cultivars 'Wairi-chakhao' and ''Lalbadshabhog'. Least arsenic accumulation was found in the cultivar 'Tulaipanji' (0.17 and 0.71 mg/kg grain, respectively). Hence, grain of the cultivar 'Tulaipanji' was found to be safe for human consumption, as the grain as content within the safe limit as per WHO's guideline (maximum 0.2 mg/kg of white rice). But other cultivars need some mitigation strategies with respect to water and nutrient management so that grain as content is kept within the safe limit.
Keywords: Aromatic rice, Arsenic content, Lalbadshabhog, Wairi-chakhao

Screening of pearl millet germplasms against Drechslera leaf spot disease under artificial inoculation conditions in Arid Western Plains of Rajasthan

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ABSTRCAT
Present investigation revealed that, forty germplasms were evaluated against *D. setariae* under artificial inoculation conditions during *Kharif* 2019 and *kharif* 2020. None of the germplasms were found immune (I), highly resistant (HR), resistant (R) and none germplasms were also reported as susceptible (S) and highly susceptible (HS) against *D. setariae* on pearl millet germplasms. Seven germplasms Local germplasm-1, Local germplasm-2, Local germplasm-4, Sardar Sahar-646, Sardar Sahar-656, Sardar Sahar-658 and Sardar Sahar-685 were observed as moderately resistant (MR). Six germplasms Local germplasm-3, Local germplasm-15, Sardar Sahar-651, Sardar Sahar-662, Sardar Sahar-664, Sardar Sahar-677 were assessed as low resistant (LR). Twelve germplasms Local germplasm-5, Local germplasm-7, Local germplasm-8, Local germplasm-16, Sardar Sahar-640, Sardar Sahar-645, Sardar Sahar-647, Sardar Sahar-654, Sardar Sahar-660, Sardar Sahar-674, Sardar Sahar-680, Sardar Sahar-714 were recorded as mesothetic (M). Six germplasms Local germplasms-6, Local germplasms-18, Sardar Sahar-636, Sardar Sahar-639, Sardar Sahar-649, Sardar Sahar-666 were observed as low susceptible (LS). Nine germplasms Local germplasms-9, Local germplasms-11, Local germplasms-19, Local germplasms-20, Sardar Sahar-642, Sardar Sahar-643, Sardar Sahar-648, Sardar Sahar-650, Sardar Sahar-713 were assessed as moderately susceptible (MS) disease reaction.
Keyword: Disease reaction, Evaluation, Foliar disease, Germplasm, Millet

Growth and yield of black gram (*Vigna mungo* L.) as influenced by different mulches under rain fed condition

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ABSTRACT

Mulching is one of the most important agronomic practices which aimed to protect moisture from soil. It enables more soil moisture retention, aids in temperature regulation, boosts the physical, chemical, and biological qualities of soil, as it contributes nutrients and eventually promotes the development and production of crops. Therefore, in view of the above facts, a fieldexperimentwas conducted during *kharif* season of 2020-2021 at Experimental Farm Agronomy Section, College of Agriculture, Latur to study theeffect of different mulches on growth, yield and quality of black gram under rainfedcondition. The soil of experimental plot was clay in texture, moderately alkalinein reaction having pH (7.8) with chemical composition such as low in availablenitrogen (125.3 kg ha^{-1}), very low in available phosphorous (18.2 kg ha^{-1}) and veryhigh in available potassium (498.58kgha^{-1}). It was well drained whichwasfavourableforoptimumgrowth. The experiment was laid out in Randomized Block Design. Seventreatments were replicated thrice. The treatments were T_1 - Control, T_2 - Strawmulch @ 5 t/ha, T_3 - Spreading of FYM @ 5 t/ha, T_4 - Hand weeding cum livemulch, T5-Spreading of glyricidia/leucaenatree leaves/lopping, T6-Soilmulchby1 hoeing, T_7 - Soil mulch by 2 hoeing. The gross and net plot size of each experimental unit was 5.40 m x 4.50 m and 4.5 m x 3.9 m, respectively. Sowing was done by dibbling method using seed rate 12-15 kg ha^{-1}. The recommended dose of fertilizer for blackgram crop was 25: 50: 00: kg NPK ha^{-1}. The result showed that different mulches affected growth, yield andquality of black gram over no mulch. Hand weeding cum live mulch being (T_4) statistically at par with straw mulch (T_2) and farmyard manure (T_3), recorded significantly higher plant height, number of branch esperplant, dry matteraccumulation, soil moisture content, number of seed perpod, seedyield (2129kg ha^{-1}), st raw yield(4360kgha^{-1}), biological yield (6489kgha^{-1}), net monetary return Rs. 69442 and B:C ratio 2.99 of blackgram ascompared to no mulch.

Keywords: Blackgram, straw, Farmyardmanure, Glyricidea leaves, soil mulch by hoeing, soil moisture

Some Contribution to Misclassified Distributions and their Application

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ABSTRCAT

A misclassification is an error when some observations are misclassified from one value to another value. In certain experimental investigations involving discrete distributions, external factors may induce a measurement error in the form of misclassification. For instance, a situation may arise where sometimes certain values are incorrectly reported such a situation is termed as modified or misclassified distribution. We have made an attempt to study the misclassification in some discrete distributions where sometimes the value one is incorrectly reported as zero with probability α, in relation to some discrete distributions. We obtain the moments, recurrence relation among central moments and factorial moments of some misclassified distributions like misclassified binomial distribution, misclassified Poisson distribution and misclassified negative binomial distribution; we have obtained the estimation of parameters using maximum likelihood estimation of these misclassified distributions. Finally, two examples are presented for the misclassified Poisson and Binomial distribution to illustrate results and a goodness of fit.

Integrated Pest and Disease Management in Barley (*Hordeum Vulgare*) Under Cold Arid Conditions of Ladakh-India

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ABSTRCAT

Studies were conducted during four consecutive seasons commencing from 2019 till 2022 at multi-location trails of Union Territory of Ladakh. Barley is one of the most important cereal crops of Ladakh and is grown in all regions as main staple food. Owing to its high profitable cultivation the farmers of Ladakh have intensely cultivated it on all land types with varied elevations and input facilities. The cultivated soils were maintained with good fertility status and assured irrigation following the full package and practices of field crops asper SKUAST-Kashmir. There are many contradicting factors hindering the profitable cultivation of barley and among them the insect pests and diseases are dominant contributing to maximum yield loss. Hence keeping in view the disease and pest incidence, an integrated management of pests and diseases were deliberated in a module format at multiple locations. Experiments were conducted in consecutive seasons for all four years at selected eight locations of Ladakh comprised of Drass, Kargil, Nyoma, Leh, Rangdum, Suru, Nubra and Zansakr. Three dominant and commonly cultivated region specific barley varieties namely Sarmoo, yanggar and Chayay (nomo) were taken into considration. The sarmoo is a late sowing variety (sowing: 1stweek of May and harvested on 4th week July) were cultivated on wide range of Ladakh and is used as barley flour for making bread. The sarmoo is slightly white in color and has good protein content and other nutrient contents. While as, variety Chayay (nomo) is a later maturing one important for making local bees and is comparatively red in color. A Completely Randomized Block Design were followed and all treatment were replicated thrice within plot comprised of 8 rows of 6 m length 25 cm apart from each other. The uniform dosage of fertilizers NPK @ 80:30:20 kg/ha were given during experiment. The chemical insecticides like chloropyriphos @ 0.1 g/liter, imidacloprid (Gaucho® 70WS) @ 0.6 g a. i/kg, bio-agents like spore suspension of *Trichoderma harzianum* @ 5 g/kg (obtained from Panjab India) of seed were applied at the time of sowing. However, the foliar application of biocontrol agent used were *T. harzianum* @ 10^4 spores/ml, plant extracts such as azadirachtin were applied @10 000 ppm (0.3%) and spray application of fungicides as well as insecticides like propiconazole (Tilt® 25 EC) @ 0.1% and imidacloprid (Confidor®) respectively, were also carried out when incidence of disease and pests was recorded on the barley crop. Application of propiconazole was done thrice in total crop cycle at an interval of 40 days. While as single spray application of imidacloprid was given at the start of sowing, however the neem bio-

pesticides were repeatedly applied after an interval of 10 days. All the treatments reduced the incidence of rusts and blight, and the foliar aphids, termites and sucking insects compared to untreated control. Amongst the treatments, the seed treatment method has given higher and significant results with maximum yield and minimum incidence of diseases and insect pests compared to untreated control.

Keywords: Barley, Insect, Disease, Management, Haryana, Insecticides

Dry and Wet Analysis for Crop Planning Using Markov's Chain Model for Damoh District of Madhya Pradesh, India

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ABSTRCAT

It is important to know the sequence of dry and wet period for crop planning and to carry the agriculture practices of region. An attempt has been made to analyzed 21 years of rainfall (2000–2022) at the Damoh District in Madhya Pradesh, India for forecasting the probable time of onset and withdrawal of monsoon, probability of dry spells by using Markov chain model and finally crop planning for the region. The successive dry weeks indicate the need of supplemental irrigations and moisture conservation practices whereas, successive wet weeks gives an idea of excessive runoff water availability for rainwater harvesting and to take up suitable measures to control soil erosion. The average annual rainfall at Damoh District was observed as 1089.1 mm with coefficient of variation (CV) of 32.8%. The data on onset and withdrawal of rainy season indicated that the monsoon started effectively from 24th SMW (11-17th June) and remained active up to 40th SMW (22-28th October). During rainy season the probability of occurrence of wet week was observed more than 35% during 23-24th SMW (4th June–17th June) and average weekly rainfall ranged from 27.4 to 41.9 mm, this rain can be utilized for summer ploughing and initial seed bed preparations. Results obtained through this analysis would be utilized for agricultural planning and mitigation of dry spells at the Damoh District in Madhya Pradesh, India.

Studies on Maydis Leaf Blight Disease of Maize Caused by *Cochliobolus heterostrophus* (Drechsler)

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ABSTRCAT

Maydis leaf blight is considered the most devastating disease of maize crop, which causes noticeable reduction in crop yield. It is caused by the fungus *Cochliobolus heterostrophus* (Drechsler). It is also known as Southern corn leaf blight. Damage is most critical if infection occurs prior to silking and if weather conditions are favourable for disease development during the reproductive growth stages. For the purpose of better understanding and finding out the detailed study of the fungal pathogen firstly the symptoms should be identified in the field and isolate the pathogen, and then fungus should grow on suitable culture media under laboratory condition. Potato Dextrose Agar (PDA) is used as the media for the growth of the fungal pathogen. Ten different culture media were studied for the growth of *C. heterostrophus* and PDA was found to be the best medium for the pathogen. Different levels of pH were tried and the growth of the pathogen was best in neutral pH 7. Screening of fifteen germplasms was done and majority of the

germplasms were resistant to the pathogen. *In vitro* evaluation was done on seven *Trichoderma spp.* seven plant extracts and seven fungicides. By using *Trichoderma sp.* the fungal pathogen grown in the Petri plate by dual culture method. Botanicals and Fungicides were grown by following the poisoned food technique. After the full growth of the pathogen in the control plate, observations should be taken. As Bipolaris is slow growing pathogen, it takes nearly 7 days for complete growth in the control plate. Per cent inhibition should be calculated. By the results obtained, the best bio-control agent against Bipolaris is *Trichoderma ovalisporum* (85.23%) showing maximum growth inhibition andleast per cent inhibition of 80.4% was shown by *Hypocrealixii.* The fungicides are evaluated at four different concentrations *i.e.,* 0.1%, 0.25%, 0.5% and 0.75%. Among all the seven fungicides best per cent growth inhibition (100%) was shown by Propiconozole 25% EC and Tebuconozole 25% EC at all the four concentrations and least per cent inhibition was found in the fungicide Zineb 75% WP at 0.10% concentration (42.35 per cent inhibition). Plant extracts were evaluated at three different concentrations *i.e.,* 5%, 10% and 15%. Among all the seven plant extracts best per cent growth inhibition (100%) was shown by Garlic extract at all the three concentrations and least per cent inhibition was found in Onion at 5% concentration (61.17 per cent inhibition). Management of the pathogen was done in *in vivo* conditions with seven treatments using fungicides, plant extracts and *Trichoderma spp.,* among all the treatments the one with fungicides sprayed treatment showed the best results in terms of plant height, yield attributes and disease incidence.

Keywords: Trichoderma, Management, Botanicals, Maydis leaf blight, Fungicides

Integrated Farming System: A Sustainable and Resilient Approach for Agricultural Development in Odisha

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ABSTRACT

Integrated Farming System (IFS) is a sustainable agricultural system that aims to increase productivity, reduce risk, and promote resilience in the face of disasters. Integrated Farming System (IFS) has emerged as a sustainable and resilient agricultural approach, which aims to increase productivity and reduce risk associated with climate change. In Odisha, a disaster-vulnerable state in India, IFS is being encouraged as an alternative to conventional farming practices to enhance food security and livelihoods of farmers, especially small and marginal farmers. The IFS approach involves the integration of different farming systems such as crops, livestock, forestry, and fisheries. This integration enables farmers to diversify their income sources, improve soil health, and reduce production risks associated with climate change. Additionally, IFS helps to conserve natural resources and reduce environmental degradation. The study finds that the adoption of IFS in Odisha has led to several positive impacts. Firstly, IFS has led to an increase in yield and income for farmers as they are able to diversify their income sources by integrating crops, livestock, forestry, and fisheries. Secondly, IFS has resulted in improved soil health, reduced pest and disease incidence, and enhanced biodiversity. Thirdly, IFS has contributed to the conservation of natural resources, such as soil and water, by reducing the use of chemical fertilizers and pesticides. In conclusion, the study suggests that the adoption of IFS can have significant positive impacts in conservation of natural resources and promote resilience in the face of disasters and climate change. Therefore, there is a need for policymakers to promote IFS and provide necessary support to farmers to adopt this sustainable and resilient agricultural approach.

Keywords: IFS, Livelihood, Climate resilience, Employment

INTEGRATED MANAGEMENT OF CITRUS PSYLLA *Diaphorina citri* (Kuwayama) ON NAGPUR MANDARIN

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ABSTRCAT

Nagpur Mandarin is regarded as "Green gold" and Nagpur city after which the name of Nagpur orange is given is popularly known as the "Orange City". Present productivity which is almost 2.5 times lower than the national average is attributed to ravages of major pests and diseases. Regular incidence of eight major pests in Vidarbha region is an important constraint in economic cultivation of citrus. Among the insect pests, Citrus psylla Diaphorina citri is the most serious pest which coincides with the period of citrus flush. Both nymphs and adults of citrus psylla suck the cell sap resulting in curling defoliation of leaves, and flowers and die back of branches from tip to downward, as a result, premature dropping of fruits occur. Fifth instar nymphs act as a vector of greening bacterium which accelerates the decline 83 to 95 per cent Loss due to citrus psylla is reported. Considering the immense damage potential of citrus psylla, present study was planned to study the population dynamics and damage potential of citrus psylla in Nagpur mandarin. Bio-efficacy of eleven treatments was evaluated to find out an eco-friendly and cost effective treatment for management of citrus psylla. The citrus psylla adult population was very low during January but with the increase in temperature in February and March, the activity of adults increased. At the same time significant increase in nymphal population was also observed during February and March. It is associated with the flushing cycle and warm conditions. The major predators associated with citrus ecosystem viz., Mallada, Lady bird beetle, Spiders and preying mantids had higher population levels in second fortnight of February and first fortnight of March. Association pattern of weather parameters with natural enemies revealed preference of natural enemies to cooler conditions with lower humidity regime for Mallada grubs, warm conditions for lady bird beetles and Tamarixia parasitisation. The density dependant association of natural enemies with citrus psylla nymphs or adults abundance was evident in case of Mallada grubs, Tamarixia parasitisation and lady bird beetle grubs. Parasitism of citrus psylla nymphs by T. radiata was in the range of 0.0 – 15.4 per cent Application of neonicotinoides (imidacloprid 0.25 ml/l, acetamiprid 0.1 g/l and thiomethoxam 0.1 g/l), quinalphos 1 ml/l + karanj oil (pongamia oil) 10 ml/l and quinalphos 1 ml/l performed better for the management of citrus psylla population. The abundance of natural enemies viz., mallada, lady bird beetle, spider and preying mantid was adversely affected by application of quinalphos 1 ml/l + karanj oil (pongamia oil) 10 ml/l and quinalphos 1 ml/l. The ecofriendly treatments with higher natural enemy counts were Verticillium lecani 4 g/l, mineral oil 5 ml/l, azadirachtin 2 ml/l and amongst the insecticides application of imidacloprid 0.25 ml/l, acetamiprid 0.1 g/l and thiomethoxam 0.1 g/l showed the promise. Higher growth of new flush, bearing (buds, flowers and fruit) and biomass was recorded due to application of imidacloprid 0.25 ml/l, acetamiprid 0.1 g/l, thiomethoxam 0.1 g/l and quinalphos 1 ml/l + karanj oil (pongamia oil) 10 ml/l.

Keyword: Nagpur Mandarin, Orange City, Citrus psylla, Thiomethoxam, Parasitism, Natural enemies

Assessment of groundwater irrigation quality in Chikkanayakanahalli Taluk, Tumakur District, Karnataka

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ABSTRCAT
The assessment of the hydro chemical quality of groundwater is very important to explore its nature and usefulness. Irrigation has made a significant contribution to supporting the population's expanding food demands, as well as promoting economic growth in irrigated regions. The current study was carried out in order to estimate groundwater suitability for irrigation. Based on the physicochemical analysis, the irrigation parameters like Sodium Absorption Ratio, percent sodium, Residual Sodium Carbonate, Residual Sodium Bicarbonate, Soluble Sodium Percentage, Permeability index, Kelly's ratio, and Magnesium hazard were calculated. Among all the seirrigation parameters, it was found that all the water samples were suitable for irrigation, where as Kelly's Ratio varied from 0.95 to 10.21, and all the water samples were unsuitable for irrigation except one sample. Magnesium Hazard values were found that to be in the range of 13.99% to75.39%.Out of42 samples, 11.90% of the samples showed a magnesium hazard below 50%,suggesting their suitability, while 88.09% fall in the unsuitable category with Magnesium Hazard more than 50%,indicating their adverse effect on crop yield in the study area.
Keywords: Chikkanayakanahalli, Irrigation water quality index, Kelly's index, Sodium, Absorption ratio, Permeability index, Irrigation quality

Effect of Colchicine Treatment on Seed Germination, Plant growth and yield traits of cowpea (*Vigna Unguiculata* (L.)Walp)

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ABSTRCAT
Cowpea is very important in the tropical and sub-tropical regions of Africa where it serves as a source of protein for the local population coupled with its ability to fix atmospheric nitrogen. Induced mutation has been successful in many crop species but least applied in legumes like cowpea. Experiment was conducted on colchicine induced variations in cowpea The study investigated the effect of colchicine treatment on germination of cowpea seeds, as well as morphological and selected growth traits of cowpea plant (*Vignaunguiculata* (L.) Walp). Dry cowpea seeds were treated with colchicine at concentrations of 0.02, 0.04, and 0.05 percent. Their diploid counterparts were compared to see how polyploidy differ them. Observations of stomata, nucleus size, plant height, number of branches per plant, leaf area, and number of leaves are all morphological attributes that are more varied. There are considerable variations in flower and seed proportions. The number of seeds and stomatal cells were significantly different in a negative way. Size of the nucleus (µm2), stomatal length and width (µm), blossom length (cm) and width (cm), days to first blooming, number of flowers per plant, number of seeds per plant, seed length (mm), seed width (mm) and ten seed weight were all found to have positive significant differences. Induction of polyploidy produced a taller, more branching plant with an increase in seed weight of 10 seeds. This strategy could be used in plant breeding initiatives to increase the yield of fodder.
Keywords: Colchicine, Seed germination, Plant growth, Yield traits, Cowpea.

Effect of Intercropping and Raised Bed Planting Under Maize Based Cropping System of Siwan District, Bihar, India- A Climate Resilient Approach

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ABSTRACT

Climate Resilient Agriculture (CRA) practises includes broad set of practices that sustainably increases productivity and resilience in farming system. Practises of CRA such as intercropping and raised bed planting of maize not only sustains the production also saves time and efforts of farmers in coping up climatic vagaries. Such practises were trailed in maize growing areas of Siwan district of Bihar under Climate Resilient Agriculture programme sponsored by Government of Bihar during *Kharif*, 2022. Siwan district experienced failure in monsoons in the year 2022 as a result the crops cultivated in these areas faced moisture stress and ultimately reduction in yield levels. Maize crop (Variety-Vikrant) was cultivated in farmers' field as demo under CRA programme using intercropping with soybean (Variety-NRC 328) and also raised bed planting. Totally, eight hacters land were under intercropping of maize with soybean and fourteen hacters of land under raised bed planting. On an average, intercropping of maize with soybean resulted in yield of 48.5 q ha^{-1} in demo plots and 41.2 q ha^{-1} in non-demo plots with net returns of Rs. 40,125 and Rs. 30,620, respectively in demo and non-demo plots and BC ratio of 1.92 and 1.76, respectively in demo and non-demo plots. Raised bed planting of maize resulted in yield of 49.1 q ha^{-1} in demo plots and 41.2 q ha^{-1} in non-demo plots with net returns of Rs. 41300 and Rs. 30620, respectively in demo and non-demo plots and BC ratio of 1.98 and 1.76, respectively in demo and non-demo plots. Intercropping and raised bed planting thus served as moisture conserving structures in maize based cropping system of Siwan district by mitigating moisture stress condition resulting in better yield than non-demo plots.

Organic Amendments can impact on growth, yield, and quality of strawberries *(Fragaria x ananassaDuch*.) cv Winter Dawn

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ABSTRCAT

This study aimed to investigate the impact of different organic amendments and biofertilizers on the growth, yield, and quality of strawberries. (*Fragaria x ananasa Duch*.) cv. Winter Dawn under subtropical conditions. A total of nine treatments were tested in a complete randomized design, including various doses of Jeevamruth, Panchgavya, Azobacter, and Azospirillum, as well as a control group T1(Jeevamruth @3%), T2 5% Jeevamruth), T3(2% Panchgavya), T4(3 % panchgavya), T5(10% Azobacter), T6(20% azobacter), T7(10% azospirillum), T8 (20% Azospirillum), T9-Control (100 Percent RDN through FYM (Control).. The results indicated that T1 (3% Jeevamruth) had the highest yield (0.847 kg), longest fruit length (37.42 cm), largest leaf area (12.57 cm^2), and shortest days taken to first flower (45 days). Treatment T8 (20ml

Azospirillum) resulted in the maximum plant height (11.63), while T2 (5% Jeevamruth) showed the highest number of leaves (26), plant spread (14.67cm), fruit width (24.13mm), and fruit weight (17.17). Overall, the treatments with T1 (3 %Jeevamruth) and 20% Azospirillum were found to be the most effective in promoting growth, yield, and quality of strawberries under subtropical conditions. These findings provide important insights for the standardization of agro-techniques for strawberry cultivation in subtropical regions.

Keywords: Organic, Biofertilizers, Yield, Quality, and Strawberry

Influence of organic manure and different cultivar on growth attributes of soybean (*Glycine max*L.)

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ABSTRCAT

A field experiment was planned and conducted during 2022 at Crop Research Center, School of Agricultural Sciences, Shri Guru Ram Rai University, Pathri Bagh, Dehradun, Uttarakhand, India to investigate the "Influence of organic manure with different cultivar on growth and yield of soybean (*Glycine max* L.)". The experiment was laid out in 4×3 factorial randomized block design (FRBD) with three replications and twelve treatment combination comprised of four factor of organic manure [FYM (10 t/ha), Vermicompost (5 t/ha), Neem cake (1.25 t/ha) and Control)] and three factor of different cultivar (Pant Soya-23, Pant Soya-26 and Pant Soya-1225). Observations on growth attributes were recorded. The results revealed that application of Vermicompost 5t/ha and Pant Soya-1225 cultivar was found significantly higher Plant height, Number of Branches per plant, Number of nodules per plant , Dry weight of plant, Leaf area index, Crop growth rate, Relative growth rate.

Keyword: Cultivar- Pant Soya-23, Pant Soya-26 Pant Soya-1225, Soybean, FYM, Vermicompost, Neem cake

Abiotic Stress Management under Climate Change

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ABSTRACT

Agriculture and climate change are associated with each other in various features as the root cause for stress (biotic and abiotic) is climate change. Climate change affects agriculture in many ways such as heat waves, temperature (fall and rise), fluctuations in level of CO_2, irregular and scanty rains, pests and microbes etc. These factors of climate change have created hinderance to the environmental balance of the earth as well as to the food supply. The accountability to these stresses by the plants leads to disturbance of the plant metabolism process, leading to reduction in the plant yield and quality due to poor growth and development. Abiotic stresses such as drought, flood, salinity, temperature, heavy metal stress etc. have adverse effects disrupting the processes in plants and thus reducing the crop yield by approximately 70%. Studies have also reported that abiotic stresses are responsible for about 50% losses of the crop yield. The developmental stage of the plants when exposed to such stresses is the deciding factor of the crop response to the stress.

The response to stresses is majorly governed by the genes and biochemical metabolism through various physiological processes. Inaccordance to climate change, due to high temperature plants experience severe damage to the chlorophyll, thus affecting the functionality of plants. It also results in impaired pollen and ovary development leading to inferior reproductive phase of the plants resulting in poor yield. The management of abiotic stresses in plants is a tough task because of its multidimentional habit. Many scientists and researchers are involved in studying this comprehensive area and are working towards the ways for developing abiotic stress tolerance in various crops. The genes involved in pathways like ion homeostasis, osmolyte synthesis, antioxidative pathways etc. can be comprised for incorporating abiotic stress tolerance. Due to the multigenic nature of abiotic stress tolerance, modern approaches involve genetic transformation of various genes or transcription factors. A conventional approach can also be undertaken with proper screening methods and selection criteria through cultural breeding techniques for tolerance to abiotic stresses in plants. But one of the main limiting factors for adapting the conventional approach is that the screening/ identification process to a trait for particular type of stress tolerance in a plant might be influenced by several other stress factors. For example, the cultivars of a crop screened for tolerance to flood stress, might be affected by other factors such as biotic (pests and microbes) or abiotic (heavy metal) stress. An alternative or a better way for screening of abiotic stresses in plants is glasshouse screening. Management of abiotic stresses can be done by genetically improving the genes and transcription factors or by cultural practices such as adjusting the planting time or crop density. The management of abiotic stresses can also be done by application of phytohormones, osmoprotectants etc.

It is evident that climate change has lead to severe intensification of these abiotic stresses in plants. If not managed properly, these can make it impossible to meet the global food demand in the near future. The adaptability or tolerance to abiotic stresses in plants is due to the activities of various stress responsive genes that correlate with other elements of stress transduction pathways. A detailed approach and understanding of the physiological processes in response to abiotic stress can result in design models and transform mechanisms in order to improve tolerance in different crops.

Keywords: Abiotic stress, Climate change, Tolerance, Stress response, Management

Impact of climate change on insect pests of fruit crops

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ABSTRCAT

Climate change is the most important global shift that has caught the interest of scientific communities worldwide. Pest activity variations brought on by the climate have an additional impact on farming output, resulting in higher harvest loss, lower yields, and lower grade produce. Climate change has altered the occurrence of pest and disease in fruit crops. Changes in flowering time and temperature fluctuation can result in the introduction of new pests, minor pests gaining major pest status, and breaking of resistance. The strain that climate change will likely place on fruit output will make it harder to meet future fruit production goals. Geographical spread, local populations of flora and pollinators, and phenology all seem to have been impacted by recent climate change. The creation of new horticultural crop varieties that are tolerant of high

temperatures, resistant to pests and diseases, and produce high yields under stress, as well as the application of high-tech horticulture and responsible resource management, will be the key strategies for addressing this challenge. Despite of rising atmospheric CO2, future food production is unpredictable with concurrent events of global warming and altered precipitation.
Keywords: climate change, pest, fruit, horticulture

Effect of Inm on Active Pools of Carbon
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ABSTRCAT
Agriculture sector is facing numerous challenges and with the increasing population, need for agricultural products are also increasing. Therefore, to meet the requirement of ever increasing population, integrated nutrient management is practiced. No single source of nutrients is capable of supplying plant nutrients in adequate and balanced proportion, whereas a simple technique of using minimum effective dose of sufficient and balanced quantities of inorganic fertilizers in conjunction with organic manures, crop residues, green manures, legumes in cropping systems, use of bio-fertilizers and other locally available nutrient sources called integrated nutrient management has been proposed as a promising strategy for addressing such challenges. INM has multifaceted potential for the improvement of plant performance and resource efficiency while also enabling the protection of the environment and resource quality. To understand the mechanisms by which C is lost or stored in terrestrial systems, SOM has been conceptually separated into various pools. The SOM is subdivided into three pools that are kinetically defined as active, slow and passive pools. These pools play various functional roles in SOM dynamics and nutrient cycling. Soil microbial biomass study reflects energy flow, acts as an agent of transformation of all substances and reflects on a labile pool of C, N, P, S and micronutrients. Active pools represent microbes and microbial products, water soluble carbohydrates and exocellular enzymes and these easily comprise more than 10 to 20% of the total pulse production.Integrated use of organic manure and chemical fertilizers improves soil carbon pools viz. active pools were highest in organic and INM practices and passive pool is found abundant where inorganic sources were used. The influence of soil carbon on yield is both direct and indirect as it plays multifunctional role such as buffering, restoring and supplying of plant nutrients and also has great residual effect on subsequent crops. Integrated use of FYM with chemical fertilizers or use of FYM alone exerted significant effect on the active pools of soil organic carbon.
Keywords: Integrated Nutrient Management, Active Pools, Organic Carbon, Manure.

Influence of Mulching on Productivity of Nectarine (*Prunus Persica* L. ß Batsch Var. *Nucipersica*) Cv. Snow Queen in Rainfed Midhills of Himachal Pradesh
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ABSTRCAT
Mulching is the practice of covering the soil around the tree with a layer of organic or inorganic material to suppress weed growth, conserve soil moisture, and enhance soil fertility. The present investigation entitled, “Influence of mulching on productivity of nectarine (*Prunus persica* L.

Batsch var. *nucipersica*) cv. Snow Queen", was conducted on 10 year old nectarine orchard, established at Integrated Horticulture based Farming system-Model farm of the Directorate of Research, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan (H.P) during the year 2021. Eexperiment consisted of seven treatments viz. unmulched control (UM), grass mulch (GM), pine needle mulch (PM), black polythene mulch (BP), transparent polythene mulch (TP), nylon mulch mat (MM) and recommended practice (RP) were replicated four times in a Randomized Block Design. The results emanated from the study revealed that mulches significantly influenced the soil hydrothermal regimes. Highest soil moisture contents at 0-7.5 and 7.5-15 cm depth were conserved by BP followed by MM, GM, PM, TP and lowest under UM. Mulches favourably moderated the soil temperature and TP recorded highest maximum (1430 hr) and minimum (0730 hr) temperature. Physical-chemical properties of soil and leaf nutrients content were altered marginally by varied mulch materials. In terms of weed control, mulches effectively check and suppress the growth and emergence of weeds, application of synthetic mulches like MM and BP resulted in complete suppression of weeds except TP which recorded maximum weed biomass. Organic mulches viz. GM and PM induce to build-up and proliferate microbial community. GM recorded maximum viable microbial count and biomass-C followed by PM. Application of mulches and irrigation in treatment RP resulted in increased fruit size, weight and yield over unmulched control. BP mulched trees recorded highest (20.92 t ha^{-1}) fruit productivity closely followed by RP (20.0 t ha^{-1}) whereas lowest under UM (14.17 t ha^{-1}). The results of one year study suggested a positive effect of mulching on yield and productivity of nectarine.

Keywords: Mulching, nectarine, hydrothermal regime, microbial count, weed biomass productivity

Management of Pre-Harvest and Postharvest Losses in Vegetables

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ABSTRCAT

India is the 2nd largest producer of vegetables in the world, but about 20-30% of the vegetable produce is lost annually due to lack of adequate infrastructure and limited use of modern postharvest technologies. Vegetables have short shelf life due to high respiration rate, moisture content, bulky nature, and susceptibility to insect pests and diseases. Pre-harvest and post-harvest losses refer to measured quantitative and qualitative losses in the production system from the farm to the consumer level. Pre-harvest factors can be controlled by various cultural practices such as light and temperature and by choosing the right cultivar. Post-harvest quality deterioration occurs during harvesting, followed by marketing, transportation, and improper storage methods. These losses can be reduced by using post-harvest technologies at different stages such as packaging, processing, preservation, and storage. The knowledge of pre and post-harvest technology plays an important role in minimizing vegetable losses. Value addition and processing of vegetables are essential steps in the food industry that aim to enhance the quality, safety, and shelf life of vegetables while adding value to the final product. Value addition involves the transformation of raw vegetables into processed products such as canned vegetables, pickles, dehydrated vegetables, frozen vegetables, and ready-to-eat salads. Processing of vegetables involves various techniques such as blanching, freezing, canning, drying, and fermentation, which help to preserve the nutritional value and quality of the vegetables.

Keywords: Vegetables, Pre harvest, Postharvest, Quality, Value addition, Processing

Farmer Producer Organisations for Sustainable Development of Agriculture

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ABSTRCAT
FPO is a legal entity formed by the farmers where the farmers themselves are the shareholders. We can say 'FPO is an organisation of the farmers, by the farmers, and for the farmers. FPOs strive to connect its members to the final consumers, minimize the role of other stakeholders, through increasing their revenue from economies of scale and significantly reducing their transaction costs in the modern supply chains. When compared to non-members, FPO members had access to better information, procurement, processing, transportation, insurance, and storage facilities. Typically, a farmer producer organisation is a business that was established under the Indian Companies Act of 1956 as revised in 2002 and consists entirely of farmers and producers. Presently, around 6000 FPOs – India and 87 *FPOs – J&K, 36 FPOs are under SFAC, 16 under NABARD, 26 under NAFED and 9 under NCDC*. Major Implementing Agencies of FPO are SFAC-(Small Farmers' Agri- Business Consortium), NABARD, Ministry of Agriculture and Farmers' Welfare, State governments, NAFED (National Agricultural Cooperative Marketing Federation of India Ltd) and NCDC (National Cooperative Development Corporation . Implementing agencies establish Cluster-Based Business Organisations at the state or cluster to build and promote FPOs in accordance with their needs; nevertheless, Project Management Advisory and Fund Sanctioning Committee will assign objectives for produce clusters, entire or part of the state or area. FPOs provide a potential new route for overcoming difficulties, particularly in gaining access to larger markets. Overcoming the limitations presented by the modest scale of their respective farms, FPO participants have been able to use the power of their combined resources to get access to capital and technology, lower transaction costs, access high-value markets, and form partnerships with private businesses on more equal terms. Mahashakti Mahila Milk Producer Company Limited Promoted by NABARD Women Empowerment through FPO who covered 109 villages and included 778 active members and makes total turnover (In 2017-18 FY) of 15 crore. Farmer Producer Due to their capacity to link smallholder farmers to markets, groups may be valuable and successful participants in the supply chain. Low membership and the seasonal nature of agriculture, which forces the FPOs to remain inactive during off-seasons, are the main obstacles to their expansion. Other obstacles include the lack of appropriate market linkages, issues within clusters, the absence of an APMC licence, etc.
Keywords: Processing, Transportation, Insurance, Market, Value addition.

The Use of Mobile Phone among Farmers for Agricultural Marketing

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ABSTRCAT
Smart phones have been identified as one of those effective innovations which benefited a large number of people in the developing world. In India, mobile applications are transforming agriculture. Agriculture is prime sector of importance. More than 50% of people are engaged in agriculture activity. To make agribusiness productive, smooth and respectable it is important that,

it should be linked to recent technologies. These technologies need to be smarter, faster and cheaper to use. Mobile application one of such technology that can be used directly in agricultural growth. (Barh and Balakrishnan, 2018). Mobile technology that creates opportunities for rural farmers to obtain information and knowledge about market, agricultural issues, problems and suggest how to develop the agricultural Market. Mobile services in agricultural sector provide more information on market, weather, transport service and agricultural techniques that helps to contact with the agencies and department (Huq, *et. al.,* 2017). Mobile phone is increasing among farmers but still there is gap available among business, customers and farmers. There is need of enhancement different project about mobile phone technologies where farmers could get easy access to communicate with people to sell their goods in market. The government and other related department should also plan to reach these farmers and provide latest information about seed, weather and market on the time and provide good price of their product (Chhachhar, *et. al.*, 2013).

Keywords: Mobile Phone, Uses, Agricultural Product, Agricultural Marketing, Marketing weather, Forecasting

Future of Biofortification in Indian Agriculture

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ABSTRCAT

Biofortification is the process of improving the nutritional quality of food crops. This can be achieved through agronomic practices, conventional breeding or biotechnology-based approaches like genetic engineering and genome editing. The role of biofortified crop is immense in present agricultural scenario. Over the time we have observed that on a long run it's not possible to supplement all type of nutrients to the vast majority of people belonging to different economic level, so in order to compensate this worldwide problem of nutritional deficiency we need to fortify our crops with different type of micronutrients.In recent years, the Indian government has taken several steps to promote biofortification in agriculture.The government launched the National Agriculture Biosecurity Project (NABP) in 2015 to improve he nutritional quality of food crops, and the Indian Council of Agricultural Research (ICAR) has established a network of biofortification centers across the country.Moreover, several Indian agricultural research institutes are working on developing biofortified varieties of crops such as rice, wheat, maize, and pulses. For example, the Indian Institute of Rice Research has developed a high-iron rice variety called "Dhan Shakti," and the Indian Agricultural Research Institute has developed a high-zinc wheat variety called "HD 3226". Biofortification of crops through genetic modification can effectively lessen the burden of micronutrient deficiencies in an economically viable way.The Socio-economic benefit for Biofortified crop is quite profitable as worldwide consumers are willing to pay 23.9% higher than normal crops.This health intervention would reduce the aggregated micronutrient deficiency burden in Asia [15.6 million disability-adjusted life years (DALYs)] by 12.5-51.4%, at a low cost of USD 7.9-27.8 per DALY in a pessimistic and optimistic scenario, respectively.Thus, if more research is done in this particular field then we will be able to meet our overall nutritional need with least variety of food which in turn will lead to better food security.

Keywords-Biofortification, Socio-Economic Benefit, DALYs

Impact of Green Technology on Sustainable Agriculture: A Review

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ABSTRCAT

A global understanding of the need to safeguard the environment and people's health has emerged in the face of climate change and the COVID-19 pandemic. Numerous social, economic, political, and environmental issues have been impacted by the pandemic. Governments from around the world have also ratified a number of protocols and agreements, including the Paris Agreement and Kyoto Protocol. However, up until this point, no appropriate measures have been taken, and governments have also been unable to persuade people to adopt and regularly practise environmentally friendly habits.Nevertheless, scientists have been working non-stop to come up with ways to save the environment and build a sustainable future for future generations. The government of all countries is implementing a Green New Deal, particularly for water, wind, and other renewable resources. The goal is to completely transition from relying on fossil fuels for energy by 2050 and reduce our dependence on them by 80% by 2030. Governments, academic institutions, scientists, NGOs, medical professionals, and the general public should all work together on this. In the context of agriculture and agri-food, the Organisation for Economic Co-operation and Development (OECD) defines "green growth" as "the pursuit of economic growth and development, while preventing environmental degradation, biodiversity loss, and unsustainable natural resource use". Renewable energy, zero tillage, biotechnology, organic farming, vertical farming, irrigation, integrated pest control, drones, fleet management, and digital sensors are the top green technologies and practises making farming more environmentally sustainable. The term "sustainable development" has been more popular over the past ten years, and current research and the expansion of knowledge in this area have raised interest in it. It includes concepts like cleaner production, pollution avoidance, pollution control, and resource efficiency.

Keywords: Climate Change, Green New Deal, Environmental Degradation, Biodiversity Loss

Digitalization for Sustainable Agriculture and Rural Livelihood Security in India

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ABSTRCAT

Indian agriculture is at cross roads to meet the challenges of environmentally sustainable and economically feasible food-systems. Precision agriculture with features of predictive modeling, real-time data capture, use of digital farm data, Internet of Things (IoT), sensors, etc., has been seen as a step forward in enhancing efficiency of farm processes. Digital marketing is helping all the small farm holding & large farm holding farmers (marginal, small, medium & large farmers) to find the multiple buyers for their produces and get higher prices. At the same time the buyers/ customers/consumers are also getting the farm fresh products for reliable prices as the commission agents & middle men are not getting involved in the digital marketing system. Farmers are using android phones to access the internet, whatsapp, face books, twitter & you tube to get the updated information globally. By using the above information which has got from the digital mode, they are getting linked with national & international markets to sell their agricultural products for the best prices. The digital marketing also helps.

Keywords: Digital Marketing, precision farming, data analytics, Information communication technology (ICT), e-marketing plat forms

Organic agriculture with residue free production: Present scenario and growth in India

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ABSTRACT
India ranks 4th globally in the largest area under organic agriculture and ranks 1st in highest number of organic producres in the world in 2020. This study has thrown light on the status and growth of organic agriculture in India and specifically Jammu and Kashmir for its export, production and farm area from 2012-2021. The data source for this study is from Agricultural & Processed Food Products Export Development Authority (APEDA). For assessing the growth Compound Annual growth rate (CAGR) and for forecasting linear regression model was used. The finding of this study unrevealed that the growth of organic agriculture for farm area and farm production in India is 20.69% and 14.59% respectively and as for Jammu and Kashmir it is 19.51% and 33.52% respectively. The linear regression model predicted 31,00,000 ha and 35,00,000 MT for India and 39,000 ha and 51,000 MT for Jammu and Kashmir till 2022-23. The average productivity of organic agriculture in India and Jammu & Kashmir is about 1.31 and 0.97 MT/ha. As in the case of organic export (Rs. Crores) for India and Jammu & Kashmir the growth is around 24.99% and -35.11% respectively. For growth in export with countries USA has a CAGR of 37.42% which is the highest followed by Australia with 29.31% then the European Union with 18.52%. Therefore, the novelty of this study clearly depicts that India is going to be a global competitor for organic products in the coming future as all its indicators are showing growth and the future is promising for organic agriculture which will enhance the soil health and its environment.

Keywords: Organic Agriculture, CAGR, Export, Organic production

Food processing of agriculture products

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ABSTRCAT
Food processing is a vital aspect of the food industry, which involves converting raw agricultural products into finished food products that are safe, convenient, and tasty to eat. This process is designed to increase the shelf life of food products, prevent spoilage, and maintain the nutritional value of the food. In this abstrcat, we will discuss the various techniques and methods involved in food processing. Food processing involves several stages, including cleaning, sorting, grading, cutting, blending, and packaging. The techniques used in each stage vary depending on the type of food product being processed. For example, fruits and vegetables are typically washed and sorted to remove any impurities, while meat and poultry are usually trimmed, deboned, and ground. One of the most common techniques used in food processing is preservation. This involves using methods such as canning, freezing, and drying to extend the shelf life of food products. Other techniques used in food processing include pasteurization, which involves heating food products to kill harmful bacteria, and fermentation, which is used to produce products such as yogurt, cheese, and bread. In recent years, there has been a growing interest in using newer technologies such as high-pressure processing, pulsed electric fields, and irradiation to process food. These

techniques are designed to reduce processing times, improve the quality and safety of food products, and reduce the need for preservatives. Overall, food processing is an essential aspect of the food industry that enables us to have access to a wide variety of safe, convenient, and nutritious food products.

Keywords: Processing, Shelf life, pasteurization, packaging

Fortification of zinc in wheat crop (*Triticum aestivum L.*)

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ABSTRCAT

Fortification is a cost-effective and better way to tackle micro-nutrient deficiencies. Enriched food helps in providing the daily intake nutrient requirement which can lead to improved food security internationally. The methods which are helpful in bio-fortification are a type of crop, method of application, doses of different fertilizers required. In wheat, fortification helps in the enrichment of micro-nutrient concentration in the edible portion of wheat which are grains. It is an effective manner that can maintain soil health as well as the nutritional value of crop will be improved by it.In crop production and crop nutrition role of macro and micronutrients is crucial to achieving high yield. Almost 60% of total arable or cultivated land is having problems due to mineral stress caused by unbalance of essential nutrients such as unavailability of the elements, deficiency of elements, or toxicity of the elements. This is responsible for reduction in the number of spikelet in wheat because, concentration of zinc in plants is lies between 25 to 100 ppm. When the crops are grown in zinc-deficient soils that time the yield of those crops reduces as well as the edible part is having a deficiency in zinc. This can cause severedisorders or malnutrition in humans those were eating zinc-deficient foods. Wheat is low in zinc concentration because of zinc-deficient soils. This can be done by producing these grains from the farmer's field which can be done by fortification of fertilizers by zinc which is used by farmers generally.Fortified fertilizers are a mixture of multiplenutrient carriers which satisfy the crops nutritional demand supported area, soil, and growth stage of the plant. Application of fortified fertilizers or coated fertilizers is useful in reducing deficiencies of Zn, B, and S within the soil and it ensures that the balance of nutrients by the use of fertilizers remains healthier for soil.

Keywords: Food security, Fortification, Micro nutrients, Fertilizers, Soil health.

Recent Trends in Marketing of agricultural produce

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ABSTRCAT

The most crucial industry for every nation is agriculture. Similar to this, India places a premium on agriculture. More over half of the nation's population works in this economic sector. We can say that India's economy is based primarily on agriculture. Our ability to survive rests entirely on it. India's agriculture and farmers are therefore crucial in every way.India's agricultural marketing is ineffective due to a mismatch between prices paid by consumers and those earned by producers, fragmented marketing channels, inadequate infrastructure, and regulatory distortions. To remedy these deficiencies and restrain the excesses of middlemen, urgent measures are required. Producers' firms and cooperative marketing societies could be

encouraged as alternatives for selling products, along with novel models that increase producers' negotiating power and scale up successful experiments. In the meantime, price policy needs to be asdjusted to reflect the changing demand and supply for different crops. Although the governmental sector is equally important to fulfil the greater social purpose of maintaining price stability through market operations, the private sector is crucial to increasing efficiency. In order to expand the agricultural marketing system, the government created a variety of programmes and policies, but the main emphasis was on the production side. Today, it is imperative to strengthen the marketing system through efficient execution. Marketingbigger magnitude was implied as production and yields increased as a result of farmers adopting cutting-edge technologies. Farmers frequently lack awareness of market factors including pricing, demand, and supply, which may be related to a lack of market information and knowledge. As a result, they are forced to sell their produce to intermediaries under distress conditions. These dealt with the requirement for an effective, controlled marketing system to help farmers and protect them against market manipulation.

Keywords: Economy, Agriculture, Market Information, Demand and Supply.

Effect of *Bacillus thuringiensis* sub sp. *kurstaki* and botanicals on protection of stored combs from *Galleria mellonella* Linn.

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ABSTRCAT

Honey bees are the most ecofriendly insects to the farmers as they not only provide honey, bees wax, pollen and other hive products but also help in cross pollination of different crops. G. mellonella is considered as one of the most notorious and devastating insect pest of honey bees. At the time of storage, combs that are apparently free of wax moth may contain eggs that will hatch later. The larvae feed on pollen and honey before burrowing from the surface of the comb to the midrib. From there they tunnel through the comb, feeding on honey, pollen, beeswax and the cocoons of bee larvae. Various chemicals are being used for its management but various problems are associated with the excessive use of chemicals. In the present study, *B. thuringiensis* sub sp. *kurstaki* and botanicals were used in various concentrations for the protection of stored combs from *G. mellonella*. Combs were dipped in different concentrations of *Btk* and botanicals and were stored in a hive body (chamber) that was placed on the bottom board and covered with an inner cover. After 90 days of storage, lowest mean per cent area infested per comb was recorded in sulphur fumigation (1.36) followed by *B. thuringiensis* sub sp. *kurstaki* 1.5 % (1.84), *B. thuringiensis* sub sp. *kurstaki* 1.0 % (2.52), Neem Seed Kernel Extract 7 % (3.13), Azadirachtin 10,000 ppm 1 % (3.34), Neem oil 7 % (3.62), neem seed kernel extract 5 % (4.99), *B. thuringiensis* sub sp. *kurstaki* 0.5 % (5.42), Neem oil 5 % (14.70), Neem Seed Kernel Extract 3 % (17.29), Azadirachtin 3,000 ppm 1 % (19.75), Dhrek Seed Kernel Extract 7 % (21.55), Neem oil 3 % (26.23) Dhrek Seed Kernel Extract 5 % (28.01), Dhrek Seed Kernel Extract 3 % (31.03) and water treatment (33.81) whereas the highest mean per cent area infested per comb was in control (49.15). We concluded that *Btk* 7 % gave best result to manage *G. mellonella* infestation after sulphur fumigation.

Residue-free Farming and its Potential Benefits

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ABSTRCAT

In the recent years, it has been observed that health emerged as a top priority for the majority ofthe human population. In today's world, staying fit and healthy has become the need of the hourwhich has ultimately created the need of having a very health-friendly diet for the masses. Thisneed in one way has also created an opportunity for entrepreneurs to enter the field of residue-free farming. The use of biocides and biofertilizers made from organic materials to protect cropsand promote their growth is the best way to define residue-free farming. Integrating the practice of residue-free farming is vital to match the expectations of the consumer. Residue-free techniques are economical, and they do not hamper production quantity. Considering the benefits of residue-free farming, there are many reasons that describe why residue free farming is gaining ground in India. A significant risk of illnesses including leukaemia, prostate cancer, and lymphoma has always been associated with eating food that has undergone chemical processing. Residue-free products, which are free of harmful sprays, have been found to work best for people who have food allergies or other dietary limitations.The degrading quality of the soil has been amajor source of worry in the agricultural sector. The widespread overuse of chemical fertilisers has been cited as the main cause of this stage. The fact that the soil's fertility is eroding andconsequently lowering the product's nutritional value has a negative effect on the health of thosewho consume the product is an extremely important issue that must be acknowledged. Therefore, it is strongly advised to promote residue-free farming, which would improve the soil's quality inone way and benefit the final consumer in another. Due to the fact that India's economy is largelybased on agriculture, this sector has historically received a lot of attention.There is nolongerany industry in today's world that is unaffected by technology, and agriculture is no exception.The effects of advanced technology have given the industry a significant boost.It is relativelysimple to maintain the quality of the produce and increase its nutritional value by implementing modern agri-technologies such as green houses, drip irrigation systems, fertigation, residue free production, rain water harvesting, high density plantations, contour farming,waste land utilisation, etc. The widespread adoption of these new farming approaches has helped promote food safety. But given the ever-expanding demand for quality food, residue-free products may be a more viable approach when it comes to large-scale farming. This disruptive farming practice is a harbinger of a greener, cleaner and heal thier agricultural sector.

Keywords: Residue free farming, Soil fertility, Chemical fertilizers, Modern agri-technologies, Food safety

Production and marketing of apple effected by climate change in Kullu district of Himachal Pradesh

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ABSTRCAT

Suitable agro-climatic conditions in Himachal Pradesh have allowed for the cultivation of a variety of fruit crops, which have contributed significantly to the state's socio-economic growth. Although apple dominates in terms of both area and production, certain areas are experiencing a decline in productivity due to environmental changes. This study aims to analyze the changes in the growth of apple orchards over time and space in response to these changes in the environment. Primary and secondary data was used in this study. Although Himachal Pradesh was once known for its high-quality apples, the crop has become uneconomical and unproductive in many parts of the state, forcing fruit growers to switch to other fruits and vegetables. Climate change has had a significant impact on the apple crop, affecting blossoming, fruit setting, yield, and increasing pest and disease incidence. The climate is generally warmer, and snowfall has decreased in amount and changed in timing. December and January snowfall has become rare, and the snowfall period now extends through February, March even in April. As a result, the production and quality of the apple is decreased and poor quality of apple can't be marketed and maintaining apple orchards has become a challenging task, with new trees unable to survive and older ones dying fast.

Keywords: Apple, snowfall, climate, temperature

Importance of Arabidopsis thaliana in seed production

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ABSTRCAT

Arabidopsis thaliana, commonly known as thale cress, is a small flowering plant that has been extensively studied in plant biology and genetics.Arabidopsis serves as a model organism for studying plant biology due to its small size, short life cycle, and simple genome. Its genome was the first plant genome to be fully sequenced, providing a valuable reference for genetic research. Insights gained from Arabidopsis can often be applied to other plants, including those used in seed production.Understanding the genetic and molecular mechanisms controlling floral development in Arabidopsis helps researchers elucidate similar processes in crop plants, leading to improved seed yield and quality.Studying the pollination and fertilization processes in Arabidopsis provides insights into the mechanisms of sexual reproduction in plants. This knowledge can be applied to enhance pollination efficiency and increase seed set in crop plants.Arabidopsis has been extensively studied to understand the genetic and physiological factors that regulate seed dormancy and germination. This knowledge can be applied to manipulate these processes in crop plants, ensuring optimal timing and uniformity of seed germination.Researchers can easily introduce and study specific genes or genetic modifications in Arabidopsis to investigate their effects on seed development and production. The findings from such studies can be applied to improve seed traits in crop plants, such as yield, quality, and resistance to biotic and abiotic stresses.Overall, while Arabidopsis itself may not directly contribute to commercial seed production, its importance lies in its role as a model organism. By unraveling the genetic and molecular mechanisms governing seed production in Arabidopsis, researchers can gain valuable insights into the biology of crop plants and develop strategies to enhance seed yield, quality, and other desirable traits in agricultural crops.

Keywords: Arabidopsis, Seed production, Seed yield, Genome, Plant Biology, Seed dormancy, Seed germination

Organic Farming with residue-free production

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ABSTRCAT
Organic farming is a method of agriculture that relies on sustainable practices such as crop rotation, soil conservation, and the use of natural fertilizers and pesticides. The goal of organic farming is to produce healthy food with residue-free production while minimizing the impact on the environment. It involves growing crops without using synthetic fertilizers, pesticides, or genetically modified organisms (GMOs). Organic farmers rely on natural methods such as crop rotation, cover crops, composting, and beneficial insects to maintain soil fertility and control pests.The benefits of organic farming with residue-free production are numerous. For one, it can help reduce the amount of synthetic chemicals that are released into the environment, which can have negative impacts on human health and wildlife. It also promotes biodiversity and soil health, which can lead to better yields and healthier crops. Some of key principles and practices associated with organic farming and residue-free production are Soil health, Natural fertilizers, Weed control, Genetic integrity, Pest and disease management, Residue-free production and Certification. By combining organic farming practices with residue-free production, farmers can produce crops and livestock while minimizing synthetic inputs and pesticide residuesThis can be achieved through a combination of sustainable farming practices and careful monitoring of the production process which promotes environmental sustainability, biodiversity, and the production of healthy, wholesome food. Several studies have shown that organic foods are often higher in vitamins and minerals than conventionally grown foods, and they may also have lower levels of harmful contaminants such as pesticide residues.Overall, organic farming with residue-free production is an important method of agriculture that can help to promote sustainability, protect the environment, and produce healthier food.
Keywords: Organic farming, genetically modified organisms, composting, Residue-free production

Climate change and Horticulture

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ABSTRCAT
India is the second largest producer of vegetables in the world. Climate change is the primary cause of losses in vegetable production worldwide, in terms of reducing growth, yield and quality. Climate change cause an increase in average air temperature of 1.4ºC, increase in atmospheric Co_2 concentration, and significant changes in rainfall pattern.Usually extreme temperatures, limited soil moisture, reduced availability of irrigation water, high wind speed, increase in occurrence of hails and thunderstorms, frost damage and tsunamis etc., are the major limiting factors for reduction in the quality produce. Vegetables are very perishable and due to the hail storms the prices rise and thus decreasing the consumer preferences. Sudden change in climate also

influences the incidence and resurgence of pests and diseases, host-pathogen interactions, soil microbial population. Change in the behaviour of pollinators due to erratic weather conditions leads to poor pollinationwhich affects the seed development and fruit set. The crop management practices like mulching with crop residues and plastic mulches help in conserving soil moisture. Excessive soil moisture due to heavy rain is also a major problem. Development of new cultivars of horticultural crops tolerant to high temperature, resistant to pests and diseases, short duration and producing good yield under stress conditions, as well as adoption of hi –tech horticulture and judicious management of land use resources will be the main strategies to meet these challenges. Breeding techniques and biotechnology are essentially required to meet these challenges. Protected structures will provide best results in cultivation of horticulture crops and mitigation of climate change impacts.

Keywords: Climate change, Hi-tech horticulture, Mitigation, Protected structures

Factors contributing for high yielding of cauliflower and to find out the constraints faced by the farmers

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ABSTRCAT

Cauliflower is one of the popular vegetable which had its origin in Cyprus and Mediterranean coast. Cauliflower is rich in vitamin C and mostly cultivated in northern India as it requires cooler climate to grow.The present study was conducted in Khagaria District of Bihar''. Carried out during 2017-18, 120 respondents from 10 villages were randomly selected and data were collected and analysed by using appropriate statistical methods. the factors contributing for increasing yield of cauliflower were sowing at proper time (90.00%), applying organic manure (81.60%), taking plant protection measures from time to time (78.30%) following blanching practice (70.00%) following irrigation schedule at proper intervals (66.60%) and using high yielding varieties 63.60 per cent.

Keywords:-Cauliflower, Constraints, Factors, Suggestions and Farmers

Association between Income and Employment Generation of the Women Beneficiaries and Selected Independent Variables

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ABSTRCAT

Income generation through vocational training programmes is a major mandatory activity of Krishi Vigyan Kendra. KVK has emphasized on four categories for imparting training i.e. agriculture, agro processing, agro based enterprise and non-farming sector. KVK imparts need based and skill oriented trainings to generate the income for women. Vocational training programmes take into account all methods and means which will result in skill development in rural youths in the area of their interest. The status, employment and work performed by women in society are the indicators of a nation's overall progress. Without the participation of women in various activities, the social, Economic or political progress of a country will be stagnated. The

present study was conducted in Jaipur region of Rajasthan. In the Jaipur district Krishi Vigyan Kendra Chomu was selected, the study was conducted with 105 women respondents.The response of trainees was recorded through personal interview methods. The coefficient of correlation show that income of trained employed women was positively and significantly associated with education and mass media participation at 1% level of significance whereas occupation, social participation, marital status, land holding, vocational training received, economic motivation, market orientation, risk orientation was positively and significant associated at 5% level of significance whereas age, caste and type of house was positively and non-significantly related with the income of trained women. And employment generation of trained women was positively and significantly associated with their education and marital status at 1% level of significance, whereas employment generation of trained women was positively and significantly found with their occupation, education, social participation, land holding, mass media participation, vocational training received, economic motivation, market orientation and risk orientation at 5% level of significance, while age, caste and type of house was positively and non-significantly associated with their employment generation.

Keywords: - vocational training, Income, Employment, Correlation

Fusarium wilt of chickpeas: Biology, etiology and symptom

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ABSTRCAT

Chickpea (*Cicer arietinum* L.) is an important annual legume crop in all chickpea growing countries.Fusarium wilt, caused by the soilborne fungus *Fusarium oxysporum* f. sp. *ciceris*, has become a major factor limiting chickpea production worldwide. The pathogen long survival in soil and high pathogenic variability, with eight races 0, 1A, 1B/C, 2, 3, 4, 5, and 6 having been identified so far, are key elements in the development and management of the disease.Races 0 and 1B/C cause yellowing syndrome whereas 1A, 2, 3, 4, 5 and 6 lead to wilting syndrome. The pathogen is highly variable in its cultural characteristics and pathogenicity.When disease occurs at seedling stage, seedlings collapse and lie flat on soil surface. In case of adult plants, characteristic symptom is brown to black discoloration of xylem vessels. In susceptible plants hyphae are inter and intracellular in pith, xylem and cortex. The phytotoxin produced by the pathogen causes wilting and leaf burning. The disease is more severe in light sandy soil than heavy clay. High soil temperature and deficiency of moisture appear to have a definite bearing on its incidence. The amount of organic matter is inversely related to wilt incidence. The development of wilt is favored by increase in nitrogen.

Impact of climate change on insect, pest, and plant disease

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ABSTRCAT

One of the major biotic factors are pest, pathogen, insect, which impacted by climate change and weather disruption. Insect response to environment change is crucial for understanding how Agro wjt78- ecosystems will response to climate change. Climate change and global warming are of great concern to agriculture world wide and are among the most discussed issue in today society.

Climate parameter such as increased temperatures, Co2 level and changing the precipitation patterns changing the precipitation patterns. Have significant impact on agricultural production and agricultural insect pest.The climate influences the incidence as well as temporal and spatial distribution of plant disease. Main factor that controls growth and development of disease are temperature, light, water. Climate change affects survival, multiplication, sporulation, distance and dispersal of inoculum, increase rate of pathogen. Plant disease and pest reduced effectiveness of biological control especiallynatural enemies, result there is a serious risk of crop economic losses as were as challenge to human food security, there include modified pest management tactics, monitoring climate and pest population,use of modelling prediction tools.

Keyword: climate change, global warming, agriculture production, agricultural insect, pest, and disease management.

Farm Women and Climate Change: Closing Gender Gap for Strengthening Climate Resilience and Adaptation

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ABSTRCAT

Climate variability and extreme events have been increasing over the past century and they are projected to increase further. Uncertainty in climate has always had serious impact on agriculture and allied sectors. This impact was found to be different on men and women. Research evidence indicates that women are more vulnerable to climate change than men. Over the years, research has indicated that gender is an essential determinant for effective adaptation. Less access to resources, limited participation in decision-making, cultural norms, patriarchal traditions have marginalized women over decades and made them more vulnerable to climate change. Moreover, differences were found in adaptation strategies followed by men and women. Women have always been an invisible working force in agriculture and allied sector, though they contribute to $3/4^{th}$ of the work done. Climate change induced outmigration of men led to feminization of agriculture which further led to increased workload and less access to financial services. Gender gap in agriculture was found in access to land, technology, social capital, rural labour markets and financial services. It was found that women are likely to adopt climate resilient technologies when they own the land that they work on. Hence, providing land rights to women by eliminating discrimination under the law, reducing gender inequalities in human capital, promoting financial literacy, developing need-based technologies and mobilizing women in to groups would help in closing the gender gap in agriculture. Women are at the frontline of climate change and it is imperative to acknowledge their efforts and potential in combating climate change for better resilience and adaptation.

Influence of Organic Manure and Bio fertilizer on growth and yield of Lentil (*Lens culinaris* Medic)

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ABSTRACT

A field experiment was conducted during winter season of 2022-23 at crop research centre, School of Agricultural Sciences, Shri Guru Ram Rai University, Dehradun, Uttarakhand to evaluate the

"Effect of organic manure and bio fertilizer on growth and yield of Lentil. The experiment was laid out in randomized block design with three replications and seven treatments comprised following levels of different organic manure and bio fertilizer *viz*. T_1 (Control), T_2 (FYM@5t/ha), T_3 (VC @ 2t/ha), T_4 (Rhizobium), T_5 (FYM@5t/ha + Rhizobium), T_6 (FYM@2.5t/ha + VC @1t/ha) and T_7 (VC @2t/ha + Rhizobium). The growth parameter *viz*. Plant height (53.08cm), number of branches/plant (4.39), dry weight of root nodules (6.46mg) were recorded highest with application of vermicompost@2t/ha + Rhizobium followed by FYM@5t/ha + Rhizobium. The yield parameters *viz*. Straw yield (1314.20kg/ha), Seed Index (2.87g), Seed yield (114.07kg/ha) were also recorded significantly higher with rhizobium inoculation and vermicompost application which was at par with FYM@5t/ha+ Rhizobium.
Keyword: FYM, Growth, Lentil, Rhizobium Vemicompost, and Yield.

Integrated Pest Management in Potato

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ABSTRCAT
One of the four primary food products grown worldwide is the potato (*Solanum tuberosum* L.; Family: Solanaceae). It is the fifth-largest food product worldwide, only cereals like wheat, rice, maize, and barley surpass it. It is typically a crop found in mild, temperate climates or at elevations of at least 2000 meters in tropical areas. It can't grow well in low-altitude, hot, tropical environments; it needs cool evenings and soil with enough moisture. The high nutritional value of potatoes makes them a popular staple meal in many nations. It can supplement the food needs of the country in a substantial way as it produces more dry-matter food, has well balanced protein and produces more calories from unit area of land and time than other major food crops. Most potatoes grown for commercial purposes are propagated vegetatively using lateral buds that develop on the tuber, a modified stalk. Numerous diseases and pest are passed down from one generation to the next through such vegetative propagation. A essential component of increasing the food supply is the eradication of such diseases and pests and the reduction of yield losses brought on by disease. To avoid yield losses, plant disease control concepts, strategies, and tactics are crucial. Integrated pest management (IPM) may supply effective control of the potato pests including aphids (vector of some viruses), Potato tuber moth*: Phthorimaea operculella* Zeller, Whitefly: *Bemisia tabaci* Gennadius, Root-knot nematode: *Meloidogyne sp.*, White grub: *Lachnosterna longipennis*, Cut worm: *Agrotis segetum*, *Verticillium* wilt blackleg, bacterial ring rot, *Rhizoctonia*, *Phytophthora infestans* (late blight) and several weeds (night shades, pigweeds, lambs quarters, and annual grasses). Regular checks for sound seed or nursery stock, crop production, accurate problem identification, cultural practices (crop rotation, sanitation, etc.), biological control, soil fumigation, treatment of seed or nursery stock, and de-infestation of cutting tools are all included.
Keywords: Potato; IPM; Pests and Diseases

Effect of Pre-harvest Application of Melatonin on the Yield and Post-harvest Quality of Guava (*Psidium guajava* L.) cv. Allahabad Safeda

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ABSTRCAT

Guava is a very important and popular tropical and subtropical climacteric fruit. The aim of this study was to investigate the effect of pre-harvest application of Melatonin on the yield and post-harvest quality of guava (*Psidium guajava* L.) cv. Allahabad Safeda. This study was carried out on the winter season guava under subtropical conditions. The plants were treated with the two doses of melatonin, i.e., 0.1 mmol L^{-1} and 0.2 mmol L^{-1} and the ones untreated with melatonin were used as control. The results of the experiment revealed that foliar application of Melatonin led to better yield and quality of fruits as compared to control in which the treatment with Melatonin @ 0.1 mmol L^{-1} recorded maximum Fruit length (53.53 mm), Fruit diameter (55.70 mm), Fruit weight (117.17 g), Fruit volume (104.73 ml), Firmness (4.68 Kg cm^{-2}), Reducing sugars (7.84 %), Non-reducing sugars (4.87 %), and Total sugars (12.51 %) and the lowest Physiological loss in weight (10.60 %) whereas those plants which were treated with Melatonin @ 0.1 mmol L^{-1} recorded maximum Fruit set (67.78 %), Fruit yield (100.92 Kg per tree), Total Soluble Solids (12.02^{o} Brix), Ascorbic acid content (187.37 mg per 100 g), Antioxidants (36.42 %), and Flavonoids (20.35 %). Therefore, it can be inferred that the utilization of Melatonin has proven to be advantageous in augmenting the yield and enhancing the quality of guava fruits. However, since the outcomes of the current study rely on data obtained from a single season, additional research is required to validate these discoveries.

Whole proteome analysis reveals crucial pathogenicity factors during Karnal bunt – wheat interaction

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ABSTRACT

Plant pathogens secrete proteins serving as molecular weapons during host pathogen interaction. We analyzed the whole genome of Karnal bunt inducing pathogen in order to identify extracellular localized proteins. More than 400 proteins with signal peptides were identified in the proteome, few of them only were with transmembrane domain which was eliminated. Carbohydrate active enzymes were found to be enriched in the secreted proteins, where cellulases and xylanases were overrepresented among other enzymes groups. Blast analysis against Host Pathogen Interaction (PHI) database showed than more than 30% of the secreted proteins are crucial for full pathogenicity.

Genetic Variability, Heritability and Genetic Advance of the Floral Attributes for Tuberose Genotypes

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ABSTRCAT

Tuberose is a flower crop that has been endowed with elegant floral attributes. Assessment of the genetic variability in the floral attributes of the available tuberose germplasm will provide

sufficient scope for selecting superior and desired characters in any tuberose improvement programme. The present study was conducted in Bidhan Chandra Krishi Viswavidyalaya, West Bengal with twenty different genotypes of tuberose to determine the estimates of genetic variability, heritability and genetic advance of different floral attributes of the crop. Wide ranges in the mean performance of different floral parameters were recorded for the twenty genotypes of tuberose. The phenotypic coefficient of variation was found to be higher than the corresponding genotypic coefficient of variation for all the characters. The characteristics such as pistil girth, weight of an individual floret, number of petals and number of anthers per floret had shown high genotypic and phenotypic co-efficient of variation. It was also noticed that the heritability was also high for different floral characters like bud length, weight of an individual floret, diameter of an individual floret, number of petals, number of anthers and number of whorls with high genetic advance mean which indicated the lesser influence of environment in the expression of these characters and prevalence of additive gene action in their inheritance. Hence, these traits are found suitable for selection. Henceforth, these floral characters can be relied upon for selection for further improvement in the crop.

Keywords: Tuberose, genetic advance, heritability, PCV, GCV

Impact of Terrace Gardening and Indoor Gardening on Biochemical and physiological behaviour of Humans

Sheetanshu Gupta

ABSTRCAT

Terrace gardening and indoor gardening are becoming increasingly popular due to their numerous benefits. Apart from their aesthetic value, these practices have the potential to positively impact the biochemical and physiological behavior of humans. In this review, we examine the impact of terrace gardening and indoor gardening on human health.

Firstly, plants are known to absorb carbon dioxide and release oxygen during photosynthesis, which helps to improve the air quality around them. This can have a positive impact on human health by reducing the risk of respiratory problems and enhancing overall well-being. Additionally, gardening has been found to have a calming effect on the mind and body, which can help to reduce stress levels. Studies have shown that spending time in a garden or engaging in indoor gardening can lead to lower levels of the stress hormone cortisol and increased feelings of relaxation. Moreover, exposure to nature and plants has been found to have a positive impact on mood and emotional well-being. Indoor gardening can help to improve mood by providing a sense of accomplishment and satisfaction from growing and caring for plants. Gardening also involves physical activity such as digging, planting, and watering, which can help to increase overall physical activity levels. This can have a positive impact on cardiovascular health and help to reduce the risk of chronic diseases such as obesity and diabetes.

Finally, terrace gardening can provide access to fresh fruits and vegetables, which can have a positive impact on overall nutrition and health. In conclusion, terrace gardening and indoor gardening can have a positive impact on the biochemical and physiological behaviour of humans by improving air quality, reducing stress levels, improving mood, increasing physical activity, and providing access to fresh produce. Therefore, these practices should be encouraged to promote healthy living and improve the overall well-being of individuals.

Reshaping of environmental health through Glomalin
Sheetanshu Gupta

ABSTRACT
Glomalin, a glycoprotein produced by arbuscular mycorrhizal fungi, has the potential to reshape environmental health in many ways. Its unique properties and functions make it a valuable tool for improving soil health, mitigating the impacts of climate change, and reducing the risk of exposure to environmental pollutants. One of the most important ways that glomalin can reshape environmental health is by promoting sustainable agriculture. Glomalin helps to improve soil structure, increase soil fertility, and reduce erosion, which can lead to higher crop yields and reduce the need for synthetic fertilizers and pesticides. This can help to reduce the environmental impact of agriculture and promote sustainable food production.
Glomalin can also play a key role in mitigating the impacts of climate change. By sequestering carbon in the soil, glomalin can help to reduce the concentration of greenhouse gases in the atmosphere and slow the pace of climate change. In addition, its ability to improve soil health and fertility can help to increase the resilience of soil ecosystems to the impacts of climate change, such as drought and extreme weather events.
Another important role of glomalin in the environment is its ability to sequester heavy metals and other pollutants in the soil. Glomalin acts as a binding agent, helping to immobilize pollutants and prevent them from leaching into groundwater or being taken up by plants. This is particularly important in contaminated sites, where the presence of heavy metals and other pollutants can pose a risk to human health and the environment. Studies have shown that glomalin can bind to a wide range of pollutants, including lead, cadmium, arsenic, and mercury, among others. In contaminated sites, glomalin has been found to significantly reduce the bioavailability of pollutants, reducing their toxicity and potential impact on the environment.
In summary, glomalin plays a vital role in the environment beyond carbon sequestration, soil stabilization, nutrient cycling, and water retention. Its ability to sequester heavy metals and other pollutants in the soil, as well as its contribution to mitigating the impacts of climate change on soil ecosystems, make it an important component of sustainable soil management and environmental protection.

Science of Self Healing Material and Their Applications
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ABSTRCAT
Self-healing materials now days play very important role in category of smart structures, as they can adapt to various environmental conditions, according to their sensing property. In this paper the healing science and mechanisms of certain especial materials or composites are studied and its applications are discussed. Healing mechanisms vary from an intrinsic repair of the material to the addition of a repair agent contained in a microscopic vessel. For a material to be strictly defined as autonomously self-healing, it is necessary that the healing process occurs without human intervention. Self-healing activates in response to an external stimulus (light, temperature change,

etc.) to initiate the healing processes. A material that can intrinsically correct damage caused by normal usage could prevent costs incurred by material failure and lower costs of a number of different industrial processes through longer part lifetime, and reduction of inefficiency caused by degradation over time. Different types of healing processes are considered as self-healing in general. Currently, self-healing is only considered as the recovery of mechanical strength through crack healing. However, there are other examples where not only the cracks but also small pinholes can be filled and healed to have better performance. This review addresses recovery of different types of properties, of materials. In this paper the self-healing science and mechanisms of certain especial materials or composites are studied and its applications are discussed.
Keywords: self-healing, smart material, environmental

A Pharmacological Study on Calendula Officinalis Extract for Wound Healing Activity on Mice and its Antibacterial Effect on Pus Formaing Bacteria

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ABSTRCAT
Calendula officinalis (Calendula), a member of the Asteraceae family, is often known as English Marigold or Pot Marigold. Marigold is a fragrant herb that has been used in traditional medicine for centuries. Using excision wound models on albino mice, the current work tests the ability of gels made from *Calendula officinalis*leaf extract to cure wounds. A wound-healing ointment made from *Calendula officinalis* leaf methanolic extract (1 and 2%) was created and tested on albino mice. The extract formulations were made in separate carbopol gels as well as in combination in an equal ratio. When compared to a normal betadine wound healing ointment, treated animals displayed a much shorter period of epithelization and wound healing activity. The rich phytoconstituents included in methanolic extracts, which either have an additive or individual action to speed up the process of wound healing, may be the cause of their improved wound healing activity. According to measurements of wound contraction rate, tensile strength, increased DNA, collagen, and protein synthesis, as well as histological analysis, *Calendula officinalis*extract ointment demonstrated noticeable wound healing activity and considerably improved the period of epithelialization and wound contraction. Another trial found that persistent wounds are a significant clinical issue that causes significant morbidity and mortality. Microorganisms' importance and involvement in the healing process of wounds have been hotly contested for many years. While some specialists believe that the microbial density is crucial in forecasting how quickly wounds will heal and become infected, others believe that the sorts of bacteria are more significant. Together, the findings of this study show, for the first time, the healing and anti-microbiological effects of *Calendula officinalis*extract in the treatment of skin wounds, specifically on pus-forming bacteria.
Keywords: Calendula officinalis, Wound healing activity, epithelization, Pus Formation Bacteria and Methanolic extract.

Marketing and agribusiness opportunities created for farmers in Maharashtra: A case study

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ABSTRCAT

Large number of small and marginal farmers, with limited access to technologies, and markets made farming a challenging enterprise for farmers in Maharashtra. There are 1.36 crore farmers in the state, of which 80% are small and marginal farmers. The total area of small and marginal farmers (with land holding upto 2 ha.) stands at 89.25 lakh ha. and constitutes 45.2% of area under agriculture. As per agriculture census (2015), the average size of operational land holding is 1.34 ha. in Maharashtra. Maharashtra state has 305 main market yards and 603 sub-market yards, this was the only organized channel through which the entire produce of agriculture needs to be channelized. These markets are governed by Agriculture Produce Market Committee (APMC) Act which had monopoly over marketing system. Although, these markets were created to regularise agriculture trade and avoid exploitation of farmers, over a period of time these markets themselves became monopolistic and there was need to relook and reform the APMC Act. The Government of Maharashtra, progressively adopted the reforms suggested by Government of India. There was a need to create institutions of farmers to suit and get the benefits of market reforms. Over the last one decade, the Govt. of Maharashtra has invested resources through various central and state government schemes, programs and multi-lateral funded projects for marketing and agribusiness development in state. Current study focuses on four such initiatives which has created marketing and agribusiness opportunities for famers in Maharashtra *viz; the* World bank Assisted projects– Maharashtra Agricultural Competitiveness Project (MACP), State of Maharashtra's Agribusiness and Rural Transformation (SMART) Project, Maharashtra Project on Climate Resilient Agriculture (PoCRA) and Asian Development Bank assisted, Maharashtra Agribusiness Network Project (MAGNET).

MACP project implemented during 2010-2019. The development objective of MACP was to "Increase productivity, profitability and market access of the farming community in Maharashtra." The total project cost was Rs. 703.95 crores. The major interventions were Intensification & diversification of market led production and improving farmer access to markets. The project upgraded 100 APMCs, improved 408 rural haats and simultaneously mobilized 400 Farmer Producer Companies (FPCs) in the catchment area of these markets in state with farmer common facility centres (FCSC) to create alternate marketing channels. SMART project has started in 2020, which will last in 2027. The project development objective is "To support the development of inclusive and competitive agriculture value chains, focussing on small holder farmers and Agri-entrepreneurs in Maharashtra". The total project cost is Rs. 2100 crores. The major interventions are Enhancing institutional capacity to support agricultural transformation, Expanding market access and supporting enterprise growth and Building risk mitigation mechanism. For expanding market access and supporting enterprise growth, the project is supporting 1,000 FPCs to develop

their sub-projects of value chain development with grants up to 60% of their sub-project cost. The sub-projects of these FPCs are agribusiness ventures aimed at developing alternate value chains of the commodities they grow by creating critical infrastructure and connecting with the new markets. The new markets are developed by either connecting these FPCs with end users (Processors, Exporters and Organized retail chains) or connecting them with overseas markets through export and domestic markets of other states. Depending upon type of alternate market, these sub-projects are called Productive partnership and Market access plan respectively. Until now, about 1000 FPCs have been shortlisted, 700 of them have submitted their Full Project Proposals (FPPs), of them 500 FFPs have been cleared by project, of them 200 received grants and rolled out their sub-projects. Project aims at impacting 19 lakh farmers, generate about 9000 jobs and attract 410 crore investments from private sector.

PoCRA project development objective is "To enhance climate-resilience and profitability of smallholder farming systems in selected districts of Maharashtra." The total project cost is Rs. 4000 crores. Project started in 2018 and is going to end in 2024. The major interventions are to promote climate resilient agriculture systems, post-harvest management & Value Chain Promotion. Until now, more than 3000 agribusiness proposals of FPC/FPO/SHGs are supported with matching grants (60%). The grants spent on agribusiness proposals is Rs. 318.40 crores under post-harvest management and value chain promotion. The proposals supported includes, custom hiring centres, Agro processing units, Storage facilities (Warehouses & Godown), Sorting & grading centres etc.

MAGNET project is assisted by Asian Development bank and being implemented for development of Integrated Value chains in the focused horticulture crops. Project objective is to "Improve the networks of post-harvest facilities and marketing management for the ten selected value chains. (i.e., Pomegranate, Banana, Orange, Sweet Orange, Custard Apple, Guava, Sapota, Strawberry, Okra, Chili (Green and Red) and Flowers) in the Maharashtra State". The total project cost is Rs. 1000 crores. The Major interventions are strengthening the access to institutional, technical, and marketing capacities of agribusiness institutions and farmer producer organizations, to strengthen access to finance of farmer producer organizations and value chain operators and improving and operationalising agriculture value chain infrastructure.

Under MACP, 400 FPCs were registered. This led to a surge in registrations of FPCs in Maharashtra, which at present is the highest in the country. Out of the 21,000 FPCs registered with the Registrar of companies (ROC) in India, more than 7000 are from Maharashtra. One of the corner stones of the project was to promote the marketing reforms including 'Direct Marketing Licence' for these newly created FPCs. This reform of the Direct Marketing License paved the way for alternative market channels for the farmers. Through this, farmers for the first time could access marketing channels other than the traditional APMC markets. MACP was able to successfully demonstrate the possibility of increased access to markets for the farmers. Now, more than 10% of agricultural produce is traded through these FPCs and this has brought

competitiveness in the existing APMC markets. The social capital created through MACP was further supported through SMART to develop competitive and inclusive agriculture value chains. The amount of project investment and that from corporate/private sector will boost the agribusiness opportunities for farmers and private sector through partnership mode. PoCRA addresses the issue of climate change along with development of resilient agriculture value chains and the preliminary impact assessment shows positive changes in terms of increase in income of farmers in project area. The MAGNET project which aims at developing Agri value chains for horticultural crops will lead to development of perishable and high value crops in the state. Thus, the two major issues of market and climate resilience are being successfully addressed in Maharashtra through marketing reforms and these projects.

Keywords: Agribusiness, Farmer Producer Companies, markets, Value chain Development.

Evaluation of In-vitro Free Radical Scavenging Activity of *Agaricus bisporus* Extract using Fenton Reaction

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ABSTRCAT
Medicinal plants and natural products have attracted global attention due to their safety as well as their considerable antioxidant content that helps to prevent or ameliorate various disorders including memory impairments. The phenolic compound in fruits, vegetables, herbs and spices possess potent antioxidant, anti-inflammatory, antigenotoxic and anticancer activities.Mushrooms are functional foods largely consumed in Asia and Europe. The consumption of mushroom in Brazil is very low, in part due to the lack of information about the nutritional value of the edible mushrooms cultivated in the country.The dried shoots of *Agaricus bisporus* was extracted with methanol using a Soxhlet extractor. The total phenolics content of leaf as determined by Fenton reaction and was found to be good antioxidant activity as different dose concentrations. The antioxidant activity of plant extract was carried out with ascorbic acid as a standard reducing agent. The present results were made with the use of UV-Visible Spectrophotometer. In this plant *Agaricus bisporus* Extract there was a remarkable concentration dependent free radical scavenging and reducing power was exhibited. In conclusion the present study indicates that *Agaricus bisporus* extract may be a potential source of natural antioxidant. A. bisporus appears as an excellent option to enrich the diet with antioxidant phenolic compounds.
Keywords: Antioxidant activity, Fenton Reaction, Hydroxyl radical, ascorbic acid, *Agaricus bisporus*, TBARS.

Selective Sweep Analyses Revealed Adaptation Clues in Cervus Nippon

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ABSTRCAT

The wildlife that forms an essential part of our cultural heritage is facing selection pressure, leading to specific genetic traits in their genome. The Sika deer, native to East Asia, is currently either extinct or on the brink of extinction in various locations. The decreased population size is highly vulnerable to the effects of climate change and has limited adaptation capabilities due to inbreeding. This research utilized a ddRAD approach to identify genome-wide Single Nucleotide Polymorphisms (SNPs) and further analyzed them to determine genes associated with survival and reproductive fitness. After quality control measures, a total of 127,799 SNPs were retained. By applying CLR statistics, 13 significant selective sweeps were detected, and these sweeps were found to overlap with genes related to adaptation, reproduction, and cellular functions. The average heterozygosity and nucleotide diversity were determined to be 0.21 and 0.00159, respectively. Admixture analysis revealed a single cluster, suggesting that no further sub-divergence of Sika deer populations exists. These significant findings have the potential to revolutionize our understanding of Sika deer genetics, evolution, domestication and conservation efforts. By incorporating these findings into SNP chips, we can gain a more comprehensive understanding of these areas. This knowledge will aid in the development of effective genetic improvement programs and the selection of traits that enhance fitness, ultimately contributing to the establishment of a robust and climate resistant Sika deer population, whether in captivity or under natural management conditions.

Keywords: Sika deer - ddRAD - SNP - Selective sweeps - diversity – conservation

Development of Microspore-Derived Doubled-Haploids from F_1 Donor in Eggplant (*Solanum Melongena* L.)

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ABSTRCAT

The development of microspore-derived doubled-haploids in eggplant is the most efficient way of speed breeding of completely homozygous inbred lines. In the present investigation, we studied the development of microspore-derived doubled-haploids from three F_1 (PSB-7-2 x P-219, SR-5 x SR-9322, SC-15-2 × MR-319) donors in eggplant. *In vitro* culture of pretreated (35°C for 4 days in distilled water) microspores at uni-nucleate stage in dark and their subculture in NLN medium supplemented with 2,4-D 2 mg/l + Sucrose 20g/lresulted callogenesis and subculture of induced calli on MS medium fortified with Zeatin 4 mg/l + IAA 0.2 mg/l + Sucrose 20 g/l and Agar 8g/l resulted embryogenesis and regeneration of plantlets, which were later elongated (MS medium, Murashige and Skooge 1962), rooted (1/2 MS +0.5 mg/l IBA+ 8 g/l plant-agar) and established as complete plants after hardening. The microspore culture of PSB-7-2 x P-219 and SR-5 x SR-9322 had 10.9 %and 3.8 % (Plants/100 calli) re-generation efficiencies, respectively. In total, sixty five plants from both the donors could reach to reproductive maturity in the poly-house. The molecular analysis of plants in comparison to their heterozygous donor established their gametic origin. Cytological analysis of Metaphase-1 and Anaphase-1 stages in dividing pollen mother cells of the regenerants confirmed doubled-haploidy in thirty five regenerants. Whereas aneuploidy, haploidy and triploidy in 29, 5 and 1 plants, respectively. Flow cytometric analysis also clearly differentiated haploid, doubled haploid and triploid peaks. However, all the developed doubled haploid plants had comparable reproductive potential in comparison to their donor parents.

Keywords: Eggplant, microspore culture, ploidy, morphology, genetic divergence.

A Study on Nutrition Security for Rural Adolescents in Telangana State

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ABSTRACT

Nutrition security refers to the state of having access to and consuming a sufficient quantity and quality of nutritious food to meet one's dietary needs and lead a healthy life. It encompasses not only the availability of food but also factors such as access, utilization, and stability of food sources. The scope of nutrition security extends beyond mere food availability. It includes various aspects such as dietary diversity, nutritional quality, food safety, and cultural acceptability of the available food. It emphasizes the importance of addressing malnutrition in all its forms, including under nutrition, micronutrient deficiencies, and overweight/obesity.

The importance of nutrition security lies in its profound impact on individual and societal well-being. Adequate nutrition is essential for physical growth and development, cognitive function, immune system functioning, and overall health. Good nutrition also contributes to economic productivity, poverty reduction, and social stability.

Ensuring nutrition security for adolescents in rural households is crucial for their growth, development, and overall well-being. Adolescence is a critical period of rapid physical, cognitive, and emotional changes, and adequate nutrition plays a vital role in supporting these transitions.

Key factors to consider for promoting nutrition security among adolescents in rural households are Nutritional Education, Accessibility and Availability, Nutrient-Dense Foods, Addressing Micronutrient Deficiencies, Community Engagement, Empowerment and Skills Development, School-Based Interventions, Monitoring and Evaluation. By addressing these factors, nutrition security can be improved for adolescents in rural households, enhancing their health, well-being, and future prospects. It encourages the use of diverse and nutritious food sources, promotes environmental sustainability, and supports resilient and inclusive food systems.

Keywords: Adolescents Nutrition security, rural households, Access, Education and Micronutrient deficiencies

Vermicompost Production; an Economic Analysis in Kalyana Karnataka Region

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ABSTRCAT

Vermicomposting is a composting method that utilizes specific species of earthworms to facilitate the conversion of organic waste and produce a higher quality end product. It is known as "gold from garbage," and is most important input in organic agriculture production. Because of the high nutritious content, and there is a progressive increase in demand emerging as growing industry that has the potential to provide jobs in rural India while also promoting organic farming in India. However the literature review suggests lack of studies on economic aspects of production and marketing aspects. To through light on this aspect, the paper presents the economic analysis in terms of input utilisation, costs and returns and profitability of its production in different methods of production viz., cement construction , vermin bed and open pit method in Kalyan Karnataka region. The paper analysis the data collected from 60 farmers in three taluks from two districts-Kalaburgi and Koppal, using multistage random sampling technique using pre-tested structured interview schedules. The snow ball technique was used in the third step to pick sample responders within each taluka, and 15 farmers from each taluka were chosen for the study. The data was analyzed using tabular analysis.

The findings revealed that human labor was the most utilized input across the three different methods oof vermicompost production, with hired labor accounting for 63.54% of the total labor input and family labor accounting for 36.45%. The average input utilization for earthworm culture, dung, and crop residue was 1.33 kg, 1.36 q, and 12.74 q per cubic meter, respectively. The total cost of vermin-compost production was found to be Rs. 4853 per cubic meter. The cost was highest in the cement constructed method at Rs. 5684 per cubic meter, followed by the vermi bed method at Rs. 4749 per cubic meter, and the soil pit method at Rs. 4127 per cubic meter .The overall gross return realized across the method was Rs. 9005 and the net return was Rs. 4154 per cubic meter. For the cement constructed method, the gross return was Rs. 11103, and the net return was Rs. 5418 per cubic meter. For the vermi bed and soil pit methods, the gross returns were Rs. 9192 and Rs. 6720 per cubic meter, respectively, and the net returns were Rs. 4442 and Rs. 2592 per cubic meter, respectively. In study area, the cement construction method was the most profitable venture when compared to the vermi bed method and the soil pit method. Thus, vermicompost production in the cement constructed method can be promoted to increase farmers' income and improve their livelihood in the study area. As a result, it is a lucrative business with higher net profits and benefit cost ratio. The research demonstrated that vermicompost production is a viable enterprise. A suitable organic waste and cow dung supply chain can entice individuals to productionof vermicompost on a huge scale.

Keywords: Vermicompost, per cubic meter, cement constructed method, vermibed, soil pit method, net income, gross income

Managemental and Environmental Causes of Infertility in Livestock

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ABSTRCAT

The livestock industry is severely harmed by farm animal infertility. These rhythms can be disturbed by illnesses, inadequate nutrition, bad herd management, genetic and congenital conditions, hormonal imbalances, or environmental changes, which can make the animal infertile and, if only briefly, have an impact on breeding programs. Each reason must therefore be

accurately determined and dealt with in accordance with the examination's results. The relationship between infertility and some metabolic and dietary factors has recently been studied. Anestrus or erratic heats may occur at lower levels. The postpartum period's shortage of energy decreased luteinizing hormone production and dynamic follicle diameter while lengthening the calving interval. One of the environmental factors that affects how cattle is handled and produced is stress.

Keywords: Infertility; Poor Nutrition; Herd Management; Environmental; Postpartum; Stress

Effect of UMMB & Mineral supplementation on growth and reproductive performance of Heifers.

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ABSTRCAT
Thirty heifers cross bred cows were randomly selected at Jehanabad district of Bihar and equally divided into three groups. Animals were treatment with Group I UMMB (Urea Molasses Mineral Block) at the dose rate of 300g/day two time for 20 days orally, Group II Cheated Mineral mixture at the dose rate of 50g/day for 20 days orally, and Group III (Control) Common feeding &concentrate mixture (maize 40kg +wheat bran 40kg+soybean meal 17kg and salt 1% each), green fodders and wheat straw. Resulted that of group II , feeding of concentrated along with mineral mixture feeding are better than that of others groups for growth and reproductive performance in heifers in respect of B:C ratio (1.8) due to occurrence of normal heat and better conception rate .

Keywords: Heifer, Cross bred, Concentrate, Mineral mixture, UMMB and B: C ratio

Evaluation of Seed Priming Techniques for Enhancing Seed Quality in Sesame (*Sesamum indicum L.*)

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ABSTRCAT
Sesame is one of the most important oilseed crops. India is one of the major producers of many oilseed crops like groundnut, mustard, rapeseed, sesame, etc. Sesame is known as “Queen of oil seeds” because seeds have high quality poly unsaturated stable fatty acids (PUFA). No agricultural practice can improve a crop beyond the limits set by the seed. Any achievement in the crop improvement can be propagated and established in the field only through seeds. Hence, the seed priming technique with organic agents (plant and animal products) has been used for invigorating the performance of seed in many crops. An experiment was conducted in the Seed Technology Research Laboratory of Department of Plant breeding and Genetics, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal during 2019 in order to know the influence of seed priming on seed quality characters of Seasame (*Sesamum indicum* L.) cv. TMV 3. The experiment was carried out in a completely randomized design with three replications. The treatments comprised of six seed priming agents *viz*., T_1- 1% coconut water, T_2 - 1% cow urine, T_3- 3% moringa leaf extract, T_4 - 3% panchakavya, T_5 - 3% arappu butter milk solution and T_6 - water and T_7 - control (untreated seeds). Among the treatments, priming of seeds with 1% coconut

water registered significantly superior seed quality parameters *viz*., germination per cent (92%), speed of germination (31), seedling root length (10.5 cm), seedling shoot length (6.9 cm), seedling dry weight (0.03 10g seedling^{-1}), seedling vigour index length (1451) and seedling vigour index mass (2.1). Hence, it is concluded that one per cent coconut water was the superior priming agent for sesame seed quality enhancement which is cost effective, non-toxic and eco-friendly sources.
Keywords: Seed priming; Seed quality characters, Sesame

Science of Self Healing Material and Their Applications
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ABSTRCAT
Self-healing materials now days play very important role in category of smart structures, as they can adapt to various environmental conditions, according to their sensing property. In this paper the healing science and mechanisms of certain especial materials or composites are studied and its applications are discussed. Healing mechanisms vary from an intrinsic repair of the material to the addition of a repair agent contained in a microscopic vessel. For a material to be strictly defined as autonomously self-healing, it is necessary that the healing process occurs without human intervention. Self-healing activates in response to an external stimulus (light, temperature change, etc.) to initiate the healing processes. A material that can intrinsically correct damage caused by normal usage could prevent costs incurred by material failure and lower costs of a number of different industrial processes through longer part lifetime, and reduction of inefficiency caused by degradation over time. Different types of healing processes are considered as self-healing in general. Currently, self-healing is only considered as the recovery of mechanical strength through crack healing. However, there are other examples where not only the cracks but also small pinholes can be filled and healed to have better performance. This review addresses recovery of different types of properties, of materials. In this paper the self-healing science and mechanisms of certain especial materials or composites are studied and its applications are discussed.
Keywords: self-healing, smart material, environmental.

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ABSTRCAT
The present investigation on "Studies on interaction of rice genotypes with *Bacillus subtilis*" was carried out during Kharif 2021 at Agricultural Research Station (ARS), Gangavathi, University of Agricultural Sciences (UAS), Raichur, which is situated in the Northern Dry Zone of Karnataka between 15^{o} 15' 40" North latitude and 76^{o} 31' 40" East longitude and at an altitude of 419 m above mean sea level. The main objectives of the investigation include the evaluation of rice genotypes for their interaction with *Bacillus subtilis* for yield and yield-related traits and effect of *B. subtilis* on induced systemic resistance (ISR) in rice plants by triggering genes. The phenotypic

growth (shoots and root)-related responses of rice plants to *B. subtilis* inoculation in Hoagland's solution was studied. Twenty selected genotypes including six popular varieties viz., BPT-5204, Gangavathi Sona, IR-64, RNR 15048, GNV-1089 and MTU-1010 from ARS, Gangavati constituted the experimental material for the present investigation conducted in RBD design with two replications. The effect of *B. subtilis* on the growth of shoots and root length of rice seedlings in Hoagland's solution has been studied under laboratory conditions. Treated MTU 1010 and Gangavathi sona genotypes showed a rapid increase in seedling growth than untreated seedlings in Hoagland's solution. The twenty *B. subtilis* treated genotypes have shown a positive effect on the growth of shoot and root length compared to untreated seedlings in Hoagland's solution.

INFLUENCE OF RAMPHAL (*Annona reticulata* L.) ROOTSTOCK ON CUSTARD APPLE (*Annona squamosa* L.) cvs. BALANAGAR AND ARKA SAHAN

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ABSTRCAT

The present investigation entitled "Influence of Ramphal (*Annona reticulata* L.) rootstock on custard apple (*Annona squamosa* L.) cvs. Balanagar and Arka Sahan with an objective to study the influence of Ramphal (*Annona reticulata* L.) rootstock on graft success, survival per cent and vigour of custard apple cultivars. The experiment was carried out at Main Horticultural Research and Extension Center (MHREC), UHS, Bagalkot (Karnataka) in the year 2021. The experiment was laid down in a Completely Randomized Design and the observation was recorded on growth, success, survivability and biomass parameters of grafted plants of custard apple cultivars.

The experiment comprised of eight treatments *viz.*, T_1- Softwood grafting of Balanagar on 15th January, T_2- Softwood grafting of Balanagar on 30th January, T_3- Softwood grafting of Balanagar on 15th February, T_4- Softwood grafting of Balanagar on 28th February, T_5- Softwood grafting of Arka Sahan on 15th January, T_6- Softwood grafting of Arka Sahan on 30th January, T_7- Softwood grafting of Arka Sahan on 15th February, T_8- Softwood grafting of Arka Sahan on 28th February which were replicated thrice. The results of the present investigation showed significant differences among the grafts of different treatments tried for all the characters studied. In growth characteristics, treatment T_7 recorded significantly the maximum number of sprouts per graft (3.40), length of the sprouted shoot (25.37 cm), number of leaves (26.54), leaf area (30.66 cm^2), leaf area per graft (898.39 cm^2), scion girth (7.97 mm), rootstock girth (6.92 mm), girth of graft union (8.22 mm), length of the longest root (34.73 cm) with the highest survivability of graft (91.10 %) at 90 days after grafting and graft success (95.55 %) at 30 DAG. Although, the minimum number of days required for grafting (8.31) was recorded in T_3. With respect to biomass characteristics, T_7 recorded the maximum fresh weight of shoot (33.43 g), dry weight of shoot (18.36 g), dry weight of root (12.40 g) and shoot: root ratios (1.47 and 1.48) of fresh and dry weight basis, respectively. However, treatment T_7 is statistically on par with T_6 for most of the parameters studied.

Hence, it can be concluded that T_7 (softwood grafting of Arka Sahan on 15th February) performed best in terms of graft growth, success, survivability and biomass.

Influence of nitrogen, copper and zinc nanofertilizers on yield and its attributing components in chilli (*Capsicum annuum* var. annuum L.)

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ABSTRCAT

To study the efficacy of nanofertilizers in chilli, an experiment was carried out during the year 2020 and 2021. The experiment was conducted at the experimental field of division of vegetable science, SKUAST- Kashmir, Shalimar Srinagar during Kharif 2020 and Kharif 2021 with an objective of assessing the effectiveness of nanofertilizers (Nitrogen, Zinc and Copper) for enhancing yield attributes of chilli (*Capsicum annuum* L.), variety Kashmir Long-1. The experiment was carried out in randomized block design with twenty seven treatments and three replications. Foliar application of the nanofertilizers was done thrice at three different stages of crop growth. Out of the 27 treatment combinations T_{19} (N @ 4ml/l + Cu @ 2ml/l + Zn @ 2ml/l) was found best with regard to yield parameters of chilli. The results under such treatment were significantly higher for fruit length (11.75 cm), fruit diameter (2.01 cm), number of fruits plant^{-1} (61.07), fruit weight (8.55 g), fruit yield plant^{-1} (515.60 g) and fruit yield per hectare (177.79 q). The minimum number days to first flowering (28.01), days to fruit set (33.09) and days to first harvest (89.40) were recorded with treatment T_{19} (N @4 ml/l + Cu @ 2ml/l + Zn @ 2ml/l). It was also observed from the results that the application of nanofertilizers also increased the quality attributes of chilli.

Keywords: Efficacy, Nanofertilizers, Chilli, Growth, Foliar application

Multi -Criteria Land Suitability Assessment for Mulberry based agroforestry using AHP and GIS approach in Baramulla district of the Kashmir valley, India to achieve Sustainable agriculture

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ABSTRCAT

Land suitability assessments are necessary to reduce human impact on the environment and determine the best use of land. The Baramulla district of the Kashmir valley has been searched for in this study as a potential location for mulberry agroforestry. We assessed the suitability of the land for mulberry agroforestry in the Baramulla district of India using basic parameters such as slope, temperature, rainfall, LULC, and physical and chemical properties of the soil and applied the weighted multicriteria evaluation (MCE) technique in a geographic information system (GIS)

environment. Utilising the accessible literature and interviews with regional experts, the AHP approach was used to score the criteria. Through weighted overlay analysis, a map of the suitability of mulberry agroforestry for the research area was created, incorporating numerous criteria. The Mulberry agroforestry suitability map for the study region reveals that 16.99% of the land was extremely suitable, 28.96% was moderately suitable, 38.18% was just marginally suitable, and 15.87% was unsuitable. The results have also been thoroughly examined using Google Earth images, in comparison with Sentinel-2b LULC output and on field visits utilising GPS in order to increase the reliability of the data. Farmers, regional planners, and the government can use the research study's findings to guide their decisions regarding prospective mulberry agroforestry areas in the region and the methods that will provide a sustainable agroforestry management strategy and sustainable land use planning

Keywords: Land suitability, Analytical hierarchy process, GIS, Mulberry Agroforestry, Baramulla district, Kashmir valley

Agriculture Drone and its Applications in Jammu & Kashmir

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ABSTRCAT

UT of Jammu and Kashmir has an important role in countries agriculture. Presently the agriculture sector is contributing 21.09%of the GDP at state level. Jammu and Kashmir is advancing in adopting the new technologies in the field of agriculture. To update the farming community government has started ‘Holistic Agriculture Development Project’ in which the main emphasis is to initiate the use of agricultural machinery (Harvester, graders, packers) and technology (Drones, weather guiding apps, Sensor based agriculture) on the farms. Drones can play a key role in data collection and pesticide applications due to easy application methods.

Drones are defined as Unmanned Aerial Vehicles (UAVs) that are autonomously programmed or remotely controlled, either by a remote control or a ground station, and are categorized as networked robotic technologies. Different prospects are offered by drones for the agricultural sector are pesticide spraying, soil sampling and fertilizing, farm animal surveillance, real-time aerial imagery, and sensor data collection etc. In India, presently, drones are being advocated primarily as an automated spray device that can be tasked with pesticide etc. spraying over crops to reduce health hazards associated with manual spraying and save time, resources, and human labour. The camera in the drone allows it to capture images and the obstacle radar in the drone allows it to manoeuvre any obstacles like wires, poles etc. that may appear in the drone flight path. The flow meter in the drone ensures an automatic return to the launch point in case battery/spray liquid/water is exhausted. UAVs equipped with special sensors can collect multispectral images that are stitched to generate spectral reflectance bands. These bands allow users to calculate indexes such as a Normalized Difference Vegetation Index (NDVI), a Leaf Area Index (LAI) or a Photochemical Reflectance Index (PRI), allowing farmers to view crop changes or stress conditions that are otherwise invisible to the human eye.

Directorate of Extension (SKUAST Jammu) has bought 3 drones and is going to demonstrate this technology on farmers’ field. Very soon it will be available through custom hiring services also for the betterment of farming community.

Keywords: UAV, Drone, aerial imagery, sensor-based agriculture.

Economics of Lemongrass Cultivation in Jammu region of J&K

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ABSTRCAT
The present study was carried out to study the cost of cultivation and returns from lemongrass at Sirah village of Katra block of district Reasi. Lemon grass is an aromatic grass cultivated for oil extraction. It is very useful in monkey-affected areas, as it is not consumed by animals. A study was carried out by using different cost concepts, estimated from primary data collected from 15 cultivators. The cost of cultivation was calculated using operating expenses per hectare. The gross returns from cultivation of lemongrass in a hectare were assessed while net return over Cost of cultivation was calculated, respectively. The B:C ratio was calculated, which indicated that lemongrass cultivation is a profitable venture in the study area. There are two channels for marketing of lemongrass oil, i.e. (i) producer-local buyer-industry, and (ii) producer- industry. It was observed that marketing cost and price spread was higher on channel-I due to more number of intermediaries. The lemongrass cultivator can ease their marketing activities and enhance income through formation of Farmers Producers Company, which is under process.
Keywords: Lemongrass, Aromatic oil, FPOs.

Genetic variability analysis of different genotypes of Blackgram (*Vigna mungo* L.) for quality parameters under rainfed condition

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ABSTRCAT
Blackgram (*Vigna mungo* L.) is the third most important pulse crop after gram and pea. The present experiment was conducted during *kharif* 2021 at Pulses Research Sub-Station of Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (SKUAST-Jammu) and protein analysis was done in the laboratory of division of Plant Physiology, SKUAST-Jammu while iron content and zinc content were analyzed in the laboratory of International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, Hyderabad. Genetic variability parameters i.e., heritability and genetic advance percentage of mean was studied among thirty different genotypes of blackgram. The effect of genotype was significant at one percentage among all the quality traits including protein, iron, and zinc. On the mean value basis PU-8 genotype exhibited the highest selenium content; it helps in determination of drought tolerance nature of blackgram crop. All thirty genotypes had enough amount of variability for all the quality traits. Maximum protein content exhibited by PU-15-21, Fe content exhibited by PU-15-30, Zinc content exhibited by PU-KUG216. Protein and Fe content showed moderate GCV and PCV, whereas, low GCV and PCV content revealed by Zn. All the quality traits revealed high heritability along with high genetic advanced percentage of mean except Zn content. However, the nutrient content is high in pulses, but the bioavailability is poor in pulses because the presence of antinutrients likes phytic acid which inhibits the iron and zinc absorption.

Keywords: Blackgram, Protein, Iron, Zinc, malnutrition, heritability, and Genetic advance percentage of mean.

Unravelling the rhizosphere modification using nanofertilizers.

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ABSTRCAT

With the rising global population growth and limitation of traditional agricultural technology, global crop production could not provide enough nutrients to assure adequate intake for all people .Rhizosphere is where plant roots, soil, and soil biota interact, and is the portal of nutrients transporting from soil into plants. The rhizosphere processes could modify the bioavailability of all nutrients and nanomaterial (NMs) before entering the food plants. However, to date, the overall rhizosphere processes regulating the behaviors and bioavailability of NMs to enhance the quality and quantity of nutritional value are uncertain and little information is available.Various nanofertilizers such as nitrogen, phosphorous, secondary and micronutrient nanofertilizer, for environment sustainability and crop productivity are currently in use. This review is an attempt to assess NMs-mediated changes in plants, soil microbial taxa and related mechanisms of the behavior and bioavailability of NMs driven by rhizosphere processes, e.g., root secretions, microbial flora and fauna activities. A series of rhizosphere processes can influence how NMs enter plants and change the biological responses, including nutrient absorption and transport. The associations of nanomaterials with plant cells, the process of internalization, and the distribution of biomolecules using nanoparticles as a carrier are studied but not well understood. Different microbial taxa exhibit various responses to NPs .Various nanomaterials can assume a significant part in organic matter disintegration, nitrogen cycling, polysaccharides degradation, plant growth advancement and protection. Also concentration of NPs in the soil is a critical factor driving the NP- microbial interactions .The NPs enters the plant system by several routes, mainly through roots and leaves. NPs interact with plants at cellular and subcellular levels after entry; promoting changes in morphological and physiological states .These interactions may be positive or negative, depending on the nature of the NPs and the plant species. The chemical nature, reactivity, size, and specifically concentration of NPs in or on the plant could determine NPs' effects on mechanism of nutrient uptake and translocation in plant -systems

Various techniques have been successfully used to study nanostructure of rhizosphere and its microbial community. The plant's biological functions depend on the events that occur at the molecular level. However, little progress has been made at the molecular level influenced by nanoparticles, which is an important step in evaluating potential mechanisms and plants' effects. However, considering nanotechnology's potential benefits to date, increasing concerns regarding absorption, translocation, bioavailability, toxicity of nanoparticles, particularly affecting rhizosphere and soil microbial communities and its enzymatic and chemical properties, their applicability is to be explored, though reports available are few. Therefore, it is important to understand plants underlying mechanism and response towards nanoparticles in soil and the rhizosphere through various approaches in plant species and soil typesand safeguard the interest of IFSM and Plant productivity.

Innovative nutrient-value preservation method using refractance windows: A Review

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ABSTRCAT

It is extremely practical to assess how food processing affects the nutrients and health benefits of fruits and vegetables. Refractance window drying (RWD), a unique contact drying approach, was compared to various drying processes, such as the freeze drying technique, in this brief literature review. Carotenoids, phenolic or polyphenol content, and antioxidant capability are significant reported quality attributes. The RWD technology's gentle drying process demonstrated a number of ways to maintain the product quality, nutrient content, and biological activity to a high degree.

Keywords: Drying, Myllar film, Refractance Window Dryer.

Synthesized Nanoscale Fe by Different Methodology Use for Reclaimed Iron Deficiency in Rice Crop

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ABSTRCAT

The deficiency of iron in soil was recorded on worldwide levels. Conventional Fe fertilizer i.e. resulted in low use efficacy (1-5%). An novel Fe fertilizer was synthesized using three techniques *i.e.* chemical method (Fe-NPs Chem.), biological method (Fe-NPs Bio.) and iron containing nanoclay polymers composite (Fe-NCPC). Soil and foliar application under controlled condition pot experiments was conducted to evaluate the efficacy of nanoscale synthesized Fe particles using rice cultivars (*Rajendra Mansuri*). Synthesized nanoscale Fe-NPs 5.05%, 0.96% and 4.47% total Fe content was recorded, respectively. RDFe at various levels (100%, 50% and 25%) and foliar application of (40 ppm) synthesized Fe-NPs were tested in pot experiment and compared with $FeSO_4.7H_2O$. Fe containing nanoclay polymer composite (Fe-NCPC) followed by biological synthesis then chemical synthesis of nano Fe significantly increased the DTPA Fe, available N and S content and stimulated the enzyme activities in rhizosphere soil as well as enhanced the Fe distribution in soils. For future scope that needed to be evaluated mechanism of uptake and translocation of potential toxicity of NFs before large scale use in agriculture sector.

Keyword: Fe-NPs, Fe-NCPC, enzyme activities

Effect of two new generation herbicides on a biological indicator of soil Health

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ABSTRCAT

Herbicide is a chemical subsentence which uses to kill unwanted plants and vegetation. The application of herbicide-suppressing of weed along with the effect of metabolic and co-metabolic process action on microorganisms. Microorganisms play a crucial role in the nutrient cycle and it's maintaining soil fertility and nutrient concentration. A laboratory experiment was conducted with two new-generation herbicide pyrazosulfuron ethyl treatments, namely, recommended dose of 15 g a.i. ha^{-1} (RD) and 30 g a.i. h^{-1}(2RD), carfentrazone ethyl 25 g a.i ha^{-1}(RD), 50 g a.i. ha^{-1} (2RD) along with control applied to sandy loam soil to determine their effect on soil microbial population such as bacteria, fungi, actinomycetes, and microbial biomass carbon. The application of pyrazosulfuron ethyl (T_1 and T_2) and carfentrazone ethyl (T_3 and T_4) results showed significantly differ. At 7 days after application declined soil microbial population and microbial biomass status. Whereas, at 28 days after application significant increase in the microbial population such as bacteria (40.47%), actinomycetes (36.92%) fungi (56%) as well as MBC under herbicidal treatments compared to untreated plot. Hence, pyrazosulfuron and carfentrazone ethyl may cause short-term transitory changes in soil microbial population, and MBC.

Keywords*:* Herbicide, Bacteria, Fungi, Microbial biomass carbon.

Application of Arima, Svm Mixed Model, And Random Forest Model for Assessment of Soils Quality of Tea Growing Soils in Eastern India

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ABSTRCAT

The application of machine learning (ML) to forecast the unique properties of the soil can substantially assist geospatial design. The links between the controlling input variables and the investigated soil qualities are directly learned by ML algorithms. In this study, the ARIMA model was used to linearly model for assessment of soil quality based on time series data, and then the nonlinear part of the soil management system with time series analysis with the aid of the SVM model. Finally, the comprehensive prediction results of the two models were obtained. In addition, this study combined intelligent agriculture multi-information fusion technology, which is based on tea planting management empirical analysis in Kishanganj district. Without any explicit programming, the application of digital agriculture can open the door to scientific learning of forecasts or judgment. The Random Forest model is also used to determine the factors that control the spatial distribution of available P with different soil properties. The results have also revealed that RFM could be widely used for predictions or judgment on soil properties due to its ability to high nonlinear dimensional relationships, resistance to "overfitting" and further ability to determine the relevance of the variables, and ordinary kriging (OK) interpolation method of unknown soil properties. Moreover, the exponential model was the best-fitted model for the prediction of available phosphorus with a good accuracy level (RMSE value ≈ one). RFM using different spectral and environmental data increased the prediction results for all soil properties (R^2

> 0.90) when compared to OK method. All RFM-based prediction maps of soil available nutrients with medium range values showed towards the lower side and deficient range in the upper side of the study area. Pearson's correlation confirmed that available phosphorus was significantly correlated with soil organic carbon (r=0.49) and iron (r=0.65) at p=0.05. Principal component analysis (PAC) illustrated that soil available soil nutrients governed more loading factor in PC_1 (37.6%) and PC_2 (18.5) components. This study thus supports the notion that an increasing amount of complex data from remote sensing, particularly proximate sensing, enables agricultural planners to bridge the gap between data and decisions, which ultimately leads to decision-making procedures for nutrient management in the soil.

Keywords: RS& GIS, SOC, ARIMA model SVM model, Random Forest model, Tea soils

Influence of organic manures and different Biofertilizer inoculation on growth and yield of soybean (*glycine max* L.) under rain fed condition of Uttarakhand.

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ABSTRACT

A field experiment was conducted during *Kharif* season 2022 at crop research centre, School of Agricultural Sciences, Shri Guru Ram Rai University, Dehradun, Uttarakhand to evaluate the "Influence of organic manures and different Biofertilizer inoculation on growth and yield of soybean (*glycine max* L.) under rain fed condition of Uttarakhand". The experiment was laid out in randomized block design with three replications and twelve treatments comprised following levels of different organic manure and biofertilizer viz. T_1 (Control), T_2(Rhizobium), T_3(PSB), T_4(F.Y.M @10t/ha), T_5 (F.Y.M @10t/ha + Rhizobium), T_6 (F.Y.M @10t/ha + PSB), T_7 (Poultry @3t/ha), T_8 (Poultry @3t/ha + Rhizobium), T_9 (Poultry @3t/ha + PSB), T_{10} (Vermicompost @10t/ha), T_{11} (Vermicompost @10t/ha + Rhizobium), T_{12} (Vermicompost @10/ha + PSB).The growth attributes mainly Plant height, number of branches/plant, plant dry weight, grain yield and straw yield was found significantly higher with application of vermicompost @10t/ha + Rhizobium followed by Poultry @3t/ha + Rhizobium.

Keyword: Growth, FYM, Poultry, Rhizobium, Soybean, Vermicompost, Yield.

Influence of weed management practices and crop geometry on growth and yield of soyabean (*Glycine max* L.)

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ABSTRACT

A field experiment was conducted in soyabean during *kharif* season 2022 at crop research center Shri Guru Ram Rai University, School of Agricultural Sciences, Dehradun, Uttarakhand. To study the "Influence of weed management practices and crop geometry on growth and yield of soyabean [*Glycine max* L.]''The experiment was laid out in Factorial randomized block design with three replications and twelve treatments. The treatments comprised of three levels of crop geometry*viz*. G_1 (30 x 10 cm), G_2 (30 x 15 cm) and G_3 (30 x 20 cm) and four levels of weed management

practices *viz.* W_1 (Weedy check), W_2 [Hand Weeding (20DAS)] and W_3 [Hand weeding (40 DAS)] and W_4 [Hand weeding (20DAS) and (40 DAS)]. The growth and yield attributes *viz* plant height, Number of nodules / plants, Number of branches\plant, Number of pods per plant, Number of seeds\pod, Straw yield and Seed yield were recorded with the treatment of weeding at 20DAS and 40 DAS + crop geometry (30 cm x 15 cm)].

Keyword: Crop geometry Growth, Soyabean, Weeding, and Yield.

Effect of Crop Geometry and Weed Management Practices on Growth and Yield of Black Gram (*Vigna mungo* L.*)*

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ABSTRACT

A field experiment was conducted in black gram during *kharif* season 2022 at crop research Centre, School of Agricultural Sciences, Shri Guru Ram Rai University, Dehradun, Uttarakhand. The experiment was laid out in factorial randomized block design with three replications and nine treatments. The treatments comprised of three levels of crop geometry *viz.* S_1 (25 x 10 cm), S_2 (30 x 10 cm) and S_3 (35 x 10 cm) and three levels of weed management practices viz. W_0 (weedy check), W_1 [One Hand Weeding (25 DAS) + Mulching] and W_2 [Two hand weeding (25 DAS and 35 DAS)] Treatment of crop geometry and weed management treatments application of S_3W_1 (35 x 10 cm + One Hand Weeding 25 DAS + Mulching) were recorded the significaly highert in growth and yield attributes than other treatments *viz.* plant height, Number of leaves/plants, Number of branches\plant, Number of pod per plant, Number of seeds\pod, straw yield and Seed yield.

Keyword*:* Black Gram Crop geometry, Growth, Mulching, Weed Management and Yield

Effect of organic and inorganic fertilizers in growth and productivity of lentil (*Lens culinaris.* L.)

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ABSTRACT

Lentil is one of the most important legume crops which are highly enriched in protein. Lentil is cool seasons Rabi legume crop which acan tolerate frost and severe winter. To find out the effect of inorganic and organic fertilizers on growth and productivity of lentil an experiment is conducted on pulse crop variety PL-3 during Rabi Season (2021) at Dehradun.The Experiment was laid out in Randomized block design with five treatment and three replications.It is shown that with application of Nitrogen and Phosphorus + Vermicompost per hectare have highest plant height, no of branches , root nodules and number of pods per plant.The results shows that highest grain yield was obtained from 3tFYM/ha with NPK40:60:30 rather than other application of organic, Vermicompost, inorganic and control. This treatment increases the nitrogen fixation and number of pods per plant.The study showed that the lentil cultivarPL-3 could be successfully grown 3tFYM/ha withNPK40:60:30without compromising crop productivity and soil fertility, thereby sustaining soil-human-environment health.Therefore, this experiment explores the potential of lentil cultivars for continual and improved nutrient delivery from organic sources

coupled with synthetic fertilizers to improve crop yield, soil, environment, and human health protection.

Keyword- Growth, FYM, Nitrogen, Phosphorus, Vermicompost, and Yield.

Effect of Organic Fertilizers on Intercropping of Linseed (*Linum Usitassimum L.*) and Lentil (*Lens Culinaris*) Yield and Production

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ABSTRACT

The exploratory named "Effect of Organic Fertilizers on Intercropping of Linseed (*Linum Usitassimum L.*) and Lentil (*Lens Culinaris*) Yield and Production" was led during rabi time of 2017-18 at the H.N.B Garhwal College; Seed Science and Innovation Dept., Chauras grounds, Srinagar, Uttarakhand. The trial was spread out in Randomized Block Design. The examination was compromised with two varieties V1 (Him Alsi-1) and V2 (PL 406), four treatments and every treatment was imitated threefold. Based on analyze it is inferred that T1, T2, T7 and T8 which has Nitrogen and Neem Cake treatments have higher development and yield. The pod number which has been recorded higher in T1, T2, T7 and T8 was 90, 91, 92 and 97 individually. The plant level estimated in T1, T2, T7 and T8 are 54.14, 56.8, 48.52 and 41.9 cm separately and the rest treatment i.e vermi compost has a sufficient yield result. The dry matter was likewise kept high in Nitrogen and Neem Cake treatments.

Keywords: Lucern caterpillar (Heliothis armigera), Malathion, bavistin, economical yield, vermin wash, Soil nutrients

STANDARDIZATION OF TIME AND METHODS FOR PROPAGATION IN CUSTARD APPLE

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ABSTRACT

The field experiment was conducted at Horticulture farm of Rajasthan College of Agriculture, Udaipur, Rajasthan during 2020-21 and 2021-22. The experiment comprised of 3 treatments (Patch budding, Shield budding and Softwood grafting) with different time (1st week of March, 1st week of April, 1st week of May, 1st week of June and 1st week of July) with three replications were conducted to standardization of time and methods of propagation in custard apple. Among the various treatments, Softwood grafting with 1st week of March was superior in respect to Date of leaf bud burst (days after grafting and budding), grafting and budding success (%), stock girth (mm), scion girth (mm), stock-scion ratio, final scion girth (cm), final plant height (cm), number of branches per plant, number of leaves per plant, survival (%), Leaf length (cm), leaf width (cm), leaf area (cm^2) and specific leaf area (SLF) as compare of other treatment with time. From this study it may concluded that Standardizes of Vegetative method for commercial nursery plant production in Rajasthan condition.

Keyword: Propagation methods, time and growth parameters

EXOGENOUS APPLICATION OF SALICYLIC ACID REGULATES ANTIOXIDANT ENZYME ACTIVITIES AND QUALITY ATTRIBUTES OF UMRAN BER FRUITS UNDER COLD STORAGE

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ABSTRACT
The present study was conducted to investigate an influence of pre-harvest application of salicylic acid (1mM, 2mM and 3 mM) on shelf life and quality attributes of ber fruits cv. Umran under cold storage conditions (7.5±1^{0}C& 90-95 % RH). The cold-stored fruits were assessed for various physico-chemical attributes and enzymatic activities at 7 days interval up to 28 days. Results revealed that, fruits treated with salicylic acid@3mMresulted in reduced physiological loss in fruit weight, spoilage as well as increased firmness, soluble solids content, antioxidant activity and carotenoids. Furthermore, it suppressed activities of cell wall degrading enzymes like polygalacturonase, polyphenol oxidase, pectin methyl esterase and increased the activity of superoxide dismutaseperoxidase and catalase enzyme. It was concluded that pre-harvest spray of salicylic acid @3mMwas more effective in regulating enzymatic activities, thereby improving quality attributes and shelf life of ber fruits up to 21 days at cold storage.
Keywords: Salicylic acid, enzyme activity, quality attributes, shelf-life.

EFFECT OF ORGANIC NUTRIENT MANAGEMENT PRACTICES ON GROWTH, SOIL CHEMICAL PROPERTIES AND MICROBIAL POPULATIONS IN ONION BULB PRODUCTION

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ABSTRACT
The present experiment was conducted to access the effect of organic nutrient management practices on growth, yield and quality of onion during *Rabi* season. The experiment consisted of twelve treatments of FYM and neem cake as basal dose and liquid manures jeevamrut, panchagavya and vermiwash were applied during experimentation. The results obtained from the two years study was showed that among the different organic treatments, 50% of RDN through FYM + 50% of RDN through Neem cake + Panchagavya spray @ 3% + Vermiwash spray @ 5% at 30, 50 & 70 DAT + Jeevamrut @ 500 L ha^{-1} six times at 20 days intervals was found significantly superior to improve the bulb production, growth parameters and increased population number of soil microorganism like fungi, bacteria and actinomycetes in the soil. The nutrient status of the experimental site was also affected significantly by the application of different organic manures.
Keywords: Onion, Jeevamrut, Neem cake, Panchagavya and soil microorganism

CLIMATE SMART HORTICULTURE: IS THE PREREQUISITE OF AN HOUR

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ABSTRACT
In coming decades, climate change and global warming will threaten horticulture, food security and rural livelihoods. As the population is predictable to reach 9.5 billion by the year 2050, we will need to produce 60-70% more food. Climate change can be realized from the raising temperature, increased concentrations of CO_2 and other green house gases, raising sea levels, ozone depletion, increased incidences of drought, floods, cyclones and forest fires. It is much evident that climate change is projected to have a negative impact on phenology, flowering, pollination, fruiting and will reduce tolerance to biotic and abiotic stresses in horticultural crops. Therefore, quality and productivity of horticultural produce will decrease leading to lowered production, higher food prices and thereby making food security itself a big question. So, we need development of climate-resilient horticultural crops which are tolerant to high temperature, moisture stress, salinity and climate proofing through genomics and biotechnology is required to adapt and mitigate climate change. Also substituting to climate smart hi-tech horticulture technologies like protected cultivation, precision farming, plasticulture, micropropagation, integrated pest, nutrient and water management, micro-irrigation etc. would help to cope up climate change and maximizing the yield per unit area. Looking at the depleting water, land resources and soil fertility, adopting soilless culture (hydroponics and aeroponics) coupled with use of artificial intelligence in agriculture will provide a futuristic option for sustainable horticulture and increasing productivity, there by ensuring food security and improving livelihood of farmers.

PROPAGATION TECHNIQUES OF KIWIFRUIT FOR QUALITY PLANTING MATERIAL

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ABSTRACT
Introduction: Kiwifruit or Chinese gooseberry belongs to the genus Actinidia and family Actinidiaceae. It is a dioecious, deciduous and perennial fruiting vine, native to Southern China. Among all the species, *Actinidia chinensis* has a special economic importance owing to its high export quality. The fruits are rich in nutrition and helps improve the immunity against a number of diseases.
Materials and method: The experiment was laid out according to Randomized Block Design (RBD). Each treatment was replicated thrice times with 30 cuttings. Well matured dormant shoots of 25-30 cm length, 0.5- 1.0 cm thickness with at least 3 healthy bold buds were selected during mid-January to prepare hard-wood cuttings and the semi-hardwood cuttings were prepared in similar manner during mid- July retaining 2-3 leaves in these cuttings and were treated with 4000 ppm IBA.

Result and discussion: Among different cutting types, semi-hardwood cuttings performed better with respect to parameters *viz.* per cent rooted cutting and survival percentage etc. The higher rooting potential of semi-hardwood cuttings has been attributed to the endogenous auxin in tender vegetative growth. The percentage of rooted cuttings was higher in cuttings prepared in summer than the cuttings prepared in winter season. The presence of leaves in the cuttings at the time of planting not only supply nutrients but also specific root forming substance during rhizo-genesis which increases rooting per cent. Thus, the semi-hardwood cuttings of kiwifruit produced disease free and sound planting material more quickly and are less expensive beside requiring less space and skill.

LAND SUITABILITY EVALUATION CRITERIA FOR IRRIGATON: A REVIEW

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ABSTRACT
Land suitability assessment for irrigation is a crucial tool for both planning agricultural expansion and addressing the world's water scarcity issue. A land suitability analysis evaluates a site to determine whether it is suitable or adequate for a specific use of the land in that location. Tools for assessing land suitability have been widely used to find more effective irrigation systems in agricultural areas. The appropriateness of the land can be assessed in this study using a GIS-based Multi-Criteria Decision-Making approach (MCDM). Numerous criteria, including rainfall, evapotranspiration, population, Road network, slope, soil and land use/coverwill be considered in the land suitability analysis. A geographic information system (GIS) can be a useful tool for locating irrigable land and mapping irrigation-ready area. For decision-makers who are considering replacing crop land with irrigation land, the integration of RS-GIS and application of multi-Criteria Decision-Making using Analytical Hierarchy Process (AHP) could produce a superior database and guide map. A review was carried out for different multicriteriaanalysis to develop land suitability maps. Analytical Hierarchy Processintegrated with Multi-Criteria Decision-Makingin GIS environmentfound most suitable for irrigation.
Keywords: Land Suitability, GIS, AHP, MCDM, Remote sensing

COMPLETE REVIEW ON PRUNING AND PLUCKING EQUIPMENTS IN HORTICULTURE

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ABSTRACT
Most of the world's food and horticulture crops can be grown there. India has a total cultivable area of 142 million hectares (Mha), of which 57 Mha (or 40%) is irrigated and the remaining 85 Mha (or 60%) is rainfed (Singh *et al,* 2015). There is a chance that the amount of arable land would decline with increased industrialization, the creation of special economic zones, urbanisation, and housing sector growth. Launch of National Horticulture Mission has spurred the production and productivity of horticultural crops. Productivity of horticulture crops has increased by about 38.5% between 2004-05 and 2021-22(3rd Advance Estimate). The issue of climate change has thrown up greater uncertainties and risks, further imposing constraints on production

systems. (Anonymous, 2021-2022 NHB Report). The various growing techniques and production processes, required to work operations, technical procedures, appropriate techniques for soil management systems, orchard tractors, soil-working equipment, mulching and mowing equipment, post hole diggers, spreaders, sprayers, front-fitted knife trimmers, harvesting equipment, transporting equipment, shakers, harvesters, etc. are all included in modern horticultural mechanization. Harvesting, trimming, and spraying still require manual labour and should be automated. In India, the typical farm power density is 1 kW ha^{-1}. Timeliness is limited due to power availability during key operational periods. There is 3.75 kW ha^{-1} of required power density is thought to be necessary to maintain timeliness of activities. The relevance of regional producers and global markets for machinery and equipment cannot be overstated. New production methods must be the focus of interdisciplinary research including plant scientists, engineers, food scientists, economics, and marketing professionals. The key to innovation is a deep grasp of the system. Certain crops require distinct growing techniques, and only then can specialise machinery work. In this review different fruit plucking and pruning equipment were discussed along with the different processes involved for different crops harvesting characteristics.

Keywords: farm mechanization, farm power density, horticulture crops, pruning and plucking

A REVIEW ON MAPPING POTENTIAL GROUNDWATER ZONES FOR SUSTAINABLE DEVELOPMENT AND PLANNING USING REMOTE SENSING AND GIS

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ABSTRACT

Groundwater is a crucial resource for agricultural, industrial, and domestic purposes, and its availability and accessibility are vital for sustainable development. Groundwater potential zoning (GPZ) is a technique that allows the assessment and mapping of groundwater potential zones for the effective management and utilization of groundwater resources. In recent years, the integration of remote sensing and geographic information systems (GIS) has proved to be a powerful tool for GPZ, providing accurate and timely information on the spatial and temporal variability of groundwater potential zones. This review paper provides a comprehensive overview of the latest developments in the use of remote sensing and GIS for groundwater potential zoning. The paper describes the principles and methods of GPZ using remote sensing and GIS techniques, including data collection, pre-processing, and analysis. The review also covers the various types of remote sensing data, including satellite images, aerial photographs, and digital elevation models, and their applications in GPZ. Analytical hierarchy process (AHP), random forest model, logistic regression model, frequency ratio and other techniques were used to define the GPZ. The review paper highlights the advantages and limitations of using remote sensing and GIS for GPZ and discusses the challenges and opportunities for future research in this field. Overall, this review paper offers a valuable resource for researchers, practitioners, and decision-makers interested in the management and utilization of groundwater resources. The integration of remote sensing and GIS for GPZ can

help to improve water resources planning, management, and conservation efforts, and ensure sustainable development.

Keywords: Groundwater, Groundwater potential zoning, Remote sensing, GIS, AHP

ASSESSING WATER RESOURCES WITH SWAT: A COMPREHENSIVE REVIEW OF HYDROLOGICAL SURFACE WATER MODELLING

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ABSTRACT

Hydrological surface water modelling is an essential tool for predicting the impact of land use and management practices on water quality and quantity. The Soil and Water Assessment Tool (SWAT) is a widely used model for simulating hydrological processes and assessing the impact of land use change on water resources. This review paper provides a comprehensive overview of the SWAT model, including its various components, calibration and validation procedures, and applications in different contexts. The authors discuss the importance of accurate predictions and highlight the challenges associated with using the SWAT model, such as data availability, model complexity, and uncertainty in input parameters. The review covers different applications of the SWAT model, such as evaluating the effectiveness of best management practices, predicting the effects of climate change on water availability, and assessing the impact of land use change on water resources. The article concludes with a discussion on future research directions and potential improvements to the SWAT model. Overall, this review paper provides a valuable resource for researchers and practitioners interested in hydrological surface water modelling using the SWAT model. It highlights the strengths and limitations of the model and provides insights into its application in different contexts.

Keywords: Soil and Water Assessment Tool, modelling, hydrological processes, water resources

DEVELOPMENT OF AN ELECTRO-MECHANIC CONTROL SYSTEM FOR SEED-METERING UNIT OF SWEET CORN PLANTER

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ABSTRACT

A photo electronic sensor based instrumentation system was developed to Battery operated seed planters to quickly assess the seed metering rotor performance. The data thus collected and logged using instrumentation system without manual interference while in operation could quickly subjected to analysis, to identify defects in critical components, so that such machine components be redesigned to improve precision. Inclined and horizontal rotor plate metering mechanisms were test using a grease belt test rig in laboratory conditions fitted with the instrument system. The developed electronic sensor based instrument seed counting accuracy ranged between 96.88 to 99.55 percent of the actual seeds metered. The mean number of seeds counted by the sensor at

different forward speeds for maize varied from 257.54 to 253.88, 267.45 to 265.82 for incline and horizontal rotor plates respectively, whereas for castor in the range of 258.52 to 254.74 and 266.40 to 265.28 against the theoretical number of seeds to be dropped is 270. Seeding rate obtained for maize and castor for horizontal and inclined plate at forward speed of 3.5 km h were 11.13 and 11.18 seeds m and 5.58 and 5.63 seeds m.Seed spacing interval observed for horizontal rotor at the forward speed of 3.5 km h- was 201.33 mm for maize and 201 mm in case of castor and 207.01 mm for maize and 207.66 mm in case of inclined plate meters mechanism. Horizontal metering plate recorded more consistent seed to seed spacing interval when compared with the other mechanism. Sensing the seeds flowing through the seed tubes helps the operator to observe functioning of the planter

Keywords: Photo electronic sensor, horizontal plate, inclined plate, seed tubes, planter

KNOWLEDGE AND ADOPTION OF IMPROVED POST HARVEST TECHNOLOGIES OF WHEAT BY FARMERS OF SIKAR DISTRICT OF RAJASTHAN

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ABSTRACT

The present investigation was carried out in Dhod block of Rajasthan district. A representative sample of 130 Farmers was selected for the study spread over 4 villages. The majority of the wheat growers were belonged to middle age, educated up to higher secondary school education level, belonged to medium family members (6 to8), had agriculture as their occupation, medium level of income, medium land holding (2.01 to 5 ha),had 1.01 to 2 ha area under wheat crop with medium material possession and medium mass media. They had medium extension contact, medium social participation, medium risk orientation, medium knowledge level about improved post harvest technology of wheat and medium level of adoption of improved post-harvest technology of wheat. It was found that education, family size, annual income, land holding, area under wheat crop, material possession, mass media exposure, extension contact, social participation, risk orientation, knowledge of improved post-harvest technologies of wheat had positive and significant relationship with extent of adoption of improved post- harvest technologies of wheat, Further, coefficient of correlation indicated that Age had negatively and significant and occupation had positive and non-significant relationship with extent of adoption of improved post- harvest technologies of wheat. The major problems faced by the wheat growers were unavailability of thresher, irregular electricity supply during threshing, unavailability of required implements, lack of technical knowledge and training regarding grain storage. Wheat growers suggested that, bank should provide adequate loan for harvest requirement, short term training programmes should be provided for grading and scientific storage method and grading machines should be made available to farmers by panchayat samiti, Agricultural department at subsidized rate.

Keywords- Knowledge, Adoption, Improved Post-Harvest Technologies.

INNOVATIVE NUTRIENT-VALUE PRESERVATION METHOD USING REFRACTANCE WINDOWS: A REVIEW

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ABSTRACT
It is extremely practical to assess how food processing affects the nutrients and health benefits of fruits and vegetables. Refractance window drying (RWD), a unique contact drying approach, was compared to various drying processes, such as the freeze drying technique, in this brief literature review. Carotenoids, phenolic or polyphenol content, and antioxidant capability are significant reported quality attributes. The RWD technology's gentle drying process demonstrated a number of ways to maintain the product quality, nutrient content, and biological activity to a high degree.
Keywords: Drying, Myllar film, Refractance Window Dryer.

BRIDGING SCIENCE AND AGRICULTURE: ADVANCEMENTS IN PREDICTING CROP YIELDS

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ABSTRACT
Crop yield estimation is a crucial step in agricultural planning and management because it offers important information about the effectiveness and potential of agricultural systems. It entails estimating how much produce can be collected from a specific region, allowing farmers, decision-makers, and researchers to make informed decisions about resource allocation, food security, market predictions and sustainable agricultural practices. The combination of several data sources, such as historical records, satellite imaging, meteorological information, and ground-based observations, is necessary for accurate crop yield estimation. Advanced analytical methods are used to analyze these inputs and produce accurate forecasting of crop yield. The estimate of agricultural yields is fundamentally based on historical information. Long-term datasets including data on crop yields, farming methods, and environmental factors offer useful insights into the link between many variables and the harvested crop. By analyzing historical trends, researchers can identify patterns and correlations that help inform yield forecasts.The science of estimating agricultural yields has undergone a revolution because of satellite photography and remote sensing technology. Crop health, growth phases, and geographical distribution are all comprehensive information that may be found in high-resolution satellite photos. Scientists can evaluate agricultural conditions and spot possible production variance by using vegetation indices obtained from satellite data, such as the normalised difference vegetation index (NDVI). Monitoring additional elements impacting crop yield, such as soil moisture, temperature, and nutrient content, is also made possible by remote sensing data.Another important factor in estimating crop productivity is weather information. Crop development is directly influenced by meteorological data, such as temperature, rainfall, humidity, and sun radiation. The effect of various weather patterns on crop yields may be calculated by scientists by combining meteorological data with crop models and historical records. When estimating yield fluctuations brought on by extreme weather conditions like droughts, floods, or heatwaves, this information proves to be valuable. Field surveys and observations made on the ground give valuable validation and calibration

information to the crop yield estimation models. These data sources require gathering details about the various phases of crop development, the frequency of pests and diseases, and other field circumstances. Data-driven methods and machine learning have become effective tools for estimating agricultural yields. Machine learning algorithms may discover complicated relationships and patterns that might not be obvious using conventional statistical techniques by utilizing the enormous quantity of data gathered from several sources. With the help of these algorithms, farmers are able to use resources more effectively and make wise choices regarding crop management. These algorithms can learn from previous data to create precise forecasts about future crop yields. The current study addresses an overview on the different approaches, such as, advanced analytical techniques, machine learning algorithms, and data-driven approaches that have been made around the globe for crop yield estimation to provide valuable insights into agricultural productivity which contributes to food security and sustainable agricultural applications.

Keywords: Crop Yield Estimation, Satellite Imaging, Machine Learning, Advanced Analytical Techniques, Food Security

ASSESSMENT OF METEOROLOGICAL DROUGHT IN BANAS RIVER BASIN

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ABSTRACT

Drought is one of the main natural hazards that lead to agricultural, environmental, and economic damages. It is a global phenomenon that silently spreads out and creates insidious circumstances by destabilizing the hydrological cycle. The recurrent and prolonged drought events lead to high water scarcity, loss of natural vegetation, poor groundwater recharge, etc., which adversely affect the crop yields, livestock, allied sectors, and thereby socioeconomic conditions. Moreover, it causes the loss of human and animal lives, leading to migration, and social and political conflicts in various parts of the world, including India.According to the Indian Agricultural Research Institute (IARI), 70% of the Indian population depends on agriculture, wherein 68% of the net sown area reside in drought-prone regions. In this study, an attempt is made to evaluate Meteorological drought in Banas River Basin using SPI and SPEI. The 50 years daily Precipitation (0.25*0.25) and Temperature (1.0*1.0) was obtained from IMD. The result suggests increase in the number of hot days and decrease in the number of rainy days. Also, 4-monthly and 9-monthly SPI and SPEI indicate water stress in the Basin and presence of Agricultural and Hydrological drought. Also, SVM was used to model future drought using CMIP6 data and the results suggest increase in the number of drought events in the future. The results suggest that the basin requires careful and judicious planning of water resources to sustain agricultural and other activities in the future.

Keywords: SPI (Standard Precipitation Index), SPEI (Standard Precipitation Evapotranspiration Index), CMIP6 9Coupled Model Intercomparison Project6), Support Vector Machine (SVM), IMD (Indian Meteorological Department).

SCOPE OF ELECTRIC VEHICLES IN INDIAN AGRICULTURE

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ABSTRACT
Agriculture plays a vital role in India's economyand accounts for 18.8% of country's Gross Value Added (GVA). Total workforce is engaged in agriculture and allied sector activities were 54.6 %. About 60 % of the Indian farmers are small and marginal farmer holding land of 1-2 ha. Growing awareness of environmental issues, increasingly strict anti-pollution laws, and the constant progress of modern technology are all bringing us towards the fast evolution of electric propulsion in the agricultural sector. Electric vehicles are alternatives to internal combustion engines vehicles.Experiments have been done globally to use Battery Electric Powered Vehicles (BEPVs) for light agricultural duties. BEPVs for agriculture operations can convert three forth of the chemical energy of batteries to mechanical power available at the wheels while the equivalent value for IC Engine Vehicles was 15% (Mousazadeh*et al*., 2009). This technology is most suitable for agriculture operations like light draft requirement activities such as sowing, weeding, spraying. Therefore electric powered farm equipment has the vast scope for performing light draft requirement operations in agriculture production with environmental friendly.
Keywords- Battery Operated, Electric Vehicles, Agriculture

THERMOGRAVIMETRIC ANALYSISFOR THERMAL DECOMPOSITION AND KINETIC PARAMETERS OF BIOMASS

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ABSTRACT
The diminishing supply of fossil fuels worsening the environment. The biomass is becoming more and more popular as a green renewable energy source on a worldwide scale. This demonstrates a prospective application to extract a different form of energy to take the place of fossil fuels and to be a key component of the biobased economy. The ability of biomass to meet the energy requirements of the modern world is fairly high. By using biomass, thermal power plants may consume less coal while having a less negative environmental impact. A method for describing biomass fuels for boilers and combustors is put forth that is based on thermogravimetric analysis (TGA), the deconvolution of the DTG signal, and empirical correlations. The higher heating value (HHV), the contents of moisture, volatile matter, fixed carbon, ashes, carbon, hydrogen, and oxygen, as well as the kinetic parameters of the thermal decomposition of the biomass, can all be precisely and quickly determined using this methodology. The equipment that is now used to get these characteristics is significantly more expensive and specialized than the way that is being suggested.
Keywords: Biomass, Thermogravimetric analysis, heating value, Bio-based energy.

DEVELOPMENT AND PERFORMANCE EVALUATION OF TRACTOR MOUNTED INTER ROW SHIELDED HERBICIDE SPRAYER FOR WIDE ROW CROPS

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ABSTRACT
A tractor mounted inter row shielded herbicide sprayer was developed at M/s. American Spring and Pressing Works Private Limited (ASPEE), Mumbai. Different components of the sprayer were main frame, chemical tank, pump, filter, and boom, shield mounting assembly, shield, nozzles, power transmitting unit, control panel and spray delivery hoses. The performance of the developed sprayer was evaluated in the laboratory to study the effect of independent variables on selected dependent variables. The independent variables selected were spraying pressure (138, 276 and 414 kPa), wind velocities (1.5, 1.75 and 2.0 m/s) and forward speeds (2.5, 3 and 3.5 km/h) for no shield, shield 1 and shield 2 conditions. The dependent variables were droplet size (VMD), droplet density (DD) and uniformity coefficient (UC). The machine parameters evaluated in the field were swath width (m), field capacity (ha/h), field efficiency (%), application rate (l/ha), tank discharge time (min), fuel consumption (l/h) and drift (mg). Whereas, crop parameters evaluated were crop damage (%), weed density (no./m^2) and weeding efficiency (%). Droplet size values found for shield 1 at 138 kPa spraying pressure at all forward speed were observed close to the recommended range of droplet size for herbicide application. Shield 1 reduced the spray drift by 90.37 per cent followed by shield 2 viz. 77.97 per cent as compare to no shield condition for 5 m distance in the field. The average effective field capacity and field efficiency of developed sprayer were found to be 1.05 ha/h and 75 per cent, respectively. Weeding efficiency with the developed sprayer was found to be 87 per cent. The cost of operation of developed sprayer was 882 Rs./ha as compared to cost of operation of manual weeding which was 3750 Rs./ha (Cost saving of 2868 Rs./ha).
Keywords: Shielded sprayer, Volume median diameter (VMD), Droplet density (DD), Uniformity Coefficient (UC) etc.

FARM MECHANIZATION, FARM MACHINERY ACCIDENTS AND SAFETY: AREVIEW

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ABSTRACT
India is the largest country in the South Asian region with all the problems faced by rapidly developing nations, especially in increasing mechanization. Despite such developments, there are limited data in the literature addressing the problem of vehicle and machine injuries related to agriculture. Agriculture machine injuries are a significant burden on the farm and agricultural sector in India, the most affected group is young males. Pedestrians constitute a large majority of the victims and there is high early mortality in most cases. This is an attempt to estimate the magnitude of the problem through published literature. A systematic review of the literature on machine caused injuries in agriculture farms in India, conducted using different databases and hand-searching of the selected articles. There is a lack of population-based data on injuries in India and there is large heterogeneity in the published data. This is an important research agenda for the

country. Immediate steps are required to curb this problem to limit the loss of life of the farmers. The mechanization gap between the expected level of knowledge and status of implements found that lack of awareness resulted in low status in respect of implements and its importance. Standardization and quality marking centers of farm equipment established in potential areas of the state can do the same. Farm mechanization, accidents in farm operations and safety give us the idea and scope of the future. The level of mechanization to be achieved, the futuristic developments and safety measures to be considered while manufacturing the machineries and top revent the accidents the knowledge of the scenarios should be known hence the study and reviewing the mechanization level, farm machinery accidents and safety is needed.

Keywords: Farm mechanization, machinery accidents, machinery safety, mechanization status.

ADOPTION OF CLIMATE RESILIENT CROPS IN FUTURE USE

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ABSTRACT

Climate-resilient crops and crop varieties have been recommended as a way for farmers to cope with or adapt to climate change, but despite the apparent benefits, rates of adoption by smallholder farmers are highly variable. Here we present a scoping review, using PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols), examining the conditions that have led to the adoption of climate-resilient crops over the past 30 years in lower- and middle-income countries. The descriptive analysis performed on 202 papers shows that small-scale producers adopted climate-resilient crops and varieties to cope with abiotic stresses such as drought, heat, flooding and salinity. The most prevalent trait in our dataset was drought tolerance, followed by water-use efficiency. Our analysis found that the most important determinants of adoption of climate-resilient crops were the availability and effectiveness of extension services and outreach, followed by education levels of heads of households, farmers' access to inputs—especially seeds and fertilizers—and socio-economic status of farming families. About 53% of studies reported that social differences such as sex, age, marital status and ethnicity affected the adoption of varieties or crops as climate change-adaptation strategies. On the basis of the collected evidence, this study presents a series of pathways and interventions that could contribute to higher adoption rates of climate-resilient crops and reduce dis-adoption.

Keywords: Climate, adoption, crops

An Economic evaluation of soybean cultivation in Vidisha district of Madhya Pradesh

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ABSTRACT

This paper has assessed the economic evaluation of soybean production as a potential option to improve farmers' income and ensure their sustainable livelihood in Vidisha district of Madhya Pradesh. The study was conducted as a part of survey using primary data collected from 60 numbers of farmers of two blocks *viz.* Basoda and Nateram tehsils of Vidisha district. The finding revealed per hectare total cost of cultivation of soybean was higher in marginal farms (Rs.35158 ha^{-1}). The Study also revealed that soybean growers spent 13.19 per cent of the total cost on seeds,

followed by 12.37 per cent on hired labour, 7.40 per cent on chemical fertilizers, 5.85 per cent on machine power and 5.01 per cent on plant protection materials. The highest B: C ratio (1.71) was estimated for medium farm situation. The Study suggested that department of Agriculture and zonal research station may take concerted initiatives in terms of transfer of improved technology and short term loan to the farmers. The state government should prepare policy to provide the minimum support price, which will encourage, the farmers for extension cultivation is these districts.

Keywords: Soybean, costs and returns, analysis constraints, Madhya Pradesh, India.

Genetic Study of Linseed (*Linum usitatissimum* L.) in late sown condition

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ABSTRACT

An experiment was conducted in Randomized Block design during *Rabi* season of 2021-22 at experimental farm of TCA Dholi under RPCAU, Pusa with an objective to know the genetic variability for yield and yield contributing characters among 19 entries in Linseed. Statistical Analysis revealed that out of 19 entries five entries (BRLS 109-2, RL 18112, NL 371, SLS 140, & RL 18102) showed significant earliness for Days to flowering, 3-entries (BRLS 109-2, RL 18112 & SLS 140) had significant earliness for Days to maturity and 3 entries(LMS-2019-R-4, BRLS 109-2 & SLS 140) were observed significantly higher oil yield over best check while all the entries exhibited significantly superiority for 1000 seed weight (g.) and only one entry(LCK 2140) showed significantly higher Seed Yield (Kg./ha) over check.

Keywords: Linseed, Genetic, Variability.

Effect of planting density on growth, yield and economics of elephant foot yam [*Amorphophallus paeoniifolius* (Dennst.) Nicolson].

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ABSTRACT

A trial on density planting in elephant foot yam was conducted during 2021-22 and 2022-23 on sandy loam soil in randomized block design at Agricultural Research Farm, Dholi of Tirhut College of Agriculture under Dr. Rajendra Prasad Central Agricultural University, Pusa (Bihar) to find out the effect of different planting density on growth, tuber/corm yield and economics of elephant foot yam. The soil of the experimental plot was sandy loam with pH value of 8.2. Initial soil analysis value of experimental field was: available nitrogen (204.3 kg/ha), phosphorus (16.2 kg/ha), and potassium (131.5 kg/ha). There were nine treatments i.e., T1-Normal planting at 90x90 cm, T2-Normal planting at 90x90 cm + green gram sowing in inter-row spaces and its incorporation, T3-Normal planting at 90x90 cm + dhaincha sowing in inter-row spaces and its incorporation, T4-High density planting at 75x45 ,T5-High density planting at 75x45+ green gram

sowing in inter-row spaces and its incorporation, T6-High density planting at 75x45+ dhaincha sowing in inter-row spaces and its incorporation, T7-Paired row planting at 45x55/77 cm, T8-Paired row planting at 45x55/77 cm + green gram sowing in inter-row spaces and its incorporation and T9-Paired row planting at 45x55/77 cm + dhaincha sowing in inter-row spaces and its incorporation. .'Gajendra' was taken as test variety. It was found that plant height after four months of planting under high planting density either in single row or paired row was significantly higher than normal planting and the increase was to the tune of 19.8-29.9 per cent. Corm yield, net return and B:C ratio under high density planting were also found significantly superior than normal planting and the increase were recorded to the tune of 74.7-96.7, 66.6-105.4 and 4.3-5.8 per cent, respectively. Plant height, corm yield, net return and B:C ratio in all the treatments green manured with greengram (*Vigna radiata*) or dhaincha (*Sesbania rostrata*) or without green manuring either single row planting or paired row planting under high density planting were found at par among themselves.

Keywords: Elephant foot yam, high planting density, corm yield, net return.

Integrated disease management of Alternaria leaf spot of Sunflower

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ABSTRACT

A two years field experiment was conducted on the Integrated Disease Management of Alternaria Leaf Spot of Sunflower during *spring* 2014-15 to 2015-16 in experimental farm of Dholi Kothi Farm situated at Tirhut College of Agriculture, Dholi, Muzaffarpur, Bihar. The result indicated that all the treatments tested were significantly effective in reducing the severity of Alternaria leaf spot of Sunflower. Maximum per cent seed germination (95.5%), lowest PDI of Alternaria leaf spot (7.5%), maximum seed yield (1254 q/h) and maximum per cent increase in grain yield (29.2%) were recorded in seed priming with (Carbendazim @ 2g/kg + Thiamethoxam @4 g/kg) + foliar spray of Propiconazole @ 0.1% + Thiamethoxam @ 0.4%) as soon as disease appeared and 15 days later while maximum per cent disease severity (26.5%) and lowest seed yield (887 kg/h) were recorded in control. Next superior treatment among all the treatments, seed priming with (Carbendazim @ 2g/kg seeds + Thiamethoxam @4g/kg seeds) + foliar spray of Propiconazole @ 0.1% + Azadirachtin @ 0.15%. was observed. In this treatment seed germination (92.0%), per cent, per cent disease severity (8.8%), seed yield (1232 kg/h) and per cent increase in grain yield (28. 0%) were observed which was at par with each other.

Keywords: Sunflower, Alternaria leaf spot, Chemical, Disease management.

CONSTRAINTS FACED BY THE JAGGERY PRODUCERS IN BELAGAVI DISTRICT OF KARNATAKA

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ABSTRACT

Sugarcane (*Saccharum officinarum L.*) is an important cash crop and is grown in tropical and sub - tropical region across the world. After textiles, sugarcane is the second largest agro-based industry in terms of raw material. It is more important because of their significant contribution to

our country's economy by foreign exchange earnings. In India, the sugar industry has been a focal point for socioeconomic growth in rural areas, mobilising rural capital, creating jobs, and increasing farmers' farm income. The Indian jaggery industry is the country's largest unorganised market, and it is one of the oldest and most prominent rural cottage industries. The majority of sugarcane growers are manufactures the jaggery with minimal capital expenditure, generating jobs for unemployed rural residents. Sugarcane is primarily cultivated for juice from which sugar is processed. Fifty per cent of sugar can be utilised for the production of white sugar, 30% for low purity sugar (jaggery) and 20.00% per cent for alcohol directly from sugarcane juice along with molasses. India is the highest producer and consumer of jaggery. The research was conducted in Belagavi district of Karnataka during the year 2020-2021. The Belagavi district had been purposely selected on the basis of highest area and production of sugarcane lies in the state. A total of 90 jaggery producers had taken as the sample respondents for the study purposes. The obtained data had collected by personal interview method.Majority of sugarcane growers faced the constraints of jaggery production was non -availability of labours, high wages of labours, low price, exploitation by middle man, lack of technical guidance and high cost of inputs, high interest rate on loan and insufficient repayment time, transportation and irregular supply of electricity, delayed cash payment, non- availability of inputs, inadequate credit, storage, inadequate subsidy and quantum and timely availability of credit. The government and concerned developmental departments should plan the strategies to overcome the above said problems faced by sugarcane growers through jaggery production.

Keywords: Sugarcane, jaggery, Belagavi district

EVALUATION OF PRE- RELEASE SUGARCANE GENOTYPES AGAINST RED ROT DISEASE

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ABSTRACT

Sugarcane (*Saccharum officinarum* L.) is an important Agro- industrial cash crop of tropical as well as sub – tropical regions of India and one of the visible cash crop in Bihar. A sugarcane industry particularly in Bihar is facing problems due to decline in productivity and creating serious concern to all those who involved in sugarcane research and its overall expansion. Therefore, it was needed to enhance the sugarcane production and productivity making it more profitable. It is well fact that, the improved variety is an important component in boosting yield of sugarcane. It has been observed that, if only good quality variety is used for planting, one can harvest an increase in productivity of 15-20 %. Breeding varieties for resistance to diseases in sugarcane is the most useful and economic means of disease management. Therefore, evaluation of sugarcane genotypes against red rot disease were carried out to find out the level of resistance to maintain the cane yield and juice quality in the interest of sugar mills as well as cane growers. In this context, twenty one sugarcane genotypes were evaluated against red rot disease by plug method of inoculation. Out of 21 tested genotypes, four genotypes CoX 14281, CoX 14356, CoX 11628 and CoX 094402 showed resistant reaction, ten genotypes showed moderately resistant reaction whereas, seven genotypes were observed moderately susceptible to red rot disease.

Keywords: Evaluation, sugarcane, red rot, disease.

EVALUATION OF EARLY MATURING SUGARCANE GENOTYPES FOR RATOONABILITY UNDER SUBTROPICAL CONDITION

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ABSTRACT
A study had been conducted at Pusa farm, Dr. RPCAU, Pusa, Samastipur, Bihar for the evaluation of early maturing genotypes for ratooning ability. Investigation was done on variability, character association, path analysis and genetic divergence. Data have been collected for fifteen quantitative characters namely number of shoots at 90 DAP, number of shoots at 180 DAP, single cane weight, number of millable canes, pol%, brix%, sucrose%, extraction%, purity%, fibre% at harvest, stalk diameter,cane height ,sugar yield and cane yield at harvest.Eight genotypes were cultivated in Randomised Block Design. Analysis of variance was found to be highly significant for all the characters under study.This shows the presence of inherent genetic differences among eight genotypes.Association studies between the characters for eight genotypes have been done.Correlation coefficients were splitted into direct and indirect effects with the help of path analysis. The genotypes CoP 16437 and CoP 16438 have expressed higher mean values for both cane yield and sugar yield which could be recommended for future use in breeding.In case of juice quality traits, the genotype CoLk 94184 topped the mean value. Cane height at harvest showed the maximum range among all other characters.Higher GCV and PCV were recorded in case of CCSt/ha at harvest.Genetic advance and heritability came high in case of CCSt/ha.Cane yield, NMC at harvest, Single cane weight, number of shots at 180 DAP had exhibited highest significant as well as positive correlation with CCSt/ha.Maximum significant positive association was shown in CCSt/ha through the direct effect of cane yield via indirect effect of NMC at harvest. Studied genotypes have been grouped into four clusters.Maximum inter cluster distance has been shown in cluster which indicates higher genetic diversity thus exploiting such genotypes within two clusters as parents for crossing could produce good sugarcane segregants. Maximum cluster mean value for more number of characters has been reported in cluster .The percentage contribution towards genetic divergence was found highest for purity% at harvest hence selection of this character will be useful.From the ranking of eight genotypes based on four criteria namely cane yield, CCSt/ha, sucrose%, NMC at harvest,it has been observed that CoP 16437 is the best early maturing genotypes for ratooning ability under subtropical condition.
Keywords: Evaluation, Early Maturing. Sugarcane Genotypes, Ratoonability

Validation and standardization of Harvest Index of mustard crop under moisture deficit irrigation scheduling (Varna T-59)

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ABSTRACT
Field investigations were carried out for the two years (2020-2021 and 2021-2022) to Validation and standardization of Harvest Index of mustard crop under moisture deficit irrigation scheduling (Varna T-59) as influenced by varying approaches of irrigation scheduling at the IRS of Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (Allahabad, Uttar

Pradesh, India) on sandy loam soil. Total five treatment with three replications comprised under this research work. The experiment was conducted in Random Block Design. In soil-water limiting condition irrigation amount is reduced by, 20%, 40%, 60% and 80 % of 60 mm as designed depth of irrigation in second, third and fourth treatment respectively, however in the first treatment full depth of irrigation provide without any stress. FAO aqua crop model, version 6.1 was used to validated and simulate the yield, biomass and water productivity irrigation scheduling. Model effectively simulate the grain yield, biomass and water productivity of irrigation scheduling may be due goodness of fit and good collinearity between observed and simulated values. For soil water limiting (deficit irrigation) condition model was performed good and satisfactory result for yield (RMSE=0.2, NRMSE 12.215, EF 0.94), Biomass (RMSE=1.7, NRMSE 22.1, FE=0.95) and water productivity (RMSE=0.154, NRMSE 13.9 and EF=0.98).

Keyword: Moisture deficit irrigation, aqua crop model, mustard, water productivity

SURVEY FOR THE NATURAL OCCURRENCE OF WHITE RUST DISEASE OF RAPESEED-MUSTARD IN AGRO- CLIMATIC ZONES-I OF BIHAR

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ABSTRACT

A roving survey was conducted during *Rabi* 2021-22 seasons to observe natural occurrence of white rust disease of rapeseed-mustard caused by *Albugo candida* Kuntze prevailing in Agro-Climatic Zone-I of Bihar *viz.* Muzaffarpur, Samastipur, and Darbhanga and Vaishali district. During survey it was observed the presence of disease incidence in all the places and differed across the surveyed areas because of the prevailing congenial environmental conditions and pathogen factors. The white rust incidence was varied between 15.5 to 20.3%. It was found that the mean per cent disease incidence was maximum in the district of Muzaffarpur (20.3%) and minimum in the district of Vaishali (15.5%). From survey report, it had been concluded that in previous years white rust disease was considered as minor disease but due to changing climate it was prevailing in all the areas in Agro-climatic conditions Zone- I and the incidence of the disease was increasing with time in Bihar.

Keywords: White rust, *Albugo candida,* rapeseed-mustard, Survey

Relationship between socio -economic and demographic profile of Sorghum growing farmers in relation to training needs

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ABSTRACT

Sorghum, is the third most important food grain in India, and fourth worldwide. sorghum is a staple diet for millions of people in Africa and Asia. In addition, millions of animals are fed the fodder and stover, providing milk and meat for human. The study was conducted over 80 sorghum

growing farmers in Kalaburgi district of Karnataka to assessrelationship between selected socio - economic and demographic profile of Sorghum growing farmers in relation to training needs. The finding revealed that the highest training needs among sorghum growers in different components of sorghum production technology were observed in the area of doses of pesticide and fungicide (2.79) followed by pest and diseases (2.75) and recommended doses of fertilizers (2.73. The least preferred areas for training were time and method of harvesting, signs of maturity, time and frequency of intercultural operation, preparation and selection of land among the areas of sorghum production technology. Further finding indicated that, two independent variables namely education, contact with extension agency were found positive and significant association withtraining need at 1 percent of significance with r values 0.374 and 0.291. The other variables like age, farming experience, innovation proneness, economic motivation and knowledge level with r value 0.279, 0.238, 0.251, 0.269, 0.242 were found positive and significant association with their training need among sorghum growers at 5 per cent significance. Whereas size of family, annual income, organizational participation and irrigation potential were found positive. The variables, size of land holding, and cropping intensity were found to be negative but had a non-significant association with their training needs of among sorghum growers. The regression analysis of data revealed that all the thirteen selected independent variables put together and they explained 41.64 percent variability towards the dependent variable (training need). Further it also found that, size of land holding, economic motivation, contact with extension agency and cropping intensity contributed significantly towards the training need.

Keywords: Socio-economic, demographic, Sorghum, farmers

SURVEY FOR NATURAL OCCURRENCE OF SHEATH ROT DISEASE OF RICE IN AGRO CLIMATIC CONDITIONS OF BIHAR

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ABSTRACT

Sheath rot of rice (*Oryza sativa* L.) caused by *Sarocladium oryzae* (Swada) W. Gams & D Hawksw is an important disease of rice inflicting heavy losses in all agro-climatic conditions of Bihar. Survey has been conducted during *Kharif* 2021 and *Kharif* 2022, seasons to observe natural occurrence of sheath rot of rice prevailing in agro-climatic conditions of Bihar in order to assess the recent disease scenario in changing climatic conditions. Different locations of Samastipur, Muzaffarpur, Vaishali, Darbhanga, Saran, Ara and Buxar district were surveyed and it has been observed that Sheath rot were occurring at varying degree of incidence and causing losses to the crop. The incidence of sheath rot was highest amongst all the districts surveyed and was more prevalent in Samastipur district in both *Kharif* season 2021 and 2022, with 43.2 per cent and 46.7 per cent of disease incidence, respectively, while the lowest disease incidence was recorded in Saran district, with 28.5 per cent and 26.6 per cent during 2021 and 2022. Significant differences in incidence between fields within a village level were not detected, indicating that disease incidence is similar at the village level. Observation from survey report, it had been concluded that sheath rot disease was prevalent in all the areas in the agro-climatic conditions as a whole and was congenial in changing climate for the development of sheath rot disease in Bihar.

Keywords: Survey, Rice, Sheath rot, ***Sarocladium oryzae***

Effect of organic and inorganic fertilizers on growth and yield of potato (*Solanum tuberosum* L.)" in Northern Bihar

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ABSTRACT
This field experiment was conducted during the Rabi season of year 2020-21 on potato crop with variety Kufri Lalit to test the Effect of organic and inorganic fertilizers on growth and yield of potato (Solanum tuberosum L.)".at Research farm of TCA, Dholi (Muzaffarpur), Bihar. The treatment combination is i.e., T_1 - control, T_2 – 50 % RDF, T_3 – 100 % RDF, T_4 - Crop residue incorporation (Rice straw 5t/ha) + Biofertilizer (Azotobacter, PSB, Trichoderma viride 5kg/ha each), T_5 - T4 + FYM 25t/ha, T_6 - T4 + Vermicompost 7.5 t/ha, T_7- T4 + Neem cake 5t/ha, T_8 - T4 + Poultry manure 3 t/ha. This experiment has conducted in randomized block design and thrice replicated it. The texture of experimental site was sandy loam with slightly alkaline in reaction (pH 8.31), low in organic carbon (0.47%) and available N (254 kg/ha). However, moderate in availability of P (17.4 kg/ha) and K (129.3 kg/ha), respectively. Among all treatments, treatment T_6 - T4 + Vermicompost 7.5 t/ha recorded higher plant's height (43.10), shoot's number/plant (5.47), dry matter accumulation (84.80 g/plant), tuber yield (24.12 t/ha) and treatment T_6 also recorded statistically at par with treatment T_3, T_5. In case of economic study, the benefit cost ratio (2.77) recorded from inorganic treatment T_3 (100 % RDF). Conclusively organic treatments were not comparable with inorganic RDF treatment in terms of benefit cost ratio due to higher cost of organic inputs.
Keywords: Organic; inorganic; manure, RDF, DAS.

Radiation interception and use efficiency in *Rabi* maize under different sowing dates

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ABSTRACT
Resource environment of crops particularly physical environment along with radiation umbrella atop the crop canopy exerts full control over plant's physiological processes and thereby over growth, development and yield of crop. Optimum micro-environmentin and around the crop canopy is crucial for achieving higher yield.Assessing the variation in radiation intensity withinthe canopyin relation to dry matter and leaf area index (LAI)provides important informationabout physiological processes of crops andmicroclimatic behaviour. Measurement of photosynthetic active radiation (PAR)in conjunction with crop biomass helps derive radiation use efficiencies, widely applicable for crop growth studies, and climate and ecosystem modelling. Keeping all this in view, a field experiment with winter maize (var. Rajendra hybrid 4) was conducted with five dates of sowing viz. 1 November (D1), 10 November (D2), 20 November(D3), 30 November(D4) and 10 December (D5) and three spacings viz. 60 X 20 cm (S1), 75 cm X 20 cm (S2) and 45 cm X 20 cm (S3) at the University farm of Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar during *rabi* season of 2021-22 to assess PAR variability, PAR interception and

radiation use efficiency. The experiment was laid out in split plot design with dates of sowing as main-plots and spacings as split plots.The results showed that the highest mean intercepted PAR (IPAR) (%) was observed for crop sown on D3 (20 November) and it kept on increasing from knee high stage to silking stage and decreased thereafter. It showed significant relation with LAI. Percent intercepted PAR was plotted as a function of LAI for every sowing environment, which showed significant relation. Significant relationships between grain yield and accumulated IPAR was observed for tasseling, milking and physiological maturity stages and different magnitudes of accumulated IPAR under different sowing environments were estimated for achieving highest maize grain yield. Maximum grain yield was obtained when PAR interception was 65-70% at milking stage.The value of intercepted PAR was highest (1131.2 μmol m^{-2} s^{-1}) for the crop sown on 10 December at a spacing of 45 cm x 20 cm and the lowest (133.3 μmol m^{-2} s^{-1}) for the crop planted on 1November at a spacing of 75cm x 20cm. Highest radiation use efficiency (RUE) of 5.81 g/MJ was registered for the crop sown on D3 (20November). Different equations developed in the study would be useful in predicting above ground biomass. Results on light use efficiency showed thatefficient utilization of ambient resource environment can be achieved by the crop, when it is sown on 20 November (D3).

Keywords: PAR, radiation interception, radiation use efficiency, maize, LAI and yield,

Tomato value chain analysis for Entrepreneurial Development in Kolar District (Karnataka): A Household level Study

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ABSTRACT

Tomato is a vital horticulture crop and one of the most popular vegetables worldwide, not just in India. Tomato is commonly utilized in Indian cuisine, and it also appears in various value added items such as soup, salad, pickles, ketchup, puree, sauces, etc. In India, tomato is cultivated under 812 thousand hectares with a production of 20.57 million metric tons with an average yield of 25.30 tonnes/ ha.(2020). Madhya Pradesh, Andhra Pradesh and Karnataka are leading producers of tomato in India having share 14.63 %, 10.92 % and 10.23 % ,respectively (NHB-2021). In Karnataka tomato is cultivated under 64 thousand hectares about 8 % of the state share and produced 20 lakh tonnes with an average yield of 31 tonnes/ ha. i.e. higher than that ofnational level average. In Karnataka, Kolar is leading tomato producing district and cultivating 8.52 thousand hectare with an annual production of 481 thousand tonnes andyield was 30 tonnes / ha. The value addition is one of the business strategies to adapt to thechanging markets and technologies, making it remain sustainable. It is fact that tomatoes arehighly perishable and growers must dispose them quickly and getting very low price of thecrop. Farmers do not have access to facilities for value addition in the tomato industry.In this back ground, it is necessary to focus on tomato crop to generate demandand income through value addition and entrepreneurial activities, this paper plan to analysethe current status of value addition in tomatoes with the broad objective of activities involvedin tomato value chain in studied areas. For the purpose of study primary data was utilizedwhich was collected from sixty different type of market functionaries namely commission agent (13), wholesaler (20), retailers (25) and Processor (02) during the agricultural year 2021-22.

The study finds that in value chain each actor plays an important role in addition of value in thefresh tomato but the extent of value addition was observed quite low, need to increase thelevel of value addition in studied areas by providing them proper assistance in terms of policiesrelated to market, small scale industries, secondary processing units &ample technical know- how.The study further indicates that the level of value addition was higher in processed tomato (142.86 %)in ketchup and (118.29 %)in purees due to as it changes the form into valueaddition products. The study further indicates that in case of fresh tomato degree of valueaddition was comparatively very low i.e. (15.29 %) at whole sale level, (17.13 %) at retailerlevel and (14.40 %) at organised level due to no changes of form of the produce. On the basisof findings, study suggests that bank and the government should come forward to give financialassistance and the creation of cold storage facilities, marketing infrastructures, transportationfacilities and so on for speed up value addition in tomato and increasing income andemployment in studied areas.

Keywords: Tomato, Value Chain, Entrepreneurship, Kolar, Karnataka

Natural occurrence of sugarcane wilt disease in Bihar

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ABSTRACT

Sugarcane (Saccharum officinarum L.) of Poaceae family is an important agro-industrial crop of tropical and subtropical regions of India. A vast industrial set-up, the value-chain, supply- chain and several stakeholders are mutually impacted by the success and failure of the sugarcane crop. In Bihar, more than 20 diseases of sugarcane have been reported which are caused by pathogens of varying group, which get sufficient time to establish themselves in the long duration annual crop of sugarcane. The fungal diseases have impacted approx. 83750 acres of cane growing belts in the state of Bihar. We aim to access the disease incidence (%) and disease status of sugarcane wilt disease caused by Fusarium sacchari L. in Bihar through an extensive survey. The disease intensity of sugarcane wilt varies from trace to 75% in different states of India leading to an estimated loss of 3-6 tonnes/ha and 12.7-25.4 million tonnes annually i.e., loss of Rs 12500-25000 million rupees per annum to sugarcane production in monetary terms. Wilt has emerged as major disease of sugarcane crop in Bihar with maximum (20.42%) wilt incidence at Manjhaulia sugar factory cane growing region and minimum (5.97%) wilt incidence at Kalyanpur. The mean disease incidence (%) and disease status respectively of different locations were recorded under Samastipur district: Kalyanpur Research Farm 5.97% in moderate form, Hasanpur 8.18% in mild form; West Champaran district: Harinagar 11.16% in severe form, Narkatiyaganj 9.06% in moderate form, Manjhaulia 20.42% in severe form, Lauriya 14.05% in severe form; East Champaran district: Saugauli 11.56% in severe form; Gopalganj district: Sidhawalia 9.08% in moderate form, Gopalganj 14.09% in severe form. Thus, it is concluded that there is need to frequently visit the sugarcane growing regions to know disease status and varietal susceptibility and impact of weather factors like precipitation and water stagnation, so that we can advocate the suitable varieties graded as resistant against wilt disease.

Keywords: Sugarcane, wilt, survey, disease incidence (%), disease status

Evaluation of different indigenous food baits components attracting *Bactrocera* spp.

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ABSTRACT
Tephritidae is one of the most important families under the order Diptera. Members of the order Diptera are known as "true flies" or fruit flies. In spite of causing huge economic losses, its management is still difficult mainly because of hidden nature of its immature stages (egg, maggot and pupa). So, only adult stage is the usual target for its management. Considering these research gaps, the present experiments were conducted at farmer's field, Kathalbari, Pundibari and Instructional farm, UBKV, Pundibari, Cooch Behar during 2017 and 2018. The laboratory experiments were conducted at Department of Entomology, UBKV, and Pundibari, Cooch Behar. Grape, guava, papaya, papaya, banana and pineapple pulps were used along with indigenous food materials, cidal chemicals, controlled releasers, vinegar were used for preparation of baits. Pheromone traps were also used with different wood dispenser blocks. Different coloured traps (cuelure) along with different shape were also used to evaluate the efficacy. Sticky cards of different colours were used with grease and chemicals for attracting and killing flies. Traps were hanged about 1 meter above from the ground level. The collected flies were identified using identification key. The efficacy of different ripen fruit pulp was evaluated for attracting fruit flies. The highest efficacy in terms of attracting fly was noted in food bait prepared using grape pulp. Food bait prepared from banana pulp was the second best treatments in attracting fruit flies. From all the food baits used in the experiment, only three species were identified namely *B. cucurbitae, B. dorsalis* and *B. correcta.* Among them the dominant species was *B. cucurbitae* which ranged from 48.28% - 52.08% followed by *B. dorsalis* (40.91% - 44.62%) and *B. correcta* (4.62% - 11.46%). Sex ratio (male: female) of trapped adult flies in different food baits revealed that the sex ratio of *B. cucurbitae* recorded highest as 1:1.33. Non-tephritids i.e. *Drosophila* spp., black ant (*Lasius* spp.), house fly (*Musca* spp.) and drain fly (*Psychoda* spp.) were also attracted to the bait.
Keywords: True flies, indigenous food baits, trapping

Effect of nitrogen management using LCC tool on Nitrogen mineralization pattern and Nitrogen use efficiency in Basmati rice

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ABSTRACT
The suitability of PAU-LCC for N management in evolved Basmati rice (PB 1718) was evaluated at CCSHAU Research farm KVK, Panipat during *kharif* 2020 season. The investigation was carried out in a randomized block design with three replications and eleven treatments *viz.* T_1: Control, T_2: RDF (30 kg N ha^{-1} basal + 30 kg N ha^{-1} 21 DAT + 30 kg N ha^{-1} 42 DAT), T_3: Recommended PAU LCC practice (30 kg N ha^{-1} basal + need based N application @ 30 kg ha^{-1} when LCC value is below 4 starting from 14 DAT), T_4: 30 kg N ha^{-1} at 14 DAT + need based N application @ 30 kg ha^{-1} when LCC value is below 4 starting from 21 DAT, T_5: 30 kg N ha^{-1} at 21 DAT + need based N application @ 30 kg ha^{-1} when LCC value is below 4 starting from 40 DAT, T_6: 18 kg N ha^{-1} at 14 DAT + need based N application @ 18 kg ha^{-1} when LCC value is below 4 starting from 21 DAT, T_7 : 18 kg N ha^{-1} at 21 DAT + need based N application @ 18 kg ha^{-1} when

LCC value is below 4 starting from 40 DAT, T_8 : 30 kg N ha^{-1} at 14 DAT + need based N application @ 30 kg ha^{-1} when LCC value is below 3.5 starting from 21 DAT, T_9: 30 kg N ha^{-1} at 21 DAT + need based N application @ 30 kg ha^{-1} when LCC value is below 3.5 starting from 40 DAT, T_{10}: 18 kg N ha^{-1} at 14 DAT + need based N application @ 18 kg ha^{-1} when LCC value is below 3.5 starting from 21 DAT, T_{11}: 18 kg N at 21 DAT + need based N application @ 18 kg ha^{-1} when LCC value is below 3.5 starting from 40 DAT. The results of the experiment revealed that the Nitrogen use efficiency was significantly higher (25.45 kg N ha^{-1} and 56.32% respectively as agronomic and recovery efficiency) in T_3 treatment as compared to other treatments. The available N was increased from initial value to harvest stage but P and K was decreased over initial value to harvest stage. The ammonical- N content in soil was highest (48.26 kg ha^{-1}) at 100 DAT in T_{11} while at harvest stage the maximum (60.66 kg ha^{-1}) nitrate-N content in soil was received in T_{11}. It was increased from initial stage to harvest stage but opposite trend was followed by ammonical-N in soil.

Low Cost Protected Structures: A way to mitigate Climate Change

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ABSTRACT

Climate change is one of the major issue affecting agriculture worldwide. Cultivation under controlled or regulated conditions of temperature, light, humidity and other factors which influence crop yield and quality can be termed as protected cultivation. It is a way of mitigating the adversities on crop due to uncertain and varying climatic conditions as a result of climate change. Thus protected cultivation is a means of providing favourable conditions for better plant growth with the aim of enhanced yield of improved quality by creating favourable micro-climate around the plants. These favourable conditions of micro-climate can be achieved by means of polyhouse, shadenet houses, insect proof net houses, low plastic tunnels, plastic mulching etc as these interventions have potential to enhance the crop productivity to many times which is difficult to achieve in normal open field conditions. However these interventions are undoubtedly are very beneficial for the farming community if used skillfully with proper marketing of produce but the point which goes against the majority of farming community is the higher initial cost associated with the adoption of these protective structures. Thus the introduction of low cost protected structures between the small and Marginal farmers is a way for enabling the small and Marginal Farmers to take benefits associated with protected cultivation. The KVK Mahasamund has made a poly tunnels for nursery raising of Cabbage, Cauliflower, tomato, brinjal in September. The erratic rainfall due to climate change during last week of September has damaged the nursery of vegetable crops of most of the farmers but the farmers under demonstration have succeeded in saving their vegetable nursery of above said crops. Also the cultivation of cole crops was also taken inside and outside the Low cost protected structure to study the impact of these protected structures. The marketable yield of cauliflower was found to be 5.47 kg/m2 in protected conditions against of 4.42 kg/m2 in open conditions while in case of cabbage marketable yield of was found to be 8.55 kg/m^2 in protected conditions against of 6.50 kg/m2 in open conditions. The response of small and marginal farmers towards adoption of low-cost structures for protected cultivation was encouraging as the technology adoption was feasible for them.

Keywords – Climate Change, Low cost protected structure, Cole crops, protected cultivation

Influence of biochemical constituents on population buildup of sucking pests in capsicum genotypes under different environmental conditions

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ABSTRACT

The present study on 'Effect of Biochemical Traits on Sucking Pests of Capsicum Under Protected and Open Conditions' was conducted under both protected and open conditions in the experimental field of College of Agricultural Engineering and Technology, Sher-e-Kashmir University of Agricultural Sciences & Technology - Kashmir, Shalimar involving three genotypes of Capsicum *viz*; Indra (Green), Orobelle (Yellow) and Bomby (Red) during the year 2021-2022. The findings of the current experimental studies showed that *Myzus persicae* and *Scirtothrips dorsalis* were associated with the capsicum crop from the 23rd to the 39th Standard Meteorological Week (SMW), causing significant crop damage in both environmental conditions. Aphid, *M. persicae*, and thrips, *S. dorsalis* infestations initiated during the 23rd SMW under both open and protected conditions which gradually increased during the 26th, 27th, 28th, 29th, 30th, 31st, and 32nd SMW's, respectively. The highest incidence was recorded during the 33rd SMW. In case of both the protected and open conditions, the highest aphid infestation on Indra, Orobelle and Bomby was observed to be 71.58 & 65.58, 79.78 & 73.78 and 75.68 & 69.68 per cent, respectively. In case of both the environmental conditions, the highest thrips infestation on Indra, Orobelle and Bomby was observed to be 11.80 & 4.20, 20.00 & 13.20 and 14.51 & 8.41 per cent, respectively. The pest population gradually declined thereafter up to 39th SMW. Under both environmental conditions, population density of aphid and thrips exhibited a statistically significant negative correlation with phenol and significant positive correlation with total chlorophyll, total sugar, total protein, and total nitrogen. Genotype Indra, which had a high phenol content (6.08 mg/g in open field and 6.40 mg/g in protected conditions), observed less infestation of aphid and thrips. Genotype Orobelle having higher concentration of total sugar (34.45 mg/g in the open field and 35.95 mg/g in the protected conditions), chlorophyll (0.90 mg/g in the open field and 1.32 mg/g in the protected conditions), nitrogen (2.26% in the open field and 2.29% in the protected conditions), and protein (14.12% in the open field and 14.36% in the protected conditions) observed more infestation of aphid and thrips.

Keywords: Aphid, Biochemical, Capsicum, Environmental conditions, Thrips.

Foraging of honey bees with changing climatic conditions yielding honey production in Kashmir, Himalayas.

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ABSTRACT

The Kashmir valley is the idyllic spot for beekeeping. The present study was carried on *Apis mellifera and Apis cerana indica* from diverse array of habitats spanning from valley plains to alpine peaks in the montane himalayan region. Changing climatic conditions and abundance of

floral availability from early spring to late summer season enhanced honey production significantly. In addition varying agricultural activities from one season to another and blossoms from different types of vegetations produced many herbal flavored choices of honey from conspicuous plant species such as *Robinia pseudoacacia, Pyrus spp., Fragaria spp., Brassica compestris, Pisum sativum, Trifolium spp., Helianthus annuus, Crocus sativus*, *Plectranthus rugosus* and *Iris kashmirana* etc. During the present study 500 flowers were recorded as a potential foraging flora for bees. Recorded data of flora included more than 300 herbs, 150 shrubs and above 50 trees. We also observed seasonal variations in the foraging activities of *Apis* species in different climatic conditions. The climatic variables were statistically correlated to the collection of outgoing and pollen-gathering forager data. The mean outgoing pollen gathering foraging activities of *Apis* species were higher in spring season as compared to summer and autumn seasons respectively. Spring season has been found to be best part of the year for maximum honey production and colony progression as compared to the summer and autumn seasons respectively. This research brings information concerning the performances of honey bees and the association of their performances, with climatic variables and floral diversity. Besides, provide data for further studies aiming to improve beekeeping and honey production in temperate environments. However, there may be need of further study to determine the indigence of other factors for honey production of *Apis mellifera* and *Apis cerana indica* in the studied zone of Kashmir Himalayas.

Soil and Water Conservation in Agriculture

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ABSTRACT

Conservation of soil and water resources is important for sustainability of agriculture and environment. Soil and water resources are under immense pressure due to ever increasing population thereby ensuing growing demand for food, fiber and shelter. Soil and water resources are being deteriorated due to different anthropogenic and natural factors.

Soil erosion is one of the several major deteriorative processes which results in deterioration of the soil. Soil erosion is removal of soil due to movement of water or air. Soil erosion may lead to the significant loss of soil productivity and thus may lead to the desertification under sever conditions. Water and wind are the major agencies which are responsible of soil erosion. Deforestation, over-grazing, mismanagement of cultivated soils, intensive cultivation and intensive urbanization are major factors triggering the soil erosion.

For sustainable agriculture and environment, it is pertinent for the protection of soil resources against erosion. Different control measures should be adopted to protect the soil resources against erosion. The concept of soil conservation cannot be materialized without conserving and efficient use of water resources. It is therefore pre-requisite that soil conservation practices should be adopted. Soil conservation practice include soil management, crop management, engineering, range management and forestry operation. The proper use of soil and water resources is necessary to ensure the future well-being of humans and of the environment.

Keywords: Soil, Water, Erosion, Conservation, Management

Mitigation of Salinity Stress in Mungbean by Halotolerant PGPR

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ABSTRACT
Total 41 halotolerant Plant Growth Promoting Rhizobacterial (PGPR) isolates were obtained from the rhizosphere of salinity affected mungbean. Two most potent PGPR isolates were screened on the basis ofin vitro plant growth promotion potential and identified as Bacillus subtilis and Serratia liquefaciens. Native strain of Rhizobium phaseoli was also isolated from mungbean growing under saline conditions. All these three isolates were tested in field conditions at two locations under salinity stress conditions by taking mungbean as a model crop. Experimental data revealed that all the treatments *i.e.* single or co-inoculation of PGPR significantly improved yield and yield attributing characters than control treatment. However, combined application of all the three PGPR showed significantly superior result than all other treatments under study. Pooled data revealed that application of all the three isolates in combination showed 33.31% more pods and 28.48% more seed weight/plant than recommended dose of chemical fertilizer (RDCF) treatment. Similarly, 29.62% increased seed and 37.50% straw yield were recorded due to combined application of all the three isolates in combination in pooled over RDCF. Therefore, the application of halotolerant PGPR can be useful to mitigate salt stress in the mungbean for increment of crop yield with negligible cost input and that too in eco-friendly manner.
Keywords: PGPR, Salinity stress, Mitigation of stress

Integrating Conservation Agriculture in Organic Farming

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ABSTRACT
Indian agriculture recorded all time high food grain production (~272 million tons) in 2016-17 due to the concerted efforts of farmers, scientists and extension workers. In the previous decades, major research and development efforts were focused on enhancing production and productivity of food grain crops. Among the various issues, conservation of the resource base have assumed paramount importance in view of widespread resource degradation and need to reduce the production costs, increase profitability which made agriculture more competitive. The conventional agriculture through intensive agricultural practices was successful for achieving the goals of production, but simultaneously led to severe degradation of natural resources. The occurrence of multi-nutrient deficiencies and overall decline in the productive capacity of the soil due to non-judicious use of agro- inputs, have been widely reported. Such concerns and problems posed by modern agriculture gave birth to new concepts in farming, such as organic farming, natural farming, biodynamic agriculture, do-nothing agriculture, eco-farming etc. The essential feature of such farming practices 'back to nature'. The emerging concerns for sustainable agriculture have been seen as a positive response to limits of both low-input, traditional agriculture and intensive modern agriculture relying on high levels of inputs for crop production.

Management of Crop Residues for Improving Input Use Efficiency

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ABSTRACT
Crop residues, the by product of crop production, are valuable natural resources that can be managed to maximize different input use efficiencies. Crop residue management is a well-known and widely accepted practice, and is a key component of conservation agriculture. The rapid shift from conventional agriculture to input-intensive modern agricultural practices often leads to an increase in the production of crop residues. Growing more food for an ever-increasing population brings the chance of fast residue generation. Ecosystem services from crop residues improve soil health status and supplement necessary elements in plants. In India is about 141 million tons surplus crop residue available in a year, out of which 92 mt is burned each year. Crop residues are natural resources with tremendous value to farmers. These residues are used as animal feed, composting, and hatching for rural homes and fuel for domestic and industrial use. About 25% of nitrogen, 25% phosphorus, 50% of sulphur and 75% of potassium uptake by cereal crops are retained in residues, making them valuable sources of nutrients. Therefore a field experiment was conducted during *Kharif* Season, 2021 at farmer's field of Tehsil Ganj Basoda; district Vidisha of Madhya Pradesh, to study the effect of Input Use Efficiency through crop residue management. 75% RDF + 2.5 t digested crop residues per hectare proved superior in respect of grain yield over other treatments. This might be due to balance use of fertilizers in soil which increased their availability in soil.
Keywords: Crop residues and soil properties.

Organic Weed Management in Wheat through Allelopathy

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ABSTRACT
Modern agriculture is productivity oriented and depends mainly on synthetic inputs (herbicides) to manage weeds. However, non-judicious use of these synthetic herbicides could cause environmental, health and herbicides resistance issues. Therefore, a focus has been given since last two decades on the use of plant derived organic substances as alternative to inorganic herbicides for weed control. Allelopathy is an eco-friendly and organic weed management approach, which may be used as a tool in controlling weeds. In this study, allelopathic water extracts of sorghum, sunflower and brassica were applied at 25, 40 and 55 DAS each at 18 and 20 L ha^{-1}, for weed management in wheat. For comparison, a standard herbicide *i.e.*idosulfuron + mesosulfuron (Atlantis) and a weedy check were maintained as control. Reduction in total weed density and biomass by the application of two foliar sprays of tank mixed sorghum, sunflower and brassica each at 18 L ha^{-1} were 48-59 and 48-58%, respectively. Maximum wheat grain yield was recorded from the application of two foliar sprays of sorghum, sunflower and brassica mixture at 18 L ha^{-1} at 25 and 40 DAS. This treatment was also economically the most feasible than other crop water extract treatments, with the maximum net benefits. This study suggests that allelopathy offers an attractive and environmentally friendly organic method of weed control in wheat.
Keywords: Allelopathy, Weed, Water extracts, Weed control, Wheat

Sustainable Management of Problematic Soils

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ABSTRACT
Agriculture is still relying on inorganic fertilizers and pesticides, which ultimately damage soil quality. Agriculture is facing considerable problem to decline in the soil's productivity through adverse changes in nutrient status, soil organic matter, structural attributes and concentration of toxic chemicals. Problematic soils (saline soils, salt affected soil, eroded soil, waterlogged soil etc.) are different from normal soils with certain limitations for plant growth. The avoidance of synthetic soil amendments and the use of natural amendments, as well as the nourishing of the soil and the environment, can be a sustainable approach to crop productivity. Therefore, keeping soil quality is an essential requirement for sustainable agriculture. Sustainable cropping system is a method of growing a variety of crops that take biophysical and socio-economic factors into account in order to sustainably improve soil quality and yield. Crop system practices are influenced by crop diversification, agricultural systems, soil types, agroecology, and market influences.
Keywords: Sustainable, soil quality, problematic soil

Organic Weed Management

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ABSTRACT
Weeds constitute a special class of pest which seriously limits the production of the major crops. These compete with the crops for all the inputs which are given for the crop growth and play a significant role in reducing the productivity of the crops (Maheshwari and Karthik, 2019). Weeds account for 33% loss in agriculture alone. Present agricultural system is productivity oriented and depends mainly on inorganic inputs to control weeds (Sadeghi *et al.*, 2010). Although herbicides provide promising rise in crop yield by efficient control of weeds, but unwise use of these synthetic herbicides could cause several ecological and health related issues. Restriction of synthetic herbicide use in organic agricultural systems increases the complexity of weed management leading organic farmers to cite weeds as the greatest barrier to organic production (Ryan *et al.,* 2007). Organic weed management is user friendly, non hazardous and environmentally safe and effective for sustainable crop production. It is concluded that physical weed control can only be successful where preventive and cultural weed management is applied to reduce weed emergence (e.g. through appropriate choice of crop rotation, tillage & cover crops) and improve crop competitive ability (*e.g*. through appropriate choice of crop genotype, sowing pattern and fertilization strategy). There is the problem of farmer's acceptability of these approaches because of perceived ineffectiveness and farmers inability to evaluate the negative impact of synthetic chemicals on the environment and human health. Organic weed management improve soil health as well as human health by reducing the risk of chemical residues.
Keywords: Weeds, organic farming, weed management, preventive measures

Food Security, Safety, and Sustainability—Getting the Trade-Offs Right

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ABSTRACT
Food safety and security are two complementing elements of our sustainable future. Hence, we need novel solutions for our future food security and sustainability without compromising food safety to achieve the sustainable development goals (SDG) including eradication of hunger and poverty, clean water, sustainable land use, responsible production and consumption, mitigating climate change, and sustainable life on land and water. Several approaches are possible for achieving sustainability and food security, such as limiting food losses and waste, eating more plant based foods or recycling foodstuffs. The tools and strategies used to achieve food security must align with food safety, and public health as well as sustainability. Food chains are complex and not transparent, hence we believe a One Health approach is needed to assess trade-offs and achieving sustainability (Boqvist *et al*., 2018).
To feed 10 billion persons 2050, we need to get the trade-offs right between sustainability, food security, food safety, and make better use of food already produced. Sustainable food security will require: (a) availability of food or sufficient food production, (b) access to food and ability to purchase food, (c) sufficiency in terms of nutrition including energy, proteins and micronutrients as well as safety, and (d) the stability and foresee ability of these conditions (Bazerghi *et al*., 2016).
The hierarchy of strategies for reducing food losses and waste are in descending order source reduction, reusing or reprocessing surplus foods, recycle food as feed for animals, recover the energy as biofuels, nutrients as compost, or raw materials for industry, while as last resorts one may consider recovering the energy by incineration or dumping as garbage in landfills. Intensification of food production and circular food systems could be parts of these solutions to future food security. There is no trade-off between intensification of food production aided by antimicrobials and the public health risks from antimicrobial resistance due to the zoo-technical use of antimicrobials. A sustainable future requires control of antimicrobial resistance. If one avoids that cycles of nutrients become cycles of pathogens and/or hazards, circular food production systems will a major contribution to the future sustainable food security (Ahmed, and Broek, 2017).
Keywords: Food safety, Food security, Sustainability

Various Effects of Rising Temperature as Climate Change on Agriculture Insect Pests

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ABSTRACT
Climate change, an emerging global concern has serious effects in every aspects of agriculture. Changed patterns in climatic factors like temperature, precipitation, humidity and other meteorological components are affecting the quality and quantity of agricultural commodities production. Temperature is identified as dominant abiotic factor directly affects herbivorous

insects. The increase in temperature associated with climatic change, would impact crop pest insect populations in several complex ways like extension of geographical rang, increased over-wintering, changes in population growth rate, increased number of generations, extension of development season, changes in crop pest synchrony, changes in interspecific interactions, increased risks of invasions by migrant pests and introduction of alternative hosts and over-wintering hosts. Depending on the development strategy of an insect species, temperature can exert different effects. Temperature can impact insect physiology and development directly or indirectly through the physiology or existence of hosts. The general prediction is that if global temperatures increase, the species will shift their geographical ranges closer to the poles or to higher elevations and increase their population size. Temperature may change gender ratios of some pest species such as thrips, potentially affecting reproduction rates. Natural enemy and host insect populations may respond differently to changes in temperature. Each additional degree of temperature rise could cause yield losses from insect pests to increase by a further 10-25%. Climate change has increased pest population and their damage potential by expanding distribution, enhancing survivability and allowing to develop the adaptability of insect pest. This change has been affecting the global agricultural production figure. Largest grain producers of the world are already facing massive infestation of crop pest and consequent yield losses.

Keywords: Agriculture, Abiotic factor, Temperature, Climate change, Production

Hi-Tech Horticulture

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ABSTRACT

Horticulture is the branch of agriculture concerned with the cultivation, production, and sale of fruits, vegetables, flowers, herbs, ornamental or decorative plants. Horticulture is an integral part of food and nutritional security. It is an essential component of economic security of the stakeholder. Hi-tech horticulture is a technology that is trendy, less environment-dependent, and capital intensive however with a capability to boost productivity and farmer's financial gain. Some of the technologies which the basis of hi-technology are :- genetic engineering, micro-propogation, micro-irrigation, fertigation, precision farming, high density planting, tissue culture, protected cultivation, use of GIS in horticulture development. Vegetables have excellent role in horticulture and owing to their suitability to grow in green houses, ideally fit in hi-tech horticulture technology. Use of portray and rooting media have revolutionized the hi-tech horticulture in vegetable crops. In the new era of changing climate, hi tech horticulture has become necessity so as to sustain productivity and economic stability of the Indian farmers. Hi-tech horticulture is beneficial not just for raising fruits, vegetables, and flower's crops however conjointly for conservation, plant protection, and post-harvest management together with value-addition.

Keywords: Hi-tech, horticulture, fruits, vegetables, flowers, post-harvest management.

Climate Change and Horticulture

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ABSTRACT
Significant variation in either the mean state of the climate or its variability, persisting for an extended period (typically decades or longer) is referred as climate change. Global warming and climate change is the greatest concern of mankind in 21st century. The major elements in climate change such as increasing temperatures, atmospheric CO_2, ozone depletion, UV radiation, heavy metal toxicities, extreme weather events (drought and cold), and changes in the precipitation pattern has markedly affected plant growth and development by modulating various physiological and biochemical mechanisms in horticultural crops. The Significant change may impact agriculture/ horticulture/ fish and livestock consequently food supply. The established commercial varieties of fruits, vegetables and flowers will perform poorly in an unpredictable manner due to aberration of climate. Melting of ice cap in the Himalayan regions will reduce chilling effect required for the flowering of many of the horticultural crops like Apple, Saffron, Rhododendron, Orchid *etc.* Commercial production of horticultural plants particularly grown under open field conditions will be severely affected due to high temperature physiological disorder of horticultural crops will be more pronounced e.g., Spongy tissue of mango, fruit cracking of litchi, flower and fruit abscission in solanaceous fruit vegetables. Air pollution also significantly decreased the yield of several horticultural crops and increases the intensity of certain physiological disorder like black tip of mango. Hence there is a need to protect these valuable crops for sustainability against the climate change scenario. Development of new cultivars of horticultural crops tolerant to high temperature, resistant to pests and diseases, short duration and producing good yield under stress conditions, as well as adoption of hi–tech horticulture and judicious management of natural resources will be the main strategies to meet this challenge.
Keyword: Climate, disorder, horticultural crop, India, judicious management and yield.

The efficacy of different mulching with spacing on growth and yield of strawberry (*Fragaria ananassa* Duch.) cv chandler

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ABSTRACT
An experiment was conducted at the Horticultural Research Farm of Babasaheb Bhimrao Ambedkar University, Lucknow. The experiment was performed to find out the most suitable mulching material and an ideal spacing for straw berry cultivation under Lucknow conditions. The experiment was laid out in a Factorial Randomized Block Design with three replications. The treatments comprised of three mulching materials viz. paddy straw, black polyethylene, and transparent polyethylene) with three spacings (30 x 15 cm and 30 x 20 cm and 30 x 30). On the basis of the statistical data, it is concluded that spacing of 30 x 30 cm with black polyethylene mulch was found to be the best in terms of plant growth viz. plant height, spread of plants, Number of flowers per plant, Number of leaves per plant, Fruit weight, Fruit length, Fruit diameter, Specific gravity of Fruit, and Fruit yield per plant, Fruit yield per plot, Fruit yield per plant and leaf area. However, there was slight difference in quality parameters among different treatments. The data recorded was significant difference in number of leaves per plant. Spacing

30x30 cm treatment S_3 gave the maximum number of leaves per plant (19.17), which was statistically similar (18.66) to at 30x20 cm spacing, while 30x15 cm spacing gave the minimum number of leaves per plant (17.89).Different mulching showed significant differences on the number of leaves per plant. The maximum number of leaves per plant was recorded in (21.23) from black polythene mulch (M_2) which was closely followed treatment (M_3) and maximum number of leaves per plant was recorded in (15.79) M_1 (Transparent polythene mulch).
Keywords- Spacing, mulching, yield, straw berry.

Cultivation of vegetables in river bed
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ABSTRACT
Growing of cucurbits in river beds or river basins constitute a distinct type of farming. These areas are called "diara lands" in UP and Bihar. In river beds of Jamuna, Ganga, Goamti, Sarayu and other tributaries in Haryana, UP and Bihar and other rivers in the remaining states, cucurbits like bottle gourd, ash gourd, parval, pumpkin and melona are commonly grown. It is a type of vegetable forcing during winter from November-February in North India. In Kerala, fertile basins of rivers Pamba and Manimala are utilized for growing crops like yard long bean, bitter gourd and snake gourd. Cucurbits like ash gourd, pumpkin, bottle gourd and water melon are cultivated during summer season in river beds of Bharathapuzha in Kerala. River beds are formed by alluvian and diluvian action of rivers and due to inundation caused by swollen river during South West monsoon. Fresh silt and clay deposited every year during monsoon months make the land suitable, for growing vegetables literally on sand. Even though upper layer of sand seems unsuitable for cultivation, subterranean moisture seeped from adjacent river streams, makes it possible to grow early crops. Cucurbits are adapted to this situation due to long tap root system.
Keywords- River beds, diara lands, vegetable forcing

ORGANIC FARMING WITH RESIDUE-FREE PRODUCTION
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ABSTRACT
As per the definition of the USDA study team on organic farming "organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection". In another definition FAO suggested that "Organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs.Over the past few years, there has been a paradigm shift in consumer preferences. Indian buyers are becoming increasingly health-conscious and watchful of the food they consume. In light of this

trend, two modes of farming residue-free and organic, have become increasingly popular. Simply put, residue-free farming techniques entail the protection and growth improvement of seedlings and plants by using organically procured bio-fertilisers and biocides.The produce is also grown using synthetic pesticides, which are applied at predetermined intervals so that the residue is not present in enormous quantities, conforming to the (MRL) Maximum Residue Level. Organic farming, on the other hand, is an agricultural system that relies on pest controls and bio-fertilisers that are obtained from animal and plant waste. It even involves the plantation of nitrogen-fixing cover crops. Residue-free farming eliminates the shortcomings of organic farming techniques. It is essential to promote residue-free over organic farming.

Bio- efficacy of insecticide against defoliators Tobacco caterpillar (*S. litura*)

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ABSTRACT

All treatments were found significantly superior in reducing the larval population of tobacco caterpillar as compared to control (3.87 larvae/mrl) after 10 days of 1st spray. The treatment of Chlorantraniliprole 18.5 SC @ 150 ml/ha was found most effective with minimum larval population (1.27 larvae/mrl) followed by Indoxacarb 14.5 SC @ 333 ml/ha (1.53 larvae/mrl), Triazophos 40 EC @ 800 ml/ha (1.73 larvae/mrl), Quinalphos 25 EC @ 1500 ml/ha (1.80 larvae/mrl), Profenophos 50 EC @ 1250 ml/ha (1.93 larvae/mrl) and Monocrotophos 36 SL @ 1000 ml/ha (2.20 larvae/mrl). The treatment Chlorantraniliprole 18.5 SC @ 150 ml/ha was statistically at par with Indoxacarb 14.5 SC @ 333 ml/ha and were found significantly most effective from the rest of the treatments. Same trend was also found in reducing the larval population of tobacco caterpillar after 10 days of 2nd spray.

Government plans and programmes for agriculture's sustainable development

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ABSTRACT

Farmers require good land, healthy soils, ample and high-quality water; prompt delivery of essential inputs, technologies that can ensure higher and more efficient production, good and timely extension services, easy access to credit with low interest rates, the Action Plan for a Secure and Sustainable Agriculture, and international markets. Finally, farmers need the respect and dignity that they are due in society. In order to accelerate agricultural growth, achieve the SDGs, and double farmers' income while pursuing a "Farmer FIRST" approach, a new strategy and policy reforms have been implemented. The new approach recommended to fulfil the many requirements of farmers includes: tripling farmers' income via greater productivity; diversification in farming systems that are ecologically most sustainable; and input cost reduction through scaling technical improvements. Farminnovations (be scientist or farmer-led), availability of finance at cheap interest rate, value addition and improved revenue through direct links to markets. the

utilisation of precision agriculture, biotechnology, sensor technologies, bioinformatics, climate-smart agriculture, robots, drones, big data management, artificial intelligence, etc. are highlighted as new prospects for using science for new advantages.
Keywords- Sustainable Agriculture, technical improvements

Modern aspects of crop production technologies
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ABSTRACT
Global crop production is going through a significant technical change. Based on site-specific information about environmental, biological, and economic factors that affect physical output, profitability, and soil and water quality, production management is shifting towards increased micro-management of production activities by individual field or location within a field. The amount of knowledge accessible on what influences plant growth and wellbeing will significantly increase with increased usage of monitoring equipment. Innovations in communication technology, data analytics, and sensors for use in monitoring and control systems will enable this. Additionally, we'll soon have a better grasp of the interactions between many environmental and development elements. The best input combinations for the field or within a field will be determined using this understanding, which will subsequently be implemented into management systems. Global positioning systems (GPS), yield monitors, and variable rate application technology are all used in precision farming to more precisely apply agricultural inputs to improve growth, minimise costs, and prevent environmental degradation. Precision farming, which integrates biotechnology, nutritional science, monitoring, measuring, and information technology, as well as process control technology, can be referred to as "biological manufacturing" when it comes to growing crops.
Keywords: Crop production, Profitability, Environmental factors, Yield, Technologies

Doubling Farm Income in India: Strategies and Options
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ABSTRACT
With dedicated contribution from framing community, India’s agricultural sector stands as one of the biggest in the world in terms of production of food grains, fruits, vegetables and milk. But, the Indian farmers have been passing through a painful phase over the last two decades because of poor income from farming, which resulted in increased farm indebtedness and widespread farm suicides. To remove the misery of farmers, the union Government has been working towards doubling farmer’s income by 2022-23, which was envisaged in the year 2015-16. This paper discusses various strategies that can be considered to double farmer’s income at the specified timeline. It underlines that it is difficult to achieve the goal of doubling farmer’s income, if we continue to focus mainly on the conventional production centric strategies without giving adequate importance to fixing remunerative prices for crops and improving the overall agricultural marketing condition. The paper specifically stresses that radical market reforms such as strengthening of agricultural market infrastructures, improved procurement system covering all food grain and non-food grain crops, fixing MSP based on C2 cost formula, abolishment of

minimum export price for agricultural commodities, removing agricommodities from the list of essential commodities act and enacting act on 'right to sell at MSP' need immediate attention to double farmers' income.

Farm Mechanization for Profitable Agriculture

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ABSTRACT
The agriculture sector plays a crucial role in the Indian economy, with majority of the Indian population directly or indirectly depends on it. However, land fragmentation and other challenges such as low productivity, high input costs and labor unavailability have led to stagnation in the sector's development. Farm mechanization is the process of using machines in agricultural practices to substitute human and animal power, which can play a significant role in increasing production and productivity, carrying out timely operations, efficient input utilization and reducing labor dependency and drudgery. The role of agriculture in shaping the global economy is also essential, contributing to the GDP and sustaining economic growth in both developing and developed countries. However, it is crucial to note that while agricultural production is expected to increase, global agricultural land use is not expected to grow. Technological innovations and developments resulting in enhanced yields and better production intensity will be critical in achieving the sector's growth and development goals. Effective use of agriculture machinery helps to increase productivity & production of output, undertake timely farm operations and enable the farmers to quickly rotate crops on the same land. By raising a second crop or multi-crops from the same land, there is improvement in the cropping intensity and making agricultural land commercially more viable. Mechanization also helps in animal husbandry, dairying and fisheries.
Keywords: Agriculture, Economy, Farm Mechanization,

An Review on Tomato cultivation

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ABSTRACT
India is the fifth largest producer of tomato accounting for 6.0% of the world production. It is considered as world's largest vegetable crop after potato and sweet potato. Among all the vegetable crops, tomato is the first crop that was grown in greenhouse. It is relatively easy to grow compared to other vegetables like pepper and cucumbers and also the fruit yield is very much high under protected cultivation. The major growing states are Odisha, Andhra Pradesh and Karnataka. Tomato (*Lycopersicon esculentum*) considered as "poor man's orange" and universally treated as "Protective Foods". There are two types of tomato determinate or bush tomato and indeterminate or vine tomato. For the sake of greenhouse systems mostly indeterminate type are used for maximizing crop productivity and increasing the quality of vegetables produce. They produce flowers and fruits continuously along the main stem as they grow.
Keywords: Tomato, protected cultivation, fertigation, nursery management and harvest.

Agriculture marketing, Export, Entrepreneurship development, and Agri-business management opportunities

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ABSTRACT
Agriculture in India has directly or indirectly continued to be the source of livelihood to majority of the population. Indian agriculture has seen a lot of changes in its structure. India predominantly an agricultural economy, has healthy signs of transformation in agriculture and allied activities. India has seen agriculture as a precious tool of economic development as other sectors of production depend on it. Efficient backward and forward integration with agriculture has led to globally competitive production system in terms of cost and quality. Cooperatives seem to be well positioned to coordinate product differentiation at the farm level and to integrate forward into value added processing activities. Indian agriculture can be balanced and made efficient through proper and better management practices. Entrepreneurship has becoming a popular term currently, but not all of entrepreneurs can succeed in entrepreneurial business. Entrepreneurship is characterized by the process of recognizing opportunities to build a new product, service or process and finding necessary resources to exploit the opportunity and improving the lifestyle of people. This can be accomplished as an individual or as a team. Effective entrepreneurs are characterized by traits such as creativity, innovativeness, proactively, and risk propensity. The efficiency of entrepreneurial teams is influenced by various factors such as team member characteristics, team leadership, demographic and informational diversity. Agribusiness denotes the collective business activities that are performed from farm to fork. It covers the supply of agricultural inputs, the production and transformation of agricultural products and their distribution to final consumers. Agribusiness is one of the main generators of employment and income worldwide**.**

Keywords: Agricultural marketing, Entrepreneur, Characteristics, Entrepreneurship, Agribusiness

Sub - Lethal Effects of Novel Insecticides against Tobacco Caterpillar, *Spodoptera litura* (Fabricius)

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ABSTRACT
The experiment was conducted on effect of sublethal concentrations of chlorpyrifos + fipronil, fipronil and chlorpyrifos on growth and development parameters against 6d old larvae (average larval weight = 0.0184g) of *S. litura* by leaf smear method on castor (*R. communis*) under laboratory conditions (Temp. = 28^{o}C, R.H. = 83%, Time = 9:00AM). The results revealed that chlorpyrifos @ 0.01% proved more detrimental for growth and development, with highest reduction (21.03%) in mean weight gain over control with 33.33% mortality in the test population at 4 days after feeding (DAF). The highest pupation percentage (80.95%) was found in the lowest concentration of chlorpyrifos 0.0001% followed by fipronil 0.0001% (76.19%).

In comparison to control (0.214g/pupa), 1.57 times lower pupal weight was observed in chlorpyrifos 0.01% (0.136g/pupa). A comparison on terminal mortality indicated that at the highest concentration (0.01%) chlorpyrifos caused highest larval mortality of 52.38% followed by fipronil (47.61%) and chlorpyrifos + fipronil (33.33%) while chlorpyrifos + fipronil and fipronil (28.57%) caused same larval mortality at 0.001%. It is concluded that chlorpyrifos at the sublethal concentration of 0.01% proved most detrimental for growth and development of 6d old larvae of *S. litura* by leaf dip method.

Keywords: sub-lethal effect, chlorpyrifos + fipronil, fipronil, chlorpyrifos *Spodoptera litura*, smear method.

Variability and Management of *Fusarium oxysporum* f. sp. *ciceris* (Padwick) Synd. & Hans.Causing Wilt of Chickpea (*Cicer arietinum* L.)

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ABSTRACT

The present study was undertaken on the Variability and Management of *Fusarium oxysporum* f. sp.*ciceris* causing wilt in chickpea. Randomly nine villages of Udaipur and Pratapgarh districts *viz*., Dangiyo ki hundar, Barodia, Vishma, Badrana, Gogunda, Sevana, Kalwani, Rampuria and Kherot were surveyed to know the distribution and incidence of wilt in chickpea. The per cent wilt incidence in the surveyed areas was ranged from 18.94 to 48.76. The maximum 48.76 per cent was recorded in Badrana village and minimum 18.94 per cent in Barodia village.

Isolates of *Fusarium* spp. that were isolated from various samples belonged to *Fusarium oxysporum* f. sp. *ciceris*.The pathogenicity of fungal isolates was confirmed by Koch's postulates on susceptible chickpea cultivar 'GNG 1958'. All the isolates of *Fusarium* spp.showed considerable variation in colony growth pattern, colony diameter, rate of sporulation, color of colony and spore morphology *in vitro.* The nine isolates of *F. oxysporum* f. sp.

Bio-efficacy of organic treatments against major lepidopteran predators of lac insect

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ABSTRACT

Investigation on Bio-efficacy of organic treatments against major lepidopteran predators of lac insect was carried out in the Department of Entomology, Rajasthan college of Agriculture, MPUAT, Udaipur, during 2021 to evaluate the bio-effecacy of organic treatments against major lepidopteran predators of lac insect.Among the treatments, the most effective treatment with the highest mean survival percentage of lac insect was Emamectin benzoate 5 SG @ 0.4 gm/lit (68.89 percent). Among the organic treatments, two applications of Tekha sat at 10% was the most effective in reducing the predatory population on lac, followed by NSKE at 5% and Bramhastra at 5%. Whereas, Neem oil at 2% and cow urine at 10% two treatments that were found least effective against *E. amabilis* and *P. pulverea*.

Keywords: Bio-efficacy, lac insect, *E. amabilis, P. pulverea,* and organic treatments

Bio-Efficacy of Various Plant Products against *Helicoverpa armigera*in Chickpea

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ABSTRACT
Experiment was conducted to evaluate the bio-efficacy of various plant products against *Helicoverpa armigera*in chickpea at RajasthanCollege ofAgriculture, Udaipur during rabi, 2021-22.The treatments comprised of various organic formulations made up of seed and leaf extract of plants possessing insecticidal properties *viz*., Custard apple (*Annona squamosa*) and Neem (*Azadirachta indica*). Standard procedures used by the previous worker were used for making formulations having different concentrations. The treatments were Custard apple seed extract @ 2 %, Custard apple seed extract @ 4 %, Custard apple seed extract @ 6 %, Custard apple leaf extract @ 3 %, Custard apple leaf extract @ 5 %, NSKE @ 5 %, Azadirachtin 10000 ppm and a control. Result on the bio-efficacy of various treatments shows that the maximum per cent reduction in the *H.armigera* larval population was recorded with the treatment application of Azadirachtin 10000 ppm with a mean per cent reduction of 52.85 per cent after both the sprays. The least effective treatment was the Custard apple leaf extract @ 3 % which causes a mean percent reduction of 26.15 per cent after both the sprays. The second-best treatment was NSKE @ 5% with a mean per cent reduction of 43.72 per cent.
Keywords: Bio-efficacy, Plant products, custard apple, NSKE

Compounds which have toxic and anti-nutritional status in vegetables

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ABSTRACT
Plants produce toxins as a defense mechanism to protect from man and animals. During course of evolution and continuous cultivation, these undesirable qualities might have been eliminated by selection. Still a few harmful chemicals like trypsin inhibitors, phytates, oxalates and nitrates exist in cultivated vegetables. Trypsin inhibitors are widely distributed in legumes, especially in raw soybeans. They inhibit activity of trypsin in the gut and interfere with digestibility of dietary proteins and reduce their utilization by affecting hydrolysis of proteins to amino acids. Phytic acid (inositol hexa phosphoric acid) present in mature seeds of peas and beans binds iron, zinc, calcium and magnesium and reduces bio-availability of iron. On germination of grains, phytate content reduces due to enzymatic break down which improves iron availability. Green leaf vegetables and legumes are rich source of oxalates and oxalic acid. Maximum oxalate concentration is noticed in amaranth (772 mg / 100 g). Oxalic acid converts calcium from the food consumed to insoluble calcium oxalates making it unavailable for absorption.
Keywords- trypsin, phytates, oxalates

Vegetables as protective food

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ABSTRACT
Vegetables are protective foods as their consumption prevents many diseases. Almost all vegetables are finding important roles in traditional systems of medicine. Several chemicals having the rapeutic value were identified from vegetables. Antioxidants and flavanoids are the most important among them. Role of vegetables as a source of antioxidants in prevention of new generation diseases and delaying ageing is well recognized. Antioxidants like β-carotene, ascorbic acid (vitamin-C), α-tocopherol (vitamin-E), amino acids and flavanoids present in various vegetables act as scavengers of free radicals, which induce cancer development, brain disorders and arteriosclerosis. Free radicals are molecules or atoms with unpaired electrons and are unstable and highly reactive. These free radicals initiate chain reactions of destructive processes by removing electrons from stable compounds forming many unstable compounds, free radicals and reactive oxygen species (ROS). Inflammation, strenuous exercise, exposure to certain chemicals, radiation, UV light, alcohol, cigarette smoke, air pollutants and excess of free fat diets also produce free radicals. Ageing results in a decreased production of enzymes, which counter adverse effects of free radicals and ROS.
Keywords- Antioxidants, flavanoids, amino acids

Application of remote sensing in agriculture and geographical information system in agriculture and natural resources management

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ABSTRACT
India is a developing nation as well as increasing technological country. It is also agriculture prone country and having highest population to feed this huge population farmers have to adopt new technologies for better production and productivity. Remote that means something which is not exactly in contact or physical contact, Sensing means getting information, data something like temperature, pressure, photograph, etc. Remote sensing is the process of acquiring information, detecting, analysing, monitoring the physical characteristics of an area by recording it is reflected and emitted radiation energy without having any physical contact with the object under study. This is done by capturing the reflected radiation/energy. In agriculture with the help of remote sensing technology farmer can identify crop condition, increase precision in farming, determining the soil moisture content, crop production forecasting, drought monitoring and weather forecasting can also be done.A geographic information system (GIS) is a system that creates, manages, analyses, and maps all types of data. GIS connects data to a map, integrating location data (where things are) with all types of descriptive information (what things are like there). This provides a foundation for mapping and analysis that is used in science and almost every industry. The use of GIS in agriculture enables farmers to map field data, organize and analyse it and monitor their crops remotely. GPS, robotics, drone and satellite monitoring have all contributed to farm automation. These technologies underpin collecting GIS data.
Keywords- Remote sensing, agriculture, GIS and technology.

Effects of Climate Change on Agricultural Insect Pests

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ABSTRACT
Climate change and global warming are of great concern to agriculture worldwide and are among The the most discussed issues in today's society. Climate parameters such as increased temperatures, rising atmospheric CO_2 levels, and changing precipitation patterns have significant impacts on agricultural production and on agricultural insect pests. Changes in climate can affect insect pests in several ways. They can result in an expansion of their geographic distribution, increased survival during overwintering, increased number of generations, altered synchrony between plants and pests, altered interspecific interaction, increased risk of invasion by migratory pests, increased incidence of insect-transmitted plant diseases, and reduced effectiveness of biological control, especially natural enemies. As a result, there is a serious risk of crop economic losses, as well as a challenge to human food security. As a major driver of pest population dynamics, climate change will require adaptive management strategies to deal with the changing status of pests. Several priorities can be identified for future research on the effects of climatic changes on agricultural insect pests. These include modified integrated pest management tactics, monitoring climate and pest populations, and the use of modelling prediction tools.
Keywords: climate change, global warming, food security, agriculture, insect pests

The role of genetic engineering for handling viral diseases in plants

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ABSTRACT
Most crop plant species are susceptible to a number of different viruses, some of which may cause severe systemic infection resulting in significant crop losses. So, viral diseases are a major threat to world agriculture and breeding resistant varieties against these viruses is one of the major challenge faced by plant virologists and biotechnologists. Hence a major preoccupation of both breeders and growers alike has been the development of strategies (pathogen-derived resistance) that protect against infection. Traditional approaches for managing plant virus diseases include avoiding virus-infected material, chemical control of arthropod vectors and, when available, use of virus-resistance in cultivated crops. Transgenic technology opened up environmentally friendly options to engineer plantsfor resistance to viruses. This includes both protein and RNA-based approaches. One of the earliest approaches through transgenic technology to combat the viruses was the coat proviatein-mediated resistance. Papaya (*Carica papaya*) has transformed successfullyvia *Agrobacterium*-mediated transformation with four constructs containing either the unmodified or modified coat protein (CP) gene of Florida isolateH1K of *Papaya ringspot virus* (PRSV).This involves both the artificial miRNA and siRNA based approaches. AIMV, PVX, PVY, CMV and PRSV through coat protein, PLRV and Potyviruses through Antisense RNA, CMV through Replicase associated, TMV through viral movement protein, AMCV through interfering RNA plant bodies have successfully genetic engineered in plants.
Keywords- Breeding resistant varieties, transgenic technology, genetic engineered.

Effect of Organic and Inorganic Source of Nutrients on Nutrient Content, Uptake and Quality of Fenugreek.

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ABSTRACT
The study investigated the impact of organic and inorganic sources of nutrients on the nutrient content, uptake, and quality of fenugreek. The experiment was carried out using a randomized complete block design with sixteen treatments: vermicompost + foliar spray of vermiwash and RDF+foliar spray of zincand a control (no fertilizer). Three replications were used in the study.The findings indicated that the application of vermicompost and foliar spray of vermiwash significantly improved the nutrient content of fenugreek when compared to the control and CF. The uptake of nutrients like nitrogen, phosphorus, and potassium was also enhanced by vermicompost and foliar spray of vermiwash. Furthermore, the application of vermicompost and foliar spray of vermiwash resulted in higher quality fenugreek in terms of antioxidant activity and total phenolic content, compared to the control and CF. The study s conclusion suggests that organic sources of nutrients such as vermicompost and foliar spray of vermiwash can significantly improve the nutrient content, uptake, and quality of fenugreek and may be a sustainable to chemical fertilizers in agriculture.
Keywords: organic source, inorganic source, nutrients, fenugreek, content, uptake, quality.

IMAPCT OF CLIMATE CHANGE IN APPLE PRODUCTION

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ABSTRACT
Climate change has a significant impact on apple production worldwide. Apple trees require specific climatic conditions, such as a cold winter season, to grow and produce a healthy yield. However, global warming has caused changes in temperature and precipitation patterns, which has resulted in a decline in apple production in some regions and a shift in growing locations. Extreme weather events, such as droughts, heatwaves, and heavy rainfall, have also negatively impacted apple production by causing fruit damage, reduced yield, and increased disease and pest pressure.In addition to the direct effects on apple trees, climate change has also affected the quality and flavour of the fruit. Warmer temperatures can cause apples to ripen faster, leading to a decrease in sugar content and a decline in flavour. Changes in precipitation patterns can also affect the size and texture of the fruit, making them less desirable for consumers.To adapt to these changes, apple growers have started to implement various strategies such as changing planting dates, using different apple varieties, and implementing more sustainable farming practices. However, the long-term effects of climate change on apple production and the industry as a whole are still uncertain and require ongoing research and adaptation efforts.
Keywords: Climate, Apple, Production, Temperature, Rainfall.

Doubling of farmer's income through post-harvest management of horticulture crops

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ABSTRACT
In India, the diverse agro-climatic conditions, varied soil types, and abundance of rainfall offer immense scope for the cultivation of different types of horticultural crops, including fruits, vegetables, flowers, plantation crops, tuber and rhizomatous crops and crops of medicinal and aromatic importance. India is the second largest producer (after China) of both fruits and vegetables in the world. Horticultural produce including flowers also earns well in export earnings for the country. Unfortunately, about 25-30% of horticulture produce, 10-25% of vegetables, and 30-40% of flowers get wasted due to lack of postharvest management which resulted in huge loss of crores of rupees. The minimization of these postharvest losses may be reduced by extending the shelf life of fresh horticultural produces either through pre or post-harvest management practices or by processing it into different value-added products. Several factors influence post-harvest losses in fruits and vegetables that include losses due to physical, physiological, mechanical, and unhygienic conditions, lack of proper storage conditions, refrigerated facilities and diseases and pests, etc. While harvesting to handling for storage till marketing several wound pathogens are known to infect the produced destroy the keeping quality, quantity ultimately economic losses. Post-harvest decay of fruits and vegetables occurs either between flowering and fruit maturity or during harvesting and subsequent handling and storage. There are many technologies already developed in the past that are available in the literature but are not practiced may be due to either material are not available locally, not much effective or the technology being more costly. By adoption of simple post-harvest management practices, processing, and value addition operation *viz.*, proper harvesting, sorting, grading, packaging, pulping, pickling, drying, and dehydration at the farmer's level during the peak season will help in minimization of post-harvest losses as well as doubling the farmer's income.

Keywords: Post-harvest management, Value addition, Fruits, Vegetables, Flowers, Doubling of farmer's income.

IMAPCT OF CLIMATE CHANGE IN PRODUCTIVITY AND QUALITY OF TEMPERATE CROP

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ABSTRACT
Climate change has significant impacts on temperate crop productivity and quality globally. Temperate crops, such as wheat, maize, and soybeans, are highly dependent on stable weather patterns, including adequate rainfall and temperatures, to produce healthy yields. However, with climate change, these weather patterns are becoming increasingly unpredictable, leading to a decline in crop productivity and quality. One of the primary impacts of climate change on temperate crop production is water availability. Higher temperatures and changing precipitation patterns have resulted in more frequent and severe droughts, which reduce crop yields and quality. Extreme weather events such as floods, storms, and heatwaves also damage crops, leading to crop loss, reduced yield, and reduced quality. Additionally, changes in temperature and atmospheric

CO_2 levels also affect crop development and quality. Higher temperatures can cause premature maturation and reduced crop quality, while increased CO2 levels can lead to decreased protein content and reduced nutritional value in crops. Farmers have responded to these challenges by implementing various adaptation strategies, including adjusting planting dates, using drought-resistant crop varieties, and adopting sustainable farming practices. These efforts have helped mitigate some of the negative impacts of climate change on crop productivity and quality. However, ongoing research and adaptation efforts are necessary to ensure the long-term viability and sustainability of temperate crop production in the face of climate change.
Keywords: Temperate crop, temperature, productivity, climate, quality.

Modern Prospects of Nanotechnology in Plant Pathology
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ABSTRACT
The most important applications of nanoparticle types and the common practices for control of plant diseases are described. The chapter will not include a description of all diseases that occur globally or a comprehensive report on the selected diseases and nanoparticles. We have tried to contain information on the impact of the disease and the role of nanotechnology to face these challenges as modern technology in plant control and also report a short, historical background for some nanoparticle types. We have attempted to include the newest literature and scientific research related to each nanoparticle type. We will focus on the synthesis of NPs of some compounds and their influence on plant diseases. The chapter consisted of four sections. The first section will elucidate the meaning of nanotechnology and scientific progression. Section 15.2 covers major information about plant diseases as challenges in agriculture development. The third section will include important techniques that are used to detect and manipulate causal agents of plant diseases and the use of nanoparticle in disease control. The last part addresses a common nanoparticle that is used as control agent for some plant pathogens.
Keywords: Nanoparticle, Technology, Pathogen, Agriculture.

Phloem: Variations in the Structure and Seasonal behaviour and response of stored Food reserve to changing Climatic conditions in *Citrus* species
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ABSTRACT
The current study focused on secondary phloem in the trunks of *Citrus* species (*C. Limon* (Linn.) Burm.f. *C. paradisi* (Macf.), *C. reticulata* var. *kinnow* (Linn.), and *C. sinensis* (Linn.) Osbeck.) for three consecutive calendar years in order to observe phloem behaviour in relation to climatic and age effects. The findings are summarized as follows: The three different zones that make up the bark are conducting phloem, non-conducting phloem, and periderm. Oblique to transverse

compound sieve plates are typically found on the end walls of sieve tube members. Because of seasonal factors, they fluctuate in length, radial diameter, and tangential diameter in all species. They occupy variable percentages of the transectional area in the various species investigated. Phloem fibres are dispersed in unique patterns across the secondary phloem in all species. In the various species studied, they develop intrusively and grow to reach nearly twice the length of their mother's initials.

Seasonal fluctuations in starch and specific soluble carbohydrates reserves in secondary phloem parenchyma of *Citrus* trees were investigated throughout the course of the year. Parenchyma cells operate as a carbohydrate sink, accumulating starch, maltose, sucrose, glucose, fructose, and other sugars, the amount of which varies by month and season. The cambium's seasonal activity is connected to changes in starch and soluble carbohydrate content. The cells had a low buildup of reserve resources when the cambium was active, but a significant accumulation when the cambium was dormant.

Histopathological response of *Psoralea corylifolia* infected with root-knot nematode, *Meloidogyne incognita*

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ABSTRACT

Root knot nematode *Meloidogyne* spp. are significant threat to agriculture crop including medicinal plant. The present study carried was out to examine the histopathological changes induced by the root-knot nematode *Meloidogyne incognita* in *Psoralea corylifolia* at different time intervals under glass-house conditions. At harvest, the affected roots of *P. corylifolia* have numerous galls on roots with various egg masses. Transverse section of infected root exhibits the passage of nematod. Hypertrophy in the infected cell around the nematode head is the main indication of disease. Cytological changes are clearly shown in the hypertrophied cells. The nematode feeding site inside the primary and secondary infected roots shows critical irregularities. Abmormal xylem and pholem were observed in the nematode feeding region. In heavier infection root shows the complete disorganisation of vascular tissues. There is urgent need to find eco-friendly method for the management of this nematodes.

Keywords: *Meloidogyne incognita*, Hypertrophy, Histopathology.

North-Western Himalayas a source of unexplored wealth of Endophytic biodiversity

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ABSTRACT

Mighty Himalayas is rich in medicinal plant wealth used by the locals since time immemorial for curing various ailments. Medicinal plant drug sector possesses great potential to uplift the economy of India, however, various developmental and anthropogenic pressures on the forests,

unscrupulous/unscientific exploitation of medicinal plants in the wake of their increasing national and a global trade demand have caused severe depletion of the medicinal plants resource base thereby affecting the health and livelihood options of the people. Medicinal plants are gaining global attention owing to the fact that the herbal drugs are cost effective, easily available and with negligible side effects. Bioactive natural products of medicinal plants have long been and will continue to be an important source of medicinal raw materials. The natural habitats for wild medicinal plants are being threatened by over-use and environmental and geopolitical instabilities. Most of the medicinal plants host endophytic microbes with antimicrobial potential They are source of novel natural products for medicinal, agricultural and industrial usage, such as antibiotics, anticancer agents, biological control agents, and other bioactive compounds. The search for new and effective antimicrobial agents has become a necessity due to rise in the number of super resistant strains and failure of currently used antibiotics against them leading to the increased global health concern. Endophyte studies may contribute to sustainable growth of natural source of endophytes and in turn can play role in conservation of plant resources.

Keywords: North-western Himalayas, Anti-microbial, Medicinal plants, Endophytes

Postharvest Methyl Jasmonate Alleviates Chilling Injury and Maintains Quality of 'Kinnow' (*Citrus Nobilis* Lour x *C. deliciosa* Tenora) Fruits Under Differential Storage Temperature

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ABSTRACT

Application of novel generally recognized as safe (GRAS) chemicals may help in preserving the health promoting compounds and esthetic value of the Kinnow (*Citrus nobilis* Lour *x C. deliciosa* Tenora) fruits. The aim of this study was to evaluate the effect of exogenously applied methyl jasmonate (MeJA) at differential storage temperatures on the postharvest quality of Kinnow mandarin (*Citrus nobilis* Lour *x C. deliciosa* Tenora) fruits. Physiologically mature freshly harvested fruits were treated with the different concentrations of MeJA, i.e., 0.1 mM, 0.3 mM, 0.5 mM, 0.7 mM and control for 5 min and air dried for 10 min. The treated fruits were stored consecutively at two different temperatures of 2 °C for 20 days and at 6 °C for 20 days at 85–95% relative humidity. Results showed that MeJA treated fruits maintained better quality of Kinnow mandarin (*Citrus nobilis* Lour *x C. deliciosa* Tenora) fruits than control during the entire storage period. Fruits treated with MeJA (0.5 mM) and stored at differential temperatures significantly delayed the loss in fruit weight, maintained firmness, maintained higher total soluble solids (TSS), total phenols content (TPC), ascorbic acid (AA), antioxidant activity
(AOX) and lower titratable acidity (TA) content with zero chilling injury (CI) under a cold storage period of 40 days. Also, MeJA (0.5 mM) treatment showed higher overall sensory attributes, making the fruits more acceptable to consumers after 40 days of storage. In conclusion, postharvest application of MeJA (0.5 mM) at differential temperatures proved an effective and safe strategy to enhance the quality and shelf-life of Kinnow (*Citrus nobilis* Lour *x C. deliciosa* Tenora) fruits.

Keywords: Citrus, Hormone, Cold storage, Antioxidants, Sensory

Distribution of avian fauna in Bulbule wetland, Birendranagar, Surkhet, Nepal.

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ABSTRACT
Birds are some of the most prominent species of the Earth's biodiversity and being sensitive to environmental changes which acts as a key indicator for assessing the status of ecosystem health.
A research was undertaken to investigate the status of bird distributions in Bulbule wetland of Birendranagar, Surkhet. The study was conducted to assess seasonal distribution and diversity of birds in Bulbule wetland. Line transect method was used to document bird species. Among 886 species recorded in Nepal, twenty species of birds along with 16 families were recorded in spring season (24 March to 28 April, 2018), twenty-one species of birds along with 18 families were recorded in summer season (7 July to 11 August, 2018) and 25 species of birds along with 21 families were recorded in autumn season (6 October to 10 November, 2018). Diversity of birds' species in all four season along with their threats should be figured out. Anthropogenic effects on birds should accounted by stakeholder and concern authorities in and around Surkhet valley.
Keywords: Species, Line transects, Point count, Seasons

Studies on different agro techniques for yield maximization of direct seeded rice under limited water resource in Southern Transitional Zone of Karnataka

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ABSTRACT
Three field experiments were conducted at AHRS, Bhavikere on red sandy clay loam soil. The first experiment was conducted during *kharif* 2019 and 2020 in factorial RCBD with three replications and nine treatment combinations to evaluate the varied levels and split application of fertilizers in direct seeded rice. The treatment that received application of 125% RDF with 25% N & K + 100 % P as basal, 25% N & K at 20-25 DAS, 25% N & K at 40-45 DAS and 25% N & K at 55-60 DAS recorded higher grain yield (5611 kg ha^{-1}on pooled basis).
The second experiment on suitability of rice varieties under different irrigation schedules during *summer* 2020 was laid out in split plot design with three replications and sixteen treatment combinations. Scheduling of irrigation at 1.50 IW/CPE ratios with MAS 946-1 variety recorded highest grain yield (6475 kg ha^{-1}). Scheduling of irrigation at 1.50 IW/CPE ratios in direct seeded condition consumed 1000 mm of irrigation water, while the puddled transplanted rice usually requires 1500 mm. Hence, the direct seeded rice condition at 1.50 IW/CPE ratios saves 33.33 % of water compared to puddled transplanted rice.
The third experiment on effect of drip fertigation schedule and fertilizer sources in direct seeded rice during *summer* 2020 was laid out in split plot design with three replications and twelve treatment combinations. The treatment consisting of drip fertigation scheduling once in five days with 100% RDF through water soluble fertilizer recorded higher grain yield (7859 kg ha^{-1}).

ROLE OF CO-OPERATIVE SOCIETIES IN AGRICULTURAL DEVELOPMENT

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ABSTRACT
Cooperative Societies are grass root organization of group of people united with collective responsibilities to meet their common economic, social and cultural needs which run with philosophy of self-reliance and mutual help. It helps in agricultural development supporting critical inputs supply (seeds, fertilizer, pesticides, credit), storage facilities like Go downs, agro processing facilities and marketing the agro produce. Since 1904, the cooperative moment took stardom and the five year plans and Government legislation have integrated them into the policies for self-reliant rural growth and development. Agricultural cooperative societies dealing with inputs and credit disbursement, processing cooperatives such as Sugar Cooperatives, Dairy cooperatives etc. flourished with their consumer products whereas KRIBHCO, IFFCO became successful large cooperatives in marketing their fertilizers to their farmer members and outsiders act as a business enterprise. It is concluded that the members of Cooperative societies had medium to high knowledge level about improved animal husbandry practices, medium to high monthly income and possessing medium to high level of adoption about improved animal husbandry practices and cotton production technology then non-members of cooperative societies.
Keywords: *Cooperative societies; Features, Prospects.*

Marketing of *Diospyros melanoxylon* Leaves in Rajasthan

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ABSTRACT
Tendu *(Diospyros melanoxylon* Roxb.) belong to Family Ebenaceae is predominantly present in Indian subcontinent. The leaves collected from *Diospyros melanoxylon*, traditionally known as ‘abnus’, ‘kendu’ or ‘tendu’ are broadly collected both for home consumption and for trade. The leaves of this tree are key source of proceeds for a large number of people that depend on gathering forest products. It is also known as "green gold" in tribal areas because of its revenue generating potential. The harvesting of tendu leaves offers employment to 7.5 million individuals nationwide for around three months, as per the data obtained from the Tribal Cooperative Marketing Development Federation of India. The State Government regulates the collection fees per typical bag of 1000 bundles, each having 50 leaves which are to be offered to tendu leaves collecting labourer. Tendu leaves collection & trade is regulated by Rajasthan Tendu Leaves (Regulation of Trade) Act, 1974 and rules made there under called Rajasthan Tendu Leaves (Regulation of trade) Rules, 1974. Tribal people in the nation have the right to gather, protect, and promote forest resources under the Forest Rights Act. In the districts of Pratapgarh, Banswara, Udaipur, Dungarpur, Pali, Baran, Bhilwara, Jhalawar, and Dholpur, among others, tendu leaves are mostly harvested. In the summer, both locals and tribal members gather these leaves. The coordinates of the Rajasthan’s Forest regions from where the tendu leaves are collected were located using the Arc-GIS tool. Aside from this, around 3 million individuals rely on making bidis from tendu leaves for their living. During 2021–2022, nearly 3 lakhs bags were traded, generating a total income 400 million rupees.
Keywords: NTFP, Tendu patta, tribal area, ArcGIS

Shelf-life evaluation analysis in Dahi available in local market of Suddhowala

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ABSTRACT
Dahi is one of the most popular fermented milk products which results from the lactic acid fermentation of milk. Dahi is the prime source of proteins, vitamins and calcium which are more digestible than when they are present in fresh condition. A well-known method that dahi is the curd resulting from lactic acid fermentation of milk. In Ayurveda, use of dahi is recommended for curing of numerous ailments like dysentery, dyspepsia and other gastrointestinal disorder. It also improves appetite by stimulating B and T cells of macrophages by lactic acid bacteria. Dahi is an excellent growth medium for wide range of microorganisms. So, in our study we carried out an analysis to identify the microbes that increased in growth and involved in the decrease in shelf life of the product also. The various microorganisms including *E. coli*, *Salmonella* species and *Pseudomonas* species which produces toxins and unfortunately decreases the shelf life of the product were noticed to involve according to literature studied.

Influence of organic manure and biofertilizer on growth and yield of Lentil *(Lens culinaris*)

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ABSTRACT
This study was conducted to evaluate the effect of biofertilizers viz. Rhizobium, PSB and VAM in lentil (Lens culinaris L.) crop, in the department of microbiology. In this experiment five treatment were taken as Un-inoculated (T1), Rhizobium (T2), PSB + Rhizobium (T3), VAM + Rhizobium (T4) and Rhizobium + PSB + VAM (T5). The experiment was carried out during Rabi 2010 in 2.0 m^2 plot size at pot culture house of the Department of Soil Science and Agricultural Chemistry, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. The result of this study revealed that the maximum active nodulation at 30, 60 and 90 days (8.80 13.50 and 5.00), test weight (32 g/1000 seeds), grain yield (23.8 g/ microplot) and straw yield (26.20 g/ microplot) was found in Rhizobium + PSB + VAM (T5) fallowed by PSB + Rhizobium (T3), VAM + Rhizobium (T4) and Rhizobium (T2) whereas minimum was noticed Un- inoculated (T1) microplot. It was recommended that interactive use of Rhizobium + PSB + VAM significantly affected to the biological yield of lentil crop.
Keywords: Rhizobium, PSB, VAM, Bio-fertilizers and Len

GENETIC DIVERGENCE IN COLORED PERICARP SORGHUM (*Sorghum bicolor* (L.) Moench)

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ABSTRACT
The present investigation entitled "Genetic divergence analysis in colored pericarp sorghum (*Sorghum bicolor* (L.) Moench) was carried out during *rabi* 2019- 20 at experimental farm of

Sorghum research station, VNMKV, Parbhani comprising 81 genotypes to access the genetic diversity in colored pericarp sorghum germplasm lines for qualitative and quantitative traits. Analysis of variance shows that there is considerable difference between the genotypes for all the traits. On the basis of D^2 and Tocher's method 81 genotypes were grouped into eight clusters for morphological traits these indicates the existence of significant genetic divergence among 81 genotypes studied. Among the 13 morphological traits studied glume color (39.10%), grain color (32.75%), plant height (11.33%), number of primaries per panicle (10.96%) contributed more to the genetic diversity. The inter cluster distance was maximum for cluster V&VII (D=57.91) for morphological traits. The maximum inter cluster distance shows that the genotypes belonging to these clusters were genetically most divergent, if chosen for successive breeding scheme they are likely to give higher performances. The clusters mean point out that high variance among the clusters for the traits plant height, days to 50% flowering would be used for further hybridization and isolating transgressive sergeants.

Keywords: Sorghum, coloured pericarp, genetic diversity

GENETIC DIVERGENCE FOR SHOOT FLY TOLERANCE IN COLORED PERICARP SORGHUM (*Sorghum bicolor* (L.) Moench)

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ABSTRACT

A field investigation was carried out with an aim to find out genetic distance for various shootfly tolerance parameters in 81 colored pericarp sorghum genotypes during rabi 2019- 20 at experimental farm of Sorghum research station, VNMKV, Parbhani. Based on D^2 and Tocher's method 81 genotypes were grouped into six clustersfor shoo fly tolerance related parameters. The cluster III had highest number of genotypes 36 followed by cluster II with 16, cluster IV with 10 and cluster I with 9 genotypes, cluster VI have 6 strains and cluster V have 4 genotypes. The genotypes falling in these clusters appears to be most potential one because these genotypes recorded higher number of trichome on both upper and lower leaf surface, less shoot fly dead hearts and higher intensity of leaf glossiness, and could be preferred for advance breeding programme. Inter cluster values varies from 8.77 to 80.81. The maximum inter cluster distance (D= 80.81) was observed between cluster V and cluster II which was followed by cluster II and cluster I (D=66.29), cluster IV and cluster II (D= 65.17), cluster VI and cluster V (64.74). Whereas, it was minimum in between cluster V and cluster IV (8.77). It was recorded that, trichome density (adaxial) (69.23%) contributed highest for divergence. It was followed by trichome density (abaxial) (24.69%) by 800 times ranked first, shoot fly dead heart @28 DAS (4.72%) by 153 times, seedling glossiness (0.52%) by 17 time, shoot fly eggs @21DAS (0.30%) by 11 times, seedling vigor (0.31) by 10 times, leaf angle (0.19) by 6 times. The genotypes which have shown high trichome density (ISSVT 325, GP 1673, ISSVT 108, Bajra type, GP 75, ISSVT223 and ISSVT 109), high intensity of leaf glossiness (ISSVT 714, GP 2017-5, RIL 40395-2 and GP 44), and low dead hearts percentage (ISSVT 325, YPT 1412, GP 44) can be used in development of shoot fly tolerant cultivars.

Keywords: Sorghum, coloured pericarp, genetic diversity, shootfly tolerance

VARIABILITY STUDIES IN COLOURED PERICARP SORGHUM

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ABSTRACT
The present study entitled "Genetic diversity for grain quality parameters in colored pericarp sorghum *(Sorghum bicolor* (L.) Moench)" was carried out during *Rabi* 2021-22 at Research Farm, Department of Agricultural Botany, VNMKV, Parbhani. Experimental material comprised of 24 genotypes and 3 checks were evaluated following randomized block design with two replications with following objectives. The observations were recorded for seedling vigor, days to 50% flowering, days to physiological maturity, plant height, leaf area index, relative water content, SPAD chlorophyll meter reading, fodder yield per plant, Analysis of variance indicated presence of significant differences among the treatments for all the traits. This exhibits presence of large amount of variability among all the colored pericarp sorghum treatments for yield and yield contributing traits. The analysis of variance for traits *viz.*, seedling vigor, days to 50% flowering, days to physiological maturity, plant height, leaf area index, relative water content and SPAD chlorophyll meter reading, fodder yield per plant, grain yield per plant. On the basis of mean performance for grain yield and its attributing traits genotypes ISSVT 712, YPT 1015, ICSR 93036, GP 1539, GP 40053-1-2, RIL 40 679 1-2, RIL 40141-1, Udgir Local (C) and YPT 1007 were found desirable for the traits related to drought tolerance *viz.*, seedling vigor, leaf area index, SPAD chlorophyll meter reading, relative water content, fodder yield. Moderate to high GCV and PCV recorded for plant height, SPAD chlorophyll meter reading, leaf area index, seedling vigor, fodder yield and grain yield these pointed out the presence of more variability for all these characters. High heritability together with high genetic advance as percent of mean noticed at for height, leaf area index, fodder yield and grain yield supported the predominance of additive gene controlling these characters.
Keywords: Coloured pericarp sorghum, drought tolerance, Rabi sorghum.

Induced Mutagenesis in Sorghum

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ABSTRACT
An investigation was carried out to create the variability generated through induced mutation in two sorghum populations *viz*., 296 B (*Kharif*) and Parbhani Moti (*Rabi*). Two mutagens *viz*., gamma irradiation (10 kR, 20kR, 30kR and 40kR) and EMS (0.1%EMS, 0.2%EMS, 0.3%EMS, and 0.3%EMS) and their combination were used M_1, M_2 and M_3 generations were evaluated during 2017 to 2019 at Department of Agricultural Botany, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. Mutagenic sensitivity in M_1 generation on the basis of reduced germination and plant survival revealed a dose dependent reaction and differential response of the populations. LD_{50} was found to be 20-30 kR in case of gamma irradiation and 0.3-0.4% in EMS irrespective of the genotype. Induced polygenic variability was assessed in M_2 and M_3 generations. In general

wide range of variability was created as compared to control. Among the all two population, Parbhani Moti created wide range of variability as compare to 296 B populations. The range in general increased towards positive side in all the populations with both the mutagens and their combination. EMS treatments were effective in increasing the yield potentiality compared to gamma rays in both generations.

Keywords: Sorghum, mutation breeding, mutagenic frequency, LD50, Variability

Analysis and characterization of Morpho-physiological, biochemical and molecular aspects under drought tolerant conditions using ISSR marker traits associated with drought in chickpea genotypes

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ABSTRACT

Aim:

Chickpea (*Cicer arietinum* L.) is an autogamous annual cool season grain legume cultivated in arid and semi-arid areas across the world including India. Drought is one of the most important abiotic stresses, which limits crop production in different parts of the country. Genotypes under drought were evaluated for different morphological, physiological, biochemical and molecular parameters

Method:

Estimates of yield loss may be due to drought ranges from 15 to 60 percent depending on geographical regions, duration of the crop season and dry spell. Thirteen chickpea genotypes *viz.*BG226, Vijay, JAKI 9218, Pusa362, DCP92-3, JG16, K850, CSG8962, Avrodhi, KWR108, RSG888, Pant G114 and Phule G5 were evaluated for drought conditions and these genotypes exposed to drought at reproductive stage.

Result:

Genotypes CSG8962 and BG-256 were found better under drought condition for the traits height, leaf area and proline content, as they have indigenous level of drought resistance. Level of molecular diversity observed among the genotypes under drought conditions using ISSR markers. Similarity coefficient was obtained in the form of dendogram for ISSR analysis. Jaccard′s coefficient of similarity revealed that high degree of similarity to the extent of 86% exits between genotype Pant G114, Phule G-5, K850, KWR108 where as JG-16, CSG 8962, RSG-888 and JAKI-9218 showed less similarity level of 60-63% to the member of other cluster. PIC value for ISSR ranges from 0.68 to 0.94. Out of ten ISSR markers, eight generated polymorphic bands. A total of 236 bands scored from ten primers of which 70% were polymorphic while three were monomorphic, the number of polymorphic alleles varied from 1 to 4.

Conclusion:

Hundred percent polymorphism were obtained from seven primers. Present study will give an insight for future research for isolation and characterization of drought responsible genes in chickpea.

Keywords: Chickpea, Drought, Genotypes, ISSR Markers

Effect of Bio Fertilizers, Nitrogen and Phosphorus on Yield and Economics of Cluster bean [Cyamopsis tetragonoloba (L.) Taub]

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ABSTRACT
A field experiment entitled "Effect of Bio Fertilizers, Nitrogen and Phosphorus on Yield and Economics of Cluster bean [*Cyamopsis tetragonoloba* (L.) Taub]" was conducted at Research Farm, Vivekananda Global University, Jaipur during *Kharif* season of 2021. The experiment was laid out with 8 treatments comprising in a randomized block design with three replications. Results showed that application of bio fertilizers in combination with nitrogen and phosphorus levels brought an additive effect in increasing yield and economics of cluster bean. Maximum number of pods plant^{-1}, number of seeds pod^{-1}, length of pod, seed yield (1453 kg ha^{-1}), straw yield (3028 ha^{-1}), biological yield (4481 kg ha^{-1}), net returns (₹52602 ha^{-1}) and B: C ratio (2.54) of cluster bean was obtained by application of 100% RDF + *Rhizobium* + *PSB* (T_8) which was significantly higher over application of 75% RDF, 100% RDF, 75% RDF + *Rhizobium* and 75% RDF + *PSB*.
Keywords: Biofertilizers, Cluster bean, Yield Economics

Impact of climate change on Agriculture and its mitigation strategies

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ABSTRACT
A change in the long-term weather patterns that characterise the world's regions is referred to as global climate change. Climate change poses a serious threat to the world's food and nutritional security. Because of the greenhouse effect, as greenhouse-gas emissions in the atmosphere rise, the temperature rises as well. Climate change could have a variety of effects on agriculture, including crop quantity and quality in terms of productivity, growth rates, photosynthesis and transpiration rates, moisture availability, and so on. Climate change is projected to have a direct impact on global food production. An increase in the mean seasonal temperature can shorten the growing season of many crops, reducing production. Climate change drivers, such as changes in air composition, can have an impact on food production through affecting plant physiology. Climate change has an impact on the microbial population in soil, as well as their enzymatic activities. Agriculture's contribution to climate change, as well as climate change's negative influence on agriculture, has serious consequences that are expected to have a significant impact on food production and may jeopardise food security, necessitating special agricultural policies to resist. This paper examines the data gathered from the literature on climate change, its possible causes, its near-term projections, its impact on the agriculture sector as a result of its influence on plant physiological and metabolic activities, and it's potential and reported implications for plant growth and productivity, pest infestation, and mitigation strategies and their implementation.
Keywords: Climate change, nutritional security, Greenhouse effect, Greenhouse gases (GHGs), Agriculture, Food production, Pest infestation

Characterization of quince (*Cydonia oblonga* Mill.) cultivars using SSR markers developed for apple

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ABSTRACT
Quince, also known as *Cydonia oblonga* Mill. is small-scale fruit crop, that is largely used to make marmalade, jam and sauce.Only a small number of quince cultivars are recognised worldwide, and frequently, identical names are used for ostensibly different cultivars. The current study's objective was to assess and define, using SSRmarkers, the genetic diversity of 36 quince cultivars and selections. Seven of the eight SSR markers created from apple sequences were able to amplify quince cultivars with success. There were typically 2 to 3 alleles per locus. Compared to apples, these allele counts are quite low. It is assumed that it is the result of a genetic bottleneck. Despite the low allele frequency per locus, the 36 quince cultivars of quince produced 30 distinct genotypes. The low homozygosity ratio may have been related to the quinces self-(in) compatibility trait. SSR markers failed to distinguish between cultivars that were ostensibly closely related to one another. Due to the low allele number found, the level of variability among the tested quince genotypes was often greatly constrained. It must be remembered, nonetheless, that there are not enough SSR sites that have been studied to determine the overall heterozygosity of the quince genome. The SSR markers have proven to be a trustworthy and practical tool for such assessments, necessitating more research.
Keywords: *Cydonia oblonga*, quince, genetic diversity, SSR. genetic variability.

The Responses of Antioxidant System against the Heavy Metal-Induced Stress in Tomato

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ABSTRACT
Plants continue their life cycles under a variety of environmental situations, including heavy metal- induced oxidative stress. Metal ion accumulation in plants results in the creation of free radicals, which trigger the antioxidative defense mechanisms. The activities of APX, POD, and SOD in the leaves and roots of tomato plants grown under heavy metal stress are examined in this work. Except for 50 ppm Pb, the activities of APX, POD, and SOD were significantly increased in tomato leaves after exposure to Cd, Cu, and Pb (10, 20, and 50 ppm) in comparison to control plants. APX activity in roots varied based on heavy metal types and concentrations, with Cd obviously increasing with stress, but Cu decreasing in tomato compared to control. The activity of POD clearly demonstrated that all dosages of heavy metals lowered enzyme activity in heavy metal-polluted roots. The treatment with Cd (10, 20, and 50 ppm) considerably boosted SOD activity, but Cu had the reverse effect, with root activity decreasing significantly with increasing doses when compared to uncontaminated plants. Roots from plants growing in elevated Pb (20 and 50 ppm) environments also increased SOD activity. In summary, it is obvious that Cd greatly increased the activities of APX and SOD in tomato leaves and roots. The decreases in POD and Cu activity, as well as APX and SOD activity, generated by these metals in tomato roots can be explained by heavy metal- induced free radical overproduction.
Keywords: Heavy metal, APX, Tomato, POD, SOD, cadmium, abiotic stress.

Effect of Cadmium on Physico-chemical and bioactive parameters of *Phaseolus vulgaris* L.

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ABSTRACT
Salicylic acid (SA) has been extensively studied in plants as an enigmatic signalling molecule in order to elucidate its role in biotic and abiotic stress defence. Reactive oxygen species (ROS) levels changes in plant tissues are primarily linked to SA signalling mechanisms. Then, as second messengers, ROS control a range of physiological and genetic adaptive responses, including cell wall remodelling, maintaining ion balance in the uptake of Cd and other ions, enhancing the antioxidant defence system, and controlling senescence, photosynthesis, and glutathione synthesis. These results suggest that SA's role in phytotoxicology is growing. By interacting with other plant hormones (such as auxins, abscisic acid, and gibberellins) and encouraging the activation of antioxidant compounds and enzymes, SA alerts plants that have been exposed to heavy metals (HM) and aids in their ability to withstand its stress. Infected soils containing cadmium (Cd) caused physiological and biochemical changes in plants that reduced yield and product quality. In response to Cd uptake, plants produce antioxidant molecules, which are thought to be a defence mechanism against metal stress. One of the most significant grain legumes in the world, the common bean (Phaseolus vulgaris L.) is a valuable food source for people all over the world, which explains its rising consumption and economic significance. A component of fungicide and fertilizer formulations, as well as a supplement widely used in agriculture all over the world, may expose this crop to Cd. The purpose of this investigation is to assess the impact of Cd on physical, chemical, and biological variables in order to better understand how common beans react to Cd stress

Keywords: Salicylic acid, cadmium, abiotic stress, enzymes, heavy metal, Phaseolus vulgaris L

Green technology approach for sustainability

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ABSTRACT
Green technology (GT) is a broad term and a field of new innovative ways to make environmentally friendly changes in daily life. The Green technology is the knowledge for conserving natural environment and resources and reducing human involvement. It can operate in diversified areas such as bio-fuel, eco-forestry, renewable energy, and solid waste management. It is created and used in a way that conserves natural resources and the environment. It is meant as an alternative source of technology that reduces fossil fuels and demonstrates less damage to the human, animal, and plant health, as well as damage to the world. The use of green technology is supposed to reduce the amount of waste and pollution that are created during production and consumption. It is also referred to as environmental technology and clean technology. Although it is difficult to precisely define the areas that are covered by green technology, it can safely be said that “GT is the development and application of products, equipment and systems used to conserve the natural environment and resources, which minimizes and reduces the negative impact of human activities." This technology should meet the needs of society in ways that can continue

indefinitely into the future without damaging or depleting natural resources. GT as the technology that meets present needs without compromising the ability of future generations to meet their own needs. Based on this context, "sustainability" is considered as a path forward that allows humanity to meet current environmental and human health, economic, and societal needs without compromising the progress and success of future generations. Various green initiatives are being taken to maintain and improve the quality of environment that might flourish on the new resource efficient and sustainable thinking society of the future.

Keywords: Green Technology, Energy, Sustainable Development, Environment Protection

A PROTOCOL FOR *IN VITRO* SHOOT MULTIPLICATION IN TOMATO HYBRID 'ARKA RAKSHAK'

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ABSTRACT

Tomato (*Solanum lycopersicum* L.) is an important member of Solanaceae family with chromosome number of 2n=2x=24 and originated in the Peru-Ecuador region of Andes (South America), and it is grown in almost every corner of the world (Robertson and Labate, 2007). It is the third most important vegetable crop, after potato and sweet potato, in terms of area and production in world. In India, it is one of the foremost warm season vegetable growing on over789 million hectares with an annual production of 19696.92 thousand metric tonnes, (Anonymous, 2018 a). In Jammu and Kashmir, the area under tomato cultivation was 3.58 thousand hectares with an annual production of 88.09 thousand metric tonnes (Anonymous, 2018 b).The production of the tomato in North Indian plains is often hampered both in main and off-season crops due to low yields of the existing genotypes, susceptibility to extreme temperatures, adverse climatic conditions and attacks of diseases, insect pests and nematodes. Hybrid technology has now emerged as a new tool in improving productivity and providing tolerance against various pests and diseases. Breeding hybrid varieties has yielded good results in country especially southern parts of India. Besides being expensive, existing hybrids have not given encouraging results in Northern plains due to various biotic and abiotic stresses. Moreover, available hybrids do not carry tolerance to diseases like leaf curl virus, local races of bacterial wilt and other abiotic stresses like extremes temperature and drought conditions. There is an urgent need to develop new hybrids or multiply existing better performing hybrids using both conventional and non-conventional breeding approaches. Recent advances in plant biotechnological tools offer a viable alternative in preserving, multiplying and obtaining the large quantity of disease-free planting material of hybrids or their parental lines. Micropropagation has now emerged as potential tool for fast production of true to type and disease-free planting material of elite hybrids/varieties. *In vitro* technology facilitates production, mass multiplication and season independent production of disease-free planting material and conservation of tomato in controlled and disease-free conditions.

METHODOLOGY

The present investigation was carried out in Plant Tissue Culture Laboratory of School of Biotechnology, SKUAST- Jammu, Chatha during the year 2018-2019 with the objective to standardize an efficient reproducible protocol for *in vitro* shoot multiplication in tomato hybrid Arka Rakshak, a popular triple disease resistant hybrid developed at IIHR, Bangalore. Three explants viz., cotyledon, shoot tip and hypocotyl explants were excised from 10-14 days old

axenic seedlings for shoot bud initiation and shoot multiplication on different concentrations and combinations of BAP (0.5, 1.0, 1.5 & 2.0 mg L^{-1}) in combination with Kinetin (0.0, 0.1, 0.2 & 0.5 mg L^{-1}).

RESULTS

Among all the treatments, significantly superior response with good quality compact, greenish shoot primodia was observed in T_3 - MS + 1.5 mg L^{-1} BAP in all the three explants whereas among all the explants, significantly superior response was observed in cotyledonary explants manifested in terms of early days to shoot bud initiation (11.33 days) and percentage response (98.00%) followed by shoot tip explant which takes 15.67 days to shoot bud initiation and 92.67% culture response. Regarding shoot multiplication, significantly superior response was observed in T_3 - MS + 1.5 mg L^{-1} BAP with highest number of shoots/explant (6.83) formed in 19.0 days. However, maximum shoot length (5.44 cm) was recorded in T_3 - MS + 1.5 mg L^{-1} BAP + 0.2 mg L^{-1} Kinetin. For induction of rooting in *in vitro* multiplied shoots, they were cultured on MS medium supplemented with different concentrations of IBA (0.0, 0.2, 0.5, 1.0, 1.5 & 2.0 mg L^{-1}) and results revealed best rooting response (97.67%) with early root initiation (2.73 days), maximum number of roots per shoot (4.77) and maximum root length (8.52 cm) in T_4 - MS + 1.0 mg L^{-1} IBA. The plantlets were kept for hardening in plastic cups filled with autoclaved sterilized soil, vermicompost and cocopeat (1:1:1) for 4 weeks with maximum survival per cent of 81.78%.

CONCLUSION

From the present investigation, it can be concluded that an efficient reproducible protocol for *in vitro* shoot multiplication in tomato triple disease resistant hybrid Arka Rakshak has been standardized. This protocol can be utilized for *in vitro* regeneration of hybrid tomato Arka Rakshak on a large scale.

Treatments	Hormonal concentration (mg L^{-1}) (BAP + Kinetin)	Days to shoot bud initiation	Percentage response (%)	Days to multiple shoot formation	Number of shoots /explant
T_1	0.5 + 0.0	13.67	77.67	22.67	2.56
T_2	1.0 + 0.0	14.00	82.33	24.67	3.54
T_3	1.5 + 0.0	11.33	98.00	19.00	6.83
T_4	2.0 + 0.0	15.33	73.67	21.67	2.81
T_5	0.5 + 0.1	15.00	83.00	22.67	4.57
T_6	1.0 + 0.1	16.33	84.00	27.67	4.24
T_7	1.5 + 0.1	12.00	96.33	21.00	5.69
T_8	2.0 + 0.1	15.67	72.00	27.00	2.77
T_9	0.5 + 0.2	16.00	74.00	27.33	4.52
T_{10}	1.0 + 0.2	14.67	85.00	25.67	4.32
T_{11}	1.5 + 0.2	13.67	91.33	24.00	4.55
T_{12}	2.0 + 0.2	14.33	73.00	26.00	4.53
T_{13}	0.5 + 0.5	13.33	75.33	24.00	3.59
T_{14}	1.0 + 0.5	15.33	77.33	25.67	4.55

T_{15}	1.5	+	0.5	14.67	89.67	28.67		3.75
T_{16}	2.0	+	0.5	14.33	76.33	27.33		3.07
CV (%)					2.67		3.62	0.20
2.33								

Table 1: Effect of different concentration of BAP and Kinetin on shoot bud initiation from cotyledonary explants

Introgressed, mutant and synthetic *Brassica juncea* L. lines as potential resistance sources against pan-Indian isolates of white rust pathogen, *Albugo candida*

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ABSTRACT

Purpose: White rust disease caused by the oomycete *Albugo candida* (Pers. Ex. Lev.) Kuntze, is one of the most destructive diseases of *Brassica* crops, considering the significant yield losses. The conventional methods for disease management are not only ineffective but also non-sustainable. Alternatively, exploration and development of new genetic sources that exhibit resistance to different fungal pathogens can be a reliable way to manage this disease. However, existing resistance sources against white rust disease are often ineffective due to racial variation of the causal fungal pathogen, *Albugo candida*. Therefore, in this study we aim to identify new durable sources of resistance effective against multiple races of the pathogen in advanced introgressed, resynthesized and mutant lines.

Methods: Large-scale phenotyping of 194 advanced introgressed (ILs), 90 resynthesized (RBJ), and 9 mutant lines of *Brassica juncea* L. under artificial inoculation at cotyledonary and true leaf stages was done against fourteen diverse isolates of *Albugo candida* and simultaneously these germplasms were tested at the adult plant stage under multi-location field evaluation from 2019-2022. The disease symptoms were recorded as percent disease index.

Results: Amid 194 introgressed lines, three lines, namely ERJ 39, ERJ 12, and ERJ 15, and three lines, among 90 resynthesized and 9 mutant lines including RBJ 18, DRMR 18-36-12, and DRMR 18-37-13, were identified as potential sources of resistance against multiple isolates at all the three developmental stages of the plant. Furthermore, correlation analysis revealed a positive correlation between white rust resistance at true leaf and adult plant stages for ILs as well as mutant and RBJ lines, showing inherent disease resistance in these sources. Principal component analysis (PCA) analysis to comprehend environment (isolates) and genotype interaction also showed genotypes, ERJ 12, ERJ 15, ERJ 39, ERJ 109, RBJ 18, RBJ 40, DRMRSJ 4, DRMR 18-37-13 and DRMR 18-36-12 as the most stable germplasms that performed well against *A. candida* isolates at diverse locations.

Conclusions: These novel sources of host resistance are necessary for the mustard improvement program as these can be implemented to establish a strong genetic and molecular foundation for identifying white rust resistance linked marker(s), QTLs, or gene(s) for the sustainable disease management.

Keywords: *Albugo candida*; *Brassica juncea*; Introgressed lines; Mutant lines; Resistance; Resynthesized lines; Screening

REMOTE SENSING APPLICATION IN ClIMATE SMART AGRICULTURE

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ABSTRACT
Remote sensing technology has revolutionized the way we approach agriculture, providing us with unprecedented insights into our crops, soil and other resources. Remote sensing technology helps us to monitor crop growth and health, evaluate soil moisture and nutrient levels, and spot possible stress regions by utilizing satellite and aircraft pictures. This knowledge is essential for creating and putting into practice efficient management methods that maximize crop output while minimizing environmental damage. Precision agriculture is one of the main uses of remote sensing in farming. High-resolution photography is used in precision agriculture to obtain information on the type of soil, crop production, fertilizer uptake, and other factors. This information is then used to develop site-specific management plans that target the specific needs of each crop, leading to more efficient and effective use of resources and an overall improvement in crop yield. Another important application of remote sensing in agriculture is drought monitoring. With the increasing frequency and intensity of droughts worldwide, accurate and timely information on soil moisture levels is crucial for effective drought response and management. Remote sensing technology provides this information in near real-time, allowing farmers to make informed decisions about irrigation and other water management practices. Additionally, remote sensing technology has proven to be an invaluable tool in disaster response and recovery efforts in agriculture. In the aftermath of natural disasters such as hurricanes and earthquakes, remote sensing can be used to quickly assess the extent of the damage to crops and infrastructure. This information is then used to prioritize recovery efforts, reducing the time required for the agricultural sector to return to normal operation. In conclusion, remote sensing has become an indispensable tool in modern agriculture. Its ability to provide real-time, accurate data on crops, soil and other natural resources has the potential to transform the industry, leading to more sustainable and profitable agriculture practices. As technology continues to advance, the applications of remote sensing in agriculture are likely to become even more sophisticated, providing farmers with the information and tools they need to ensure the long-term success of their operations.
Keywords: Remote sensing, Precision agriculture and modern agriculture.

Biotic and Abiotic Stress Management

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ABSTRACT
Motivation behind the topic Plants experience environmental stress in many different ways, which has an impact on their ability to grow and develop. Not all plants can withstand stress, and some of them eventually perish due to modifications in their biological processes, such as a decrease in the photosynthetic pigments or a drop in the flow of water to various areas of the plant. Due to the

unpredictability of the climate, concern is needed regarding how plants respond to various forms of stresses and how to control them. Abiotic stressors can be lessened by selecting the most suitable crop species, particularly resistant or tolerant cultivars, and by altering agronomy (sowing timing, plant density, and soil management) to ensure that vulnerable crop stages occur at the most favourable phase of the season. Early flowering and maturation are the best approaches to prevent drought stress. Silicon and potassium are crucial minerals that efficiently lessen plant stress, especially moisture/flood stress. Auxins, gibberellins, ABA, and cytokinins are exogenously applied to plants to alleviate the negative effects of salt stress, likely by reducing the buildup of harmful Clions in leaves. Salicylic acid increases the capacity for thermotolerance, whereas ABA and cryoprotectants increase the capacity for freezing tolerance. The morphological, physiological, and biochemical traits of vegetable crops, such as their robust root systems, increased water and nutrient uptake, improved photosynthetic efficiency, stronger antioxidative defence system, and improved hormonal signalling, contribute to their tolerance against abiotic and biotic stress. Micro-organisms like arbuscular mycorrhizal fungi and endophytic rhizospheric bacteria help the plants to cope with stress by producing exopolysaccharides and forming biofilms as a result of induced systemic tolerance. Before dealing with plant stress, it is important to know about the developmental phase of the plants, the stress duration and the different types of effects due to abiotic and biotic stresses since pressures and the capacity to control these stresses differ from species to species of plants.

Keywords: Plant stresses, serious effects, Mitigation, Trait improvement

FUNGICIDAL EFFICACY AGAINST FOLIAR DISEASES OF TURMERIC

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ABSTRACT

Turmeric (*Curcuma longa* L.) known as golden spice as well as "spice of life" has emerged as high value crop. Among various diseases attacking turmeric, leaf blotch disease caused by *Taphrina maculans* and leaf spot disease caused by *Colletotrichum capsici* are the two most serious foliar diseases. Turmeric yield losses have been recorded up to 37.6-52.9 per cent and upto 50 per cent in leaf blotch and spot disease respectively. Considering the seriousness of these diseases, present investigation was carried out on management of leaf blotch and leaf spot diseases of turmeric by fungicides at Tirhut College of Agriculture, Dholi, Muzaffarpur (Bihar) during *Kharif*, and 2019-20 to 2021-22. Under disease management, Lowest disease *viz., Colletotrichum* leaf spot (PDI=6.67) and *Taphrina* leaf spot (PDI=13.34) were recorded in treatment where pre-planting treatment of rhizome and spraying of crop at 90, 105 and 120 DAP was done with Propiconazole (25 EC) @0.1% and Zineb (75 WP) @0.1% respectively over control (PDI=43.89 & 47.22 respectively). Best treatment with respect to recording of highest yield of 38.09 t/ha over control (25.77 t/ha) and highest ICBR (1:22.22) were recorded in treatment where pre-planting treatment of rhizome and spraying of crop at 90, 105 and 120 DAP was done with Propiconazole (25 EC) @0.1% and Zineb (75 WP) @0.1% respectively.

Keywords: Turmeric, leaf blotch, leaf spot, fungicide.

Investigating the impact of climate change on livestock production, including changes in feed availability, water resources, and animal health

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ABSTRACT

In order to meet the needs of a growing world population, livestock production is an integral part of the agricultural sector. However, the availability of feed, water supplies, and animal health might all be negatively impacted by climate change, which is a serious challenge to the sustainability of livestock production systems.

This study looks at how climate change may affect the availability of feed, water resources, and animal health in the production of livestock. The analysis of the expected effects of climate change on livestock productivity in various locations and livestock systems rely on a variety of studies and data sources.

The study concludes that the availability of feed, water supplies, and animal health will all be significantly impacted by climate change, which will also influence precipitation patterns, temperature, and extreme weather events. Increased temperatures and altered precipitation patterns are predicted to have a considerable impact on the growth and quality of crops and forage, which will result in changes in the availability of feed. In addition to the economic feasibility of livestock production systems, this is expected to have an impact on the productivity and nutrition of animals.

With droughts and other extreme weather events having the potential to cause water shortages and decreased livestock output, changes in water resources are also anticipated to have a substantial influence on livestock production. Since shifting disease vectors and rising temperatures both increase the danger of infectious illnesses and other health issues, it is possible that climate change will have a substantial influence on animal health as well.

Keywords: Climate change, agriculture, sustainability, resilience, mitigation, and adaptation; livestock productivity; feed availability; water resources; and animal health.

Investigating the effectiveness of different climate-smart agriculture techniques in mitigating the effects of climate change on agriculture.

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ABSTRACT

The world is now facing, and it is particularly detrimental to agriculture. Climate-smart agriculture might help to mitigate the impact of climate change on agriculture (CSA). This study evaluates the effectiveness of several CSA measures to decrease the effects of climate change on agriculture. A detailed literature review was conducted to identify the many CSA tactics that have been created and are currently being implemented internationally.

The study showed that CSA approaches such agroforestry; conservation agriculture, integrated crop-livestock systems, and water management have shown potential outcomes. However, depending on the particular situation and the extent of farmer acceptance, these strategies may or may not be beneficial. This study emphasises the importance of investing in CSA techniques and conducting more research in order to successfully lessen the consequences of climate change on agriculture.

In some agricultural areas in underdeveloped nations, where the effects of climate change are most severe, the primary data gathering will take place. The survey will gather information on farmers' use of various CSA practices, their assessments of their efficacy, and the difficulties they have in doing so. The interviews with agricultural professionals will shed light on the institutional and technical obstacles to the broad use of CSA systems.
The findings will guide the creation of policies and programmes that encourage the wider adoption of these techniques and assist in identifying the most productive CSA approaches in various ago-ecological zones and situations.
Keywords: variety of crops, resilience, food security, smallholder farmers, management of the land and water, and management of animals.

Assessing the potential for climate-smart agricultural practices to contribute to global efforts to reduce greenhouse gas emissions and mitigate climate change.
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ABSTRACT
A major source of greenhouse gas emissions and a sector that is particularly sensitive to the effects of climate change, agriculture is one of the most urgent global challenges of our day. By supporting agricultural practises that boost production, improve resilience, and lower greenhouse gas emissions, the notion of "climate-smart agriculture" (CSA) has come into being. This study examines how climate-smart agriculture methods may support international efforts to cut greenhouse gas emissions and slow global warming. In order to do this, a thorough literature study was carried out, looking at the present level of knowledge about the effects of different CSA practises on greenhouse gas emissions, soil health, and food security, as well as their potential for widespread adoption. The notably through soil carbon sequestration, improved livestock management, and the use of agroforestry and conservation agriculture, have a substantial potential to lower greenhouse gas emissions in the agricultural sector. Particularly, soil carbon sequestration has been highlighted as a viable technique for reducing greenhouse gas emissions, as it also enhances soil health and boosts agricultural output's practises can increase the resilience of agricultural systems to the effects of climate change, such as droughts, floods, and extreme weather events, in addition to lowering greenhouse gas emissions. This is accomplished by employing techniques like agricultural diversification, improved water management, and the adoption of crops that can withstand drought.
Keywords: Food security, carbon sequestration, climate change, agriculture, greenhouse gas emissions, climate-smart agriculture, policy, and institutional frameworks.

Analysing the role of agricultural policies in promoting climate-resilient and sustainable farming practices
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ABSTRACT
The increasing impacts of climate change on agricultural production and food security have prompted policy-makers to consider the integration of climate-resilient and sustainable farming practices in agricultural policies. The purpose of this paper is to analyse the role of agricultural

policies in promoting climate-resilient and sustainable farming practices. The paper reviews the current agricultural policies in place in different countries and regions, highlighting the initiatives that aim to promote climate-resilient and sustainable agriculture. The study identifies several policies, including financial incentives, subsidies, and education and extension programs, that can encourage farmers to adopt sustainable practices that improve their resilience to climate change. Moreover, the paper assesses the impact of these policies on farming practices and explores the challenges that hinder the implementation of such policies. The analysis reveals that while there are several policies in place that support climate-resilient and sustainable agriculture, their impact on the ground remains limited due to the lack of political will, inadequate funding, and inadequate awareness among farmers. Therefore, the study recommends that policymakers should strengthen policies that support sustainable agriculture by creating a favourable policy environment that promotes the adoption of climate-resilient and sustainable practices.

Keywords: Climate change, Agriculture, Sustainable farming practices, Agricultural policies, Resilience, Food security.

Changes in physicochemical properties of pasteurized coconut (Cocos nucifera) milk during storage at refrigeration condition

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ABSTRACT

This study aims to evaluate the changes in the physicochemical properties of coconut milk in refrigeration conditions. Coconut milk from the endosperm was prepared for this study. Pasteurization was done by heating at a temperature of 72 ±1°C for 15 minutes. The coconut milk samples were stored for 3 weeks in refrigeration conditions (4°C). The biochemical analysis of coconut milk samples in terms of proximate composition, total solids, acidity, and pH were determined and the total viable count method was applied for the evaluation of microbiological quality. The acceptability of coconut milk samples was assessed by visual observation and sensory evaluation. Results indicated that significant retention in nutrient content was observed in all samples during storage. Statistical analysis of sensory parameters (viz. color, flavor, and taste) indicated an acceptable quality of coconut milk samples during storage. The total viable count of coconut milk samples was in an acceptable range of up to 3 weeks but fungal growth occurred after 2 weeks.

Keywords: Fresh coconut milk; physicochemical characteristics; powdered coconut milk; sensory evaluation; proximate;

Factors influencing farmers' decision to diversify crops for climate resilience

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ABSTRACT

Crop diversification is increasingly recognized as a vital strategy for enhancing climate resilience in agricultural systems. In the state of Odisha, India, where agriculture is central to livelihoods and economic development, understanding the determinants of crop diversification is crucial for promoting sustainable and climate-resilient farming practices. This abstract provides a

comprehensive review of the key factors influencing the adoption of crop diversification in Odisha, with a specific focus on climate resilience. The abstract begins by elucidating the significance of crop diversification as a response to climate change impacts, including increased temperature, changing rainfall patterns, and extreme weather events. It highlights the potential benefits of crop diversification, such as reduced vulnerability to climate risks, improved resource use efficiency, enhanced ecosystem services, and diversified income streams. Furthermore, the abstract explores the determinants that shape farmers' decisions to adopt crop diversification strategies in Odisha. It examines a range of factors at multiple levels, including the individual farmer, farm characteristics, socio-economic factors, market dynamics, and policy environment. These determinants are analyzed based on existing literature and empirical evidence, offering insights into the complex interplay of factors influencing crop diversification practices. The abstract identifies several key determinants influencing crop diversification in Odisha. At the individual farmer level, factors such as risk perception, knowledge, education, and access to information play a crucial role. Farm-level characteristics, including land size, soil fertility, water availability, and access to irrigation infrastructure, also influence diversification decisions. Additionally, socio-economic factors, such as access to credit, market demand, and price incentives, significantly impact farmers' choices. Moreover, the abstract highlights the importance of supportive policies and institutional frameworks in facilitating crop diversification. It examines the role of government initiatives, extension services, farmer organizations, and research institutions in promoting climate-resilient farming practices and facilitating the adoption of diversification strategies. By understanding these determinants and addressing the associated challenges, policymakers, researchers, and stakeholders can develop targeted interventions and supportive policies to encourage widespread adoption of crop diversification practices. Ultimately, such efforts can contribute to building climate resilience, enhancing agricultural productivity, and securing sustainable livelihoods for farmers in Odisha.

Keywords: Crop Diversification, Determinants

Allelopathic effects of aqueous extract of leaf stem and root of *Chenopodium murale* on seedling length and dry weight of various crops and weed plants

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ABSTRACT

The objective of present study is to investigate the comparative phytotoxicity of leachable allelochemicals from different parts of *C. murale* and to make their quantitative assessment on crops wheat (*Triticum aestivum* L.), chickpea (*Cicer arietinum L.*), rice (*Oryza sativa*), pea (*Pisum sativum* L.) and weeds *Melilotus indicus* L., *Phalaris minor* Retz, *Cassia tora* L., and *Vicia villosa* Roth. Root, stem and leaf aqueous extract of *C. murale* at (2%, 1%, 0.5%) were applied to determine their effect on seedling growth and dry weight of test plants. Seedling length and dry weight of all the crops and weeds were inhibited on treatment with aqueous extract. Maximum reduction was observed with treatment of leaf extracts followed by stem extracts and then root extracts. The pH of aqueous extracts of different parts of *C. murale* does not show any noticeable difference when concentration is increased.

Key words: Allelopathy, germination, aqueous extract

DEVELOPMENT OF MICROSPORE-DERIVED DOUBLED-HAPLOIDS FROM F_1 DONOR IN EGGPLANT (*Solanum melongena* L.)

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ABSTRACT

The development of microspore-derived doubled-haploids in eggplant is the most efficient way of speed breeding of completely homozygous inbred lines. In the present investigation, we studied the development of microspore-derived doubled-haploids from three F_1 (PSB-7-2 x P-219, SR-5 x SR-9322, SC-15-2 × MR-319) donors in eggplant. *In vitro* culture of pretreated (35° C for 4 days in distilled water) microspores at uni-nucleate stage in dark and their subculture in NLN medium supplemented with 2,4-D 2 mg/l + Sucrose 20g/l resulted callogenesis and subculture of induced calli on MS medium fortified with Zeatin 4 mg/l + IAA 0.2 mg/l + Sucrose 20 g/l and Agar 8g/l resulted embryogenesis and regeneration of plantlets, which were later elongated (MS medium, Murashige and Skooge 1962), rooted (1/2 MS +0.5 mg/l IBA+ 8 g/l plant-agar) and established as complete plants after hardening. The microspore culture of PSB-7-2 x P-219 and SR-5 x SR-9322 had 10.9 % and 3.8 % (Plants/100 calli) re-generation efficiencies, respectively. In total, sixty five plants from both the donors could reach to reproductive maturity in the poly-house. The molecular analysis of plants in comparison to their heterozygous donor established their gametic origin. Cytological analysis of Metaphase-1 and Anaphase-1 stages in dividing pollen mother cells of the regenerants confirmed doubled-haploidy in thirty regenerants. Whereas aneuploidy, haploidy and triploidy in 29, 5 and 1 plants, respectively. Flow cytometric analysis also clearly differentiated haploid, doubled haploid and triploid peaks. However, all the developed doubled haploid plants had comparable reproductive potential in comparison to their donor parents.

Key words: Eggplant, microspore culture, ploidy, morphology, genetic divergence.

Culture media dependent *in vitro* microtuberization potential of frost tolerant potato genotypes

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ABSTRACT

Micro-tuberization has emerged as an attractive tool for production of seed tubers, and germplasm conservation. Due to amenability to automation and high throughput, microtubers have a unique status for tuber crop breeding programmes, transportation and storage. The current investigation was aimed to study the effect of solid media in eighteen frost tolerant potato accessions in four media compositions SM1, SM2, SM3 and SM4 including different concentrations of sucrose, Benzyl amino purine and Chlorocholine chloride. The cultures were incubated under continuous darkness at 20 °C for about 70 days. The results exhibited that overall MS medium supplemented with 8% sucrose significantly enhanced micro-tuber formation, plant biomass flask^{-1}, percentage

micro-tuberization, micro-tuber diameter and number of eyes per micro-tuber. SM2 composition exhibited earliness in all the frost tolerant potato accessions. CP-1465 and K. Anand performed better for most of the micro tuber parameters such as micro-tuber formation plant biomass flask^{-1}, percentage micro-tuberization, micro-tuber diameter and number of eyes per micro-tuber**.** Further, the accessions-specific protocols need to be standardized for enhancing micro-tuberization efficiency.

Keywords: Accelerated multiplication, BAP, Microtuberization, Sucrose, Tissue culture

Millets production- A key to Indian Agriculture and their nutritional and health benefits

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ABSTRACT

Millets are the staple food in the regions of Manipur, Meghalaya and Nagaland state due to which their production is being encouraged there. In India, millets are majorly grown in 21 states on about 17 million ha area with annual production of 18 million tones with a with a productivity of 1111 kg per hectare with a contribution of 10 per cent to the country's food grains production (Directorate of Economics and Statistics' as per 2015). Millets are the rich sources of protein, Vitamin-B, essential fatty acids, dietary fiber and essential minerals like calcium, iron, zinc, potassium and magnesium. They also have health benefits like reduction in level of blood sugar, regulation of blood pressure, cardiovascular, thyroid and celiac disease. Maharashtra, Karnataka and Rajasthan are three major millet producing states in the country. The usual soil type in which millets grow in include well drained, loamy soil with balanced nutrient and moisture content. Excessive consumption of synthetic fertilizers and weedicides and plant growth regulators coupled with lower application of organic manures resulted in impaired soil health which contributes to land degradation and formation of problematic soils. In such type of low fertile soils, millets can be easily grown with certain management practices especially in dry areas where soil moisture is not sufficient to meet the demand of higher water required crops such as rice, sugarcane and cotton etc. In present scenario, the problem of malnutrition is minimized only by supply of nutrients and minerals which is only possible through millets.

Keywords-Vitamin-B, Zinc, Cardiovascular, Synthetic fertilizers, Soil health, Land degradation, Malnutrition.

GIS Based Decision Support Systems in Agriculture

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ABSTRACT

Agriculture is essentially a spatial phenomenon which is not independent of location. GIS is the tool and technology that handles various spatial databases, and is a young area of information technology. Crop identification and mapping is the need of the hour in today's world. The most important activities include identifying the crop types and depict their extent.

The decision support system with GIS tool can better organize and analyze spatial data, address the problems related to spatial and temporal variability of various natural resources on which performance of agricultural systems depends. The efficiency and accuracy of data are improved when remote sensing data products and GIS are used. Precision farming, a combination of GIS,

GPS receivers, continuous yield sensors, geostatistics and variable rate applicators is an innovative approach to practice of sustainable agriculture. We have tried to study use of GIS (Geography Information System) in agriculture. We also are going to classify the remotely sensed image via satellite and digitize the image. And this digitized image is going to be used to train the existing system so that it can automatically sense the image in future. The main technologies to implement this system are described in detail.

Key Words: GIS, precision, geography, satellite image.

The comparison of two different cryoprotectants in cryopreservation of Berari goat semen

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ABSTRACT
The objective of this study was to evaluate Tris egg yolk glycerol (TYG) and Tris egg yolk di-methyl sulfoxide (TYD) dilutors on the basis of various macroscopic, microscopic, sperm function tests and enzymes activities at neat semen, post diluted, post equilibrated and post thaw stages in Berari goat semen. Semen samples from 6 mature Berari goats were used in this study. A total of 72 ejaculates were collected once a week from the bucks using an artificial vagina and the semen pooled to minimize individual variation. Each pooled ejaculate was splited into 2 equal aliquots and diluted with tris base extenders supplemented with two different dilutors having different cryoprotectants i.e glycerol (G) and di-methyl sulfoxide (DMSO). Tris egg yolk glycerol (TYG) had better mass motility, initial motility, total sperm concentration, percentage of live spermatozoa, Hypo-osmatic swelling test (HOST), and Acrosome intactness test when compared to Tris egg yolk di-methyl sulfoxide (TYD) groups. On the other hand, TYD showed the more values of abnormal sperm percentage and Enzyme leakage test i.e AST and ALT values. In conclusion, no advantages were found in using TYD or DMSO to replace Glycerol for freezing of Berari goat sperm.

Keywords: Berari goat, Cryoprotectans, Sperm function test, Enzyme Leakage Test

Reproductive characteristics of berari male goats in breeding season

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ABSTRACT
A total of 72 ejaculates from six adult berari bucks were studied to determine the semen attributes and evaluate their fertility. The various semen attributes of fresh semen were volume, mass motility, individual motility, live sperm, abnormal sperm, sperm concentration, damaged acrosome percentage. Artificial vagina was used to collect semen from adult berari bucks, at once weekly intervals starting on 1 October 2017 and ending on 30 December 2017. Creamy semen color was the characteristic feature throughout the study. The average mean values for seminal attributes were: ejaculate volume 1.22 + 0.04 ml, seminal pH 6.79 + 0.01, mass motility (0-5 scale) 4.06 + 0.12, individual motility 85.28 + 0.95 per cent, live sperm count 90.01 + 0.5 per cent, abnormal sperm count 3.72 + 0.20 per cent and total sperm concentration 3664.58 +22.76 (×106/ml). Overall semen quality of Berari breed was found optimum for use in breeding programme.

Key Words: Berari buck, seminal attributes, semen, breeding season.

Immunoglobulin levels in Canine Atopic Dermatitis

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ABSTRACT
Canine atopic dermatitis is a common skin allergic condition of complex etiopathogenesis. Changes in epidermal barrier function, priming of skin antigen presenting cells with IgE, intrinsic keratinocyte defect and development of autoimmunity have been proposed as contributory factors. The disease is associated with IgE antibodies to environmental allergens. There is no single criterion or a simple diagnostic test for atopy. Though, gold standard test for the confirmatory diagnosis of atopic dermatitis remains intradermal allergic test to environmental allergens (cumbersome and not feasible) and/or estimation of immunoglobulins. Therefore an attempt was made to estimate the levels of serum IgE, IgA, and IgG in 4 German Shepherds with persistent non-seasonal pruritus with no other secondary complications using enzyme-linked immunosorbent assay and radial immunodiffusion assays. Mean total serum immunoglobulin (Ig)E, A and G levels were found as 21.47 $\pm$ 3.7 U/ml (15-32 U /ml), 60.27 $\pm$5.26 mg /dl (50.6- 72.6 mg/dl), and 1465.5 $\pm$ 88.71mg/dl (1250-1652 mg/dl) respectively in these atopic German Shepherds against the values reported for IgE (17.5 U/ml), IgA (103.3 mg/dl) and IgG (1066 mg/dl). IgE levels did not differ significantly. However, IgA and Ig G levels were lower and higher respectively in the atopic dogs as compared to those reported for non-atopic dogs by others. It appears that the synthesis of IgG was promoted and that of IgA was down regulated in atopic dogs. More detailed studies are indicated in this regard.

Influence of Dates of Sowing on *Kharif* Pigeon pea (*Cajanus cajan* L.) Cultivars Under Varied Weather Conditions

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ABSTRACT
In order to investigate the effect of sowing dates on yield and yield components of pigeon pea cultivars; one year field experiment was conducted at PGI, VNMKV, Parbhani during *kharif* 2017. The experimental design was split plot with three replications. The layout consisted of total 36 experimental units i.e. four dates of sowing in different Meteorological Weeks (MW) *viz.*, D_1-25 MW, D_2-27 MW, D_3-29 MW and D_4-31 MW and three cultivars (V) *viz.*, V_1- BDN-711, V_2-BDN-716 and V_3- BSMR-736 with gross plot size 5.4 m x 5.0 m and net plot size 4.5 m x 4.0 m. Results of combined analysis showed that seed yield of pigeon pea was significantly affected by sowing dates. The maximum seed yield (1450 kg ha^{-1}) was obtained; when crop was sown on 25 MW; because the number of pods per plant and 100 seed weight were also increased. Cultivars were also responded significantly towards yield and yield components. The maximum seed yield (1442 kg ha^{-1}) was produced by Cv. BDN-711.

Keywords: *Pigeon pea, cultivars, dates of sowing, crop growth, seed yield*

Climate Smart Pest Management (CSPM)

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ABSTRACT
Climate change is causing global shifts in temperature, precipitation patterns, as well as an increase in unpredictable, extreme weather patterns. It is already known that climate change has a significant impact on global crop yields (Lobell and Field, 2007) and will continue to do so in the future (Challinor et al., 2014), but climate change is also directly and indirectly influencing the distribution and severity of crop pests across the globe (Macfadyen et al., 2018), which is further affecting crop yields. In many areas of the world, new invasive species are also appearing, facilitated by climate change. Without effective monitoring and management systems in place, these invasive species have the potential to also become important pests in these new areas (Hellmann et al., 2008). The CS-IPM, or simply CSPM, is a newly introduced term to update an old concept of integrated pest management under climate change using smart techniques to achieve sustainable development goals. Therefore, CSPM encompasses a set of inter-disciplinary approaches and strategies needed for primary production in adapting to a changing climatic environment (Bouri et al., 2023). Moreover, it is a cross-sectoral approach that aims to reduce pest-induced crop losses, enhance ecosystem services, reduce the greenhouse gas emissions intensity per unit of food produced and strengthen the resilience of agricultural systems in the face of climate change (Heeb et al., 2019). To be effective, CSPM should not be understood as a stand-alone approach, but as a part of a broader Climate Smart Agriculture (CSA) intervention, which considers pest management as one of its key components.
Keywords: Climate Smart Pest Management, Invasive species, Sustainable development,

Ecosystem, Integrated Pest Management, Climate Smart Agriculture, Greenhouse gas.

Seedling Production Techniques of Papaya

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ABSTRACT
Papaya has gained importance owing to its round the year fruiting ability, higher productivity per unit area and multipurpose uses like food, medicine and as an industrial input. The demand for the quality seeds of the released varieties and hybrids from public and private sector has greatly increased. Seed production is important to sustain the papaya fruit production in the country. Therefore, it is imperative to know various technical aspects of the papaya seed production programme. Papaya is a polygamous plant and has many sex forms. The three basic types are male or staminate, hermaphrodite (bisexual) and female or pistil late. Out of these, only female is stable, whereas flowers of hermaphrodite and male vary in sex expression under different environmental conditions. Controlled pollination is better option for quality seed production compare to isolation distance based production particularly for gynodioecious varieties/hybrids. The quality of papaya seeds becomes more important considering its germination percentage (65%) which is much lower as compare to other crops. We can say without a healthy seedling its cultivation is not possible, so healthy seedling is needed for its cultivation. For growing the healthy nursery first papaya seed

treated by Fungicide like Captain or Thirum @3 gram per kg seed or Trichoderma @ 10gram per kg seed before sowing to control the Fungus disease like damping off and grow the seedlings under Protected structure (Net House) to prevent the leaf curl Viral disease at nursery stage. After Germination of seedlings one spray is needed Imidachloprid @1ml in three liter water solution so that white fly or other insect cannot spread the viral disease in the seedling. By adopting the above techniques we can grow the healthy seedling of papaya for its commercial cultivation.

Keywords- Papaya, Seedlings, Healthy, Seed Production techniques.

Growth performance of *Labeo rohita* (rohu) fry in sodic soil earthen ponds.

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ABSTRACT

The present investigation has been conducted to evaluate the growth performance of *Labeo rohita* (Rohu) fry under three different stocking densities in sodic soil earthen small ponds of dimension 8x8 m^2 ponds having depth of one meter. The experiment was conducted for a period of 50 days in triplicate. The fry were acclimatized for a period of seven days before starting of the experiment. *Labeo rohita* fry of average weights (0.35±0.01gm) were stocked @ 3.0 (T1), 4.0(T2) and 5.0(T3) million/hectare. Water quality parameters (Dissolved oxygen (DO), pH, alkalinity, hardness, ammonia, temperature, transparency) were monitored on weekly basis. pH of water was 9.21± 0.24 to 9.36± 0.24). Initial and final soil parameters (pH, EC, ESP, OC%) were also analyzed. The soil pH was 9.16±0.057, electrical conductivity (EC) 0.44±0.02 to 0.46±0.0 dSm^{-1}, exchangeable sodium percentage (ESP) was varying between 45.38±1.30 to 46.07±0.70 and organic carbon percentage (OC) was 0.15 ±0.01 to 0.17±0.02), temperature was varying between 32.82 to 33.63^{0}C. Fish growth performance and nutrient utilization were determined for average weight gain (AWG) Specific growth rate (SGR) and Feed conversion ratio (FCR). Survival rate was recorded maximum in treatment T2 and weight gain percentage was recorded highest in T1 and least in T2. The result shows that sodic can be used for fish seed rearing and culture.

Keywords: Sodic soil, *Labeo rohita*, fish culture

On Physiological and biochemical aspects of okra seed (*Abelmoschus esculentus* L.)

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ABSTRACT

The present study was carried out at Department of Seed Science and Technology, CCS Haryana Agriculture University, Hisar, Haryana during 2018â€“20, that comprised of seven fungicides used as seed treatment @2 gm/kg, *viz.* carbendazim, tebuconazole, difeconazole, flusilazole, chlorothalonil, azoxystrobin and vitavax power along with control. The freshly harvested okra seeds treated with these fungicides were stored in three different containers, viz. polythene bag, hermetic bag and metal box under ambient conditions up to a period of 18 months and their quality was assessed at a regular interval for three months. A significant decline in seed quality was observed in all the treatments as the period of ageing increased. Seeds treated with azoxystrobin and stored in metal box recorded significantly higher germination per cent (74.9%),

shoot length (8.8 cm), root length (6.8 cm), seedling dry weight (0.230 g), vigour index-I (1171), vigour index-II (17.22), catalase (198.9 mg/protein/min), superoxidase dismustase (132.2 mg/protein/min), dehydrogenase (0.46 OD/g/ml) and peroxidise (676 mg/protein/min) and lower electrical conductivity (1.036 Î¼S/cm/g) after 18 months of storage as compared to control. Hence, the study recommends that use of appropriate packaging material and seed treatment would leads to prolong the longevity and health of okra seeds.

Keywords: Fungicides, Seed Storage, Enzymes, Containers, Okra

Occurrence of spot bloch disease of wheat and its management in Eastern Uttar Pradesh

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ABSTRACT

Wheat (*Triticum aestivum* L.) belongs to family Graminae, is one of the oldest and most important cereal crops. Bread wheat accounts for approximately 95 per cent of the wheat grown, while 4 per cent is duram wheat and 1 per cent is dicoccum wheat. Among all diseases of wheat, the spot bloch disease is become serious problem to wheat farmers in Eastern Uttar Pradesh. *Bipolaris sorokiniana* was mainly responsible for causing spot blotch of wheat in Uttar Pradesh. The disease appeared 5 to 8 weeks after wheat sowing and the symptoms advanced after heading and spreaded very fast and it was observed that after seven days of incubation, Propiconazole, Hexaconazole and Difenaconazole + Propiconazole completely inhibited the growth of *B. sorokiniana in vitro* at a concentration of 250 ppm or more. Carbendazim produced cent per cent inhibition at a concentration of 500 ppm or more whereas copper oxychloride produced it at 1000 ppm only. Mancozeb even at 1000 ppm concentration could not completely inhibit the growth of *B. sorokiniana* in vitro. Possibilities of using these fungicides in the field for the management of spot blotch of wheat can be explored.

IMPACT OF CLIMATE CHANGE ON INSECT PESTS AND THEIR MANAGEMENT: A Review

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ABSTRACT

The impact of climate change on insect pests and their management in agricultural systems is substantial. Changes in temperature, precipitation and pest dynamics present challenges to traditional pest control practices. To effectively manage pests and promote sustainable agriculture, it is essential to understand the intricate relationship between climate change and insect pests. Incorporating climate change considerations into pest management strategies, adopting adaptive approaches and fostering interdisciplinary collaborations are crucial for mitigating the adverse effects of climate change on insect pests and ensuring the sustainability of farming practices in a changing climate.

Keywords: Climate change, Insect pests, Management, IPM

Environmental conditions at home and health status of work from home employees

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ABSTRACT
The world faced a health emergency like never before in the year 2020-2021 called corona virus, all the public activity was shut down and government instructed the people not to come out of home to prevent the spread of diseases as the corona virus was much more contagious than any other disease. Alike corporate workers were instructed to work from home. It sounds good working from home but it's not easy as working from office, as work from home employees ended up working for longer hours than the office hours and working for more than 8 hours in tight schedule with the static posture lead to many health hazards. The data was collected in the year 2021 to know about the demographic, their health status and existing environmental conditions of work from home employees at their home. With reference to the gender participation, it was found that more number of male employees worked as work from home (59.09%) followed by female participants. From among the two selected study areas majority of them belonged to dharwad (71.81%) followed by hubli (28.18%). Majority of the work from home employees from the study area were belonged to the less than 35 years of age group followed by 35-50 years. More than fifty percent of the respondents were married followed by unmarried.
Respondents were asked about their perception towards their health status and among them 40.90 per cent of the respondents said they feel good about their health followed by 36.36 per cent of the respondents said they feel moderate about their health and only 22.72 per cent of the respondents said they feel very good about their health status.
Respondents were asked about the existing environment parameters like lighting, ventilation, noise, temperature and relative humidity at their home for that 39.09 per cent of the respondents said they have good lighting followed by 41.81 per cent of the respondents said they have good ventilation, followed by 40.00 per cent of the respondents said they have fair noise level and relative humidity and only 38.18 per cent said they had fair temperature.

Remote sensing application in monitoring and management of soil and water pollution

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ABSTRACT
Environmental pollution is becoming more and more serious due to today's development all around the world. Environmental pollution is our concern nowadays because all the daily activities are related to the environment. Soil, water and air pollution are the most important environmental problems, which concentrates mostly in cities as well as villages too. Remote sensing is recently used in various fields of agricultural and soil sciences which includes soil survey, detection of water resources, monitoring of water and soil resources, crop and nutrient management, land use planning, assessment of soil and water pollution, soil, water and air pollution management etc. Data processing and satellite images are a useful tool for the monitoring and management of soil and water pollution. We have selected images from different sensors to analyze some cases of erosion and loss of soil quality: pollution, loss of organic matter (fire, deforestation), salinization, sealing, erosion and hydromorphic process. The sensors used for this type of study are the average

spectral and spatial resolution (embarked in Landsat, Spot, Aster, EO, and etc. satellites), high temporal resolution (embarked in MODIS, NOAA, and etc. satellites) and radar satellites (embarked in Envisat, ERS, and etc. satellites).
Remote Sensing, coupled with Geographic Information System (GIS), is a powerful tool for monitoring of soil and water pollution. Satellite imageries have been used successfully in determination of various water quality parameters like Total Suspended Solids, turbidity, chlorophyll content, colour, temperature etc. by using the Visible, Reflected Infrared and occasionally Thermal Infrared bands of the Electro Magnetic Spectrum. Remote Sensing techniques have been used in sustainable management of water resources, which include runoff and hydrological modeling, flood management, watershed management, drought management and management of Irrigation Command Areas as well as soil resources which includes soil erosion, salinity, alkalinity, land degradation, etc. Satellite imageries obtained from Landsat Thematic Mapper (TM), Linear Imaging and Self Scanning (LISS) and Wide Field Sensor (WiFS) have been used extensively by various workers for calculation of drainage basin area, drainage density, Normalized Difference Vegetation Index (NDVI) and Leaf Water Content Index (LWCI). Application of Remote Sensing in monitoring and management of soil and water pollution were demonstrated in India by a number of researchers from time to time. Typical applications include mapping of soil, delineation of water resources, water quality monitoring, and sustainable management of soil and water resources.
Keywords- *Remote sensing, Soil, Water, Pollution, NDVI, GIS.*

University Assistance and Sale Counter at Krishi Vigyan Kendra's CCS HAU, Hisar for promoting agribusiness

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ABSTRACT

Indian Council of Agricultural Research (ICAR), the supreme of agriculture in India, thought that there is a greater need to have coordination between researchers and technology/potential users. KVKs vital role in transfer of the scientific technologies to the farming community. Technology assessment and demonstration for its application, out scaling of farm innovations through On Farm Testing (OFTs), Front Line Demonstrations (FLDs) and Capacity building are the main mandate of the KVKs. The KVKs are also involved in income generating activities with the production of quality technological inputs and value-added products needed by farmers. Chaudhary Charan Singh Haryana Agricultural University, Hisar ATIC came into existence in Feb, 2002. ATIC has been established at Hisar with objectives to provide a single window delivery system for the products and species required by the potential users, to facilitate direct access to the institutional resources available in terms of advice, technology, products etc., for the farmers and to provide feedback from the users to the institute. Keeping in view the above mentioned points and importance of single window delivery system , Chaudhary Charan Singh Haryana Agricultural University, Hisar has been established twelve University Assistant and Sale Counter (UASC) at ICAR funded KVKs under Crop Reduce Management Project. The University Assistant and Sale Counter at the Krishi Vigyan Kendra (KVK) is a dedicated facility within the KVK premises that serves as a one-stop shop for farmers and stakeholders. Keeping in view, the above facts and importance of University Assistant and Sale Counter at the Krishi Vigyan Kendra CCS HAU, Hisar, Haryana the present study was conducted to know the awareness level,

satisfaction level of farmers towards services of UASC and to measure the constraints faced by of farmers towards UASC. More than half of respondents (65%) received information about UASC from KVK/University whereas 50% farmers were aware about day and opening time of UASC at KVK. The majority (88.75%) of the farmers visited UASC 'to purchase high yielding variety of seed'. The Constraints encountered by the farmers about UASC name 'lack of timely availability of seeds', 'non availability of all crop variety seeds', 'lack of transportation facility' and 'less availability of seeds'

Keywords: Sale Counter, KVK, information, Knowledge, respondents

Blockchain Technology: A Game Changer for Ensuring Food Safety and Quality in the Agribusiness Industry

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ABSTRACT

In recent years, concerns regarding food safety and quality have become increasingly prominent in the agribusiness industry. Foodborne adulteration, supply chain inefficiencies, and lack of transparency have raised consumer awareness and highlighted the need for innovative solutions. The blockchain technology has emerged as a game changer in ensuring food safety and quality throughout the agribusiness supply chain. Blockchain, as a decentralized and immutable ledger, provides a transparent and tamper-proof system for recording and verifying transactions. By implementing blockchain technology, agribusiness stakeholders can establish a secure and auditable record of every step in the supply chain, from farm to fork. One of the key benefits of blockchain technology in the agribusiness industry is its ability to enhance food safety. By enabling real-time monitoring and tracking, blockchain ensures that any quality or safety issues can be swiftly identified and addressed. Furthermore, blockchain technology enables increased transparency across the agribusiness supply chain. Consumers are increasingly demanding information about the origin, production methods, and certifications of the food they consume. Thus, it is found from this review that blockchain technology's transformative potential in ensuring food safety and quality in the agribusiness industry. By leveraging the transparency, traceability, and efficiency offered by blockchain, stakeholders can establish a robust and secure supply chain ecosystem.

Keywords: Blockchain, Agribusiness, Consumer and Supply Chain

Integrated nutrient management studies in cauliflower (*Brassica oleracea* var. *botrytis* L.)

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ABSTRACT

The investigation was carried out to study the effect of integrated nutrient management on growth, yield, quality and economics of cauliflower cv. PSBK-1. The best results for growth and quality parameters *viz.* days to marketable curd maturity (113.33), plant height (74.76 cm), stalk length (8.04 cm), number of leaves per plant (20.83), leaf length (48.75 cm) and dry matter content (10.98 %) were observed in plots fertilized with treatment T_8 (50% recommended dose of FYM + 50% recommended dose of sheep manure + 50% RDF of NPK + fortnight application of jeevamrit @ 5%) followed by treatment T_5 (Recommended dose of sheep manure (192q/ha) as basal dose at the time of field preparation + 75% RDF of NPK + jeevamrit @ 5% (fortnight Application). The yield and its components traits *viz.* curd depth (9.03 cm), curd diameter (13.19 cm), marketable curd weight (962.83 g), gross plant weight (2.18 kg) and yield per plot (9.18 kg) also registered maximum values in T_8 module. Best results for soil pH (6.88), electrical

conductivity (0.23 dSm^{-1}) and organic carbon content (17.03 g/kg) were also observed in module T_8. The highest gross income (4, 84790 Rs/ha), net income (3, 55,537.50 Rs/ha) and cost: benefit ratio (1: 2.75) was also recorded with the treatment T_8. No insect and disease incidence were noticed during the course of investigation. Hence, module T_8 (50% recommended dose of FYM + 50% recommended dose of sheep manure + 50% RDF of NPK + fortnight application of jeevamrit @ 5%) can be suggested as a cost-effective combination for getting higher yield on sustainable basis.

Keywords: Cauliflower; integrated; jeevamrit; organic; sustainable

Effect Of Integrated Nutrient Management On Seed Yield And Quality Of Brown Sarson (*Brassica campestris* var. brown sarson) Under Mid Hill Conditions Of Himachal Pradesh

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ABSTRACT

Agriculture's major challenge in the coming decades will be to sustainably meet the growing global food demand. Utilizing chemical fertilizers and developing new, high-yielding cultivars are typically used to accomplish this. Both elements are quite expensive, which raises the production's overall cost. Substituting chemical fertilizers with organic manure is becoming a promising technique for maintaining higher productivity and greater crop production stability. Therefore, a field experiment was conducted during Rabi 2018-19 at the experimental farm of Department of Seed Science and Technology, CSKHPKV, Palampur (H.P.) with the aim to study the effect of integrated nutrient management on seed yield and quality of brown sarson. The eleven treatments comprising of different combinations of FYM, vermicompost, 75%, 100% and 125% RDF were tested in Randomized Block Design, replicated four times. Higher growth, yield attributes, seed yield, straw yield, protein content, oil content,1000-seed weight were observed in treatment comprising of vermicompost @5t/ha + 125% RDF. The only use of organic manures produced noticeably lower seed yields and other growth and yield attributes. Application of vermicompost @ 5t/ha with 75% RDF proved as good as 75% RDF with FYM and vermicompost @ 5 and 2.5 t/ha respectively or FYM @ 10t/ha with 100% RDF.

Keywords: brown sarson, INM, RDF, quality, vermicompost, yield.

Factors Determining Labour Utilization in Agriculture in Different Agro-Climatic Regions of Rajasthan

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ABSTRACT

The present study was undertaken with a view to estimate the factors determining labour absorption in agriculture in different agro-climatic regions of Rajasthan as well as state as a whole. The study was based on primary data and secondary data. The primary data were collected from the 200 households of 10 villages during year of the 2018- 2019 and secondary data were used of published data from different reports and publications. The results showed that the farm size has a significant negative relationship with total labour absorption in all agro-

climatic regions as well as at the state level also except transitional plain region. The cropping intensity showed the positive association with the total labour absorption in arid western and northern region, transitional plain region, semi-arid and flood prone eastern plain and humid south and eastern plain region. The utilization of tractor hours per hectare was displayed a significant negative relationship with the total labour absorption in all the agro-climatic regions as well as at the state level also. Expenditure on animal feeds showed a significant positive association with the total human labour absorption in all the agro-climatic regions and as well as at the state level except semi-arid and flood prone eastern plain region. It was seen that the irrigation intensity showed a significantly positive relationship with the total labour absorption in arid western and northern region and humid south and eastern plain region.

Keywords: Labour absorption, agro-climatic regions, coefficient of determination, regression.

Incidence of brood diseases in different hive volumes of *Apis mellifera* colonies

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ABSTRACT

Present research study has been carried out at Dr. Y.S. Parmar University of Horticulture and Forestry Nauni, Solan, Himachal Pradesh, India from July 2020 to June 2021 to evaluate the effect of different hive volume with varied colony strengths on the occurrence of brood infections. Five treatments in this experiment were *viz*., Modified BIS type A hive (20 L), 5 frame hive (25 L), 6 frame hive (30 L), 8 frame hive (33 L) and Langstroth hive (42 L). Different volume hives with colonies of *A. mellifera* showed considerably different prevalence's of European foulbrood and sacbrood disease. The maximum average European foulbrood incidence was recorded in Langstroth hive (2.58%) followed by 6-frame hive (2.47%), 5-frame hive (1.46%), BIS Type A hive (1.25%) and significantly minimum incidence was found in 8-frame hive (0.84%). Similarly, the average sacbrood disease incidence was significantly maximum in Langstroth hive (1.08%) followed by 6-frame hive (0.80%), BIS Type A hive (0.48%) and 5-frame hive (0.42%), however no incidence was recorded in 8-frame hive. It revealed that hive volume affects the incidence of brood infection based on its bee strength. When compared to other bee hive volume for brood infection, *A. mellifera* colonies in 8-frame hives (33 L) had shown minimum incidence due to their higher colony strength.

Keywords: *Apis mellifera*, honey bee, sacbrood, European foul brood, brood diseases, Langstroth hive, bee disease

Effect of organic nutrient sources on NPK uptake by Brinjal (*Solanum melongena* L.)

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ABSTRACT

Organic manures play a vital role in boosting the soil health and uptake of nutrients from soil to plant. So study was carried out at Organic block of Vegetable Science, Dr Y S Parmar University

of Horticulture and Forestry, Nauni, Solan (HP) during Kharif season of 2019 to know the effect of organic nutrient sources on NPK uptake and soil nutrient status in brinjal. The treatments were T_1: Absolute control, T_2: FYM @ 10 t/ha, T_3: VC @ 5 t/ha, T_4: FYM @5 t/ha + VC@2.5 t/ha, T_5: Beejamrit (Seed treatment) + Jeevamrit (Drenchings + Foliar spray), T_6: FYM @10 tha + Beejamrit (Seed treatment) + Jeevamrit (Drenchings + Foliar spray), T_7: VC @5 tha + Beejamrit (Seed treatment) + Jeevamrit (Drenchings + Foliar spray), T_8: FYM @ 5t/ha + VC @2.5 tha + Beejamrit (Seed treatment) + Jeevamrit (Drenchings + Foliar spray). Among different organic nutrient sources, application of vermicompost (VC) along with beejamrit and jeevamrit (T_7) performed best for maximum NPK content in plant. Also available NPK content in soil was observed maximum in T_7. Hence, application of vermicompost @ 5t/ha along with beejamrit and jeevamrit for retention of soil fertility and better uptake of nutrients by plants to get better growth and yield can be recommended for commercial cultivation of brinjal.

Keywords: Vermicompost, Jeevamrit, Beejamrit, Brinjal, NPK, organic manure

Precision Phenotyping: A Novel Approach In Improved Vegetable Breeding

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ABSTRACT

Conventional phenotyping breeding approaches have made a significant contribution in developing many varieties in vegetable crops. Despite being commonly used, conventional phenotyping approaches have many inadequacies *viz*. longer time taken in developing a variety, low genetic gain, environmental factors and some other externalities that affect the phenotype-based selection. To address the challenges of conventional phenotyping, a novel method of high throughput phenotyping (HTP) is being considered. Crop HTP technology is a multidisciplinary and comprehensive approach that assimilates research in agronomy, information science, engineering sciences, and biology. The development of high-throughput phenotyping technology began in the preceding decade as advancements in sensors, computer vision, automation, and advanced machine learning technologies. HTP platforms are being utilized to undertake non-destructive assessments of the complete plant system in a range of vegetable crops. HTP provides precise measurements and allows collection of high-quality and accurate data which is necessary for standardizing phenotyping for genetic dissection and genomic assisted breeding methodologies such as genome-wide association studies (GWAS), linkage mapping, marker-assisted selection (MAS), genomic selection (GS) in vegetable crops. Apart from getting the phenotypic traits of the plant, these techniques are used to analyze different biotic and abiotic stress traits as well as the nutrient status of vegetable crops. This technology thus, has the ability to solve the breeder's equation for maximizing the genetic gain by increasing the intensity and precision of selection, improving the detection of genetic variations, and decreasing breeding cycles, thereby becoming a novel progression in breeding of major vegetable crops.

Keywords: Phenotyping, Genomic Selection, Vegetables, Breeding and Genetic gain

Statistical Methodology for Estimation of Post-Harvest Losses in Vegetables: A Comprehensive Approach

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ABSTRACT
Post-harvest losses in vegetables have a significant impact on food security and economic stability worldwide. Accurate estimation of these losses is crucial for effective resource allocation, policy planning, and intervention strategies. This study presents a comprehensive statistical methodology for estimating post-harvest losses in vegetables, combining data collection, analysis, and predictive modeling. The proposed methodology starts with the collection of primary data on harvested vegetable quantities from farmers, storage facilities, and marketplaces. Sampling techniques, such as stratified random sampling, are employed to ensure representative data collection. Quality assessment methods, including visual inspection, weight measurement, and sensor-based technologies, are utilized to determine the perishability and deterioration extent of the collected vegetables. Next, the collected data is subjected to rigorous statistical analysis to estimate post-harvest losses. Descriptive statistics provide an overview of the distribution and characteristics of the losses, while inferential statistics enable reliable inference about the population parameters. Regression analysis is employed to identify factors influencing the losses, such as storage conditions, transportation practices, and packaging techniques. Hypothesis testing is conducted to assess the significance of these factors. The proposed methodology accounts for both the systematic and random sources of variability in post-harvest losses. It provides a robust framework for estimating losses at various stages of the supply chain, from farm to consumer, and across different geographical regions. The results obtained from this methodology can aid policymakers, farmers, and stakeholders in identifying critical control points, implementing appropriate interventions, and optimizing resource allocation to minimize losses. In conclusion, the statistical methodology presented in this abstract offers a comprehensive and systematic approach to estimate post-harvest losses in vegetables. By combining data collection, analysis, and predictive modeling, it provides valuable insights into the magnitude and determinants of these losses. The application of this methodology has the potential to enhance food security, reduce waste, and promote sustainable agricultural practices on a global scale.
Keywords: Post-harvest losses, vegetables, statistical methodology, estimation, data collection, analysis, predictive modeling.

DUS Characterization of Walnut Seedling For Improved Pomological Traits.

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ABSTRACT
The study entitled “DUS Characterization of walnut seedling for improved pomological traits” was carried out at two districts Solan (S) and Sirmour (SS) in Himachal Pradesh. 90 genotypes were characterized for various pomological traits for two years (2017- 2018) out 90 seedling genotypes studied, six genotypes were better for pomlogical traits. Solan S-42 : Tree spreading,

trunk girth low/small (1.48 m), yield moderate 44.60 kg per plant fruits regularly, nut weight 14.44 g , kernel less shriveled, well filled. Shell thick 1.35 mm. SS-42: Tree semi erect, small/low trunk girth (1.48 m), yield 45.60 kg per tree, produced consistently, nut weight measured 14.66 g kernel moderately shriveled, well filled with 1.51 mm shell thickness. Solan S 24 Tree spreading trunk girth medium (2.14 m), yield low 35.58 kg per tree, regular yielder with nut weight of 15.68 g kernel shrivel moderate, moderately filled shell thickness of 1.34 mm. SS-8 : Tree semi erect , trunk girth medium (2.49 m), yield moderate 47.52 kg per plant regular bearer, nut weight 13.61 g, kernel less shriveled filled moderate, with shell thickness of 1.15 mm. Solan S-45 : Tree semi erect high/large trunk girth (3.29m), high yielding high yielding 60.55 kg per tree, fruited regularly, nut weight measured 15.02 g, showed shriveled kernel less than 50 percent low to moderate, shell thickness of 1.33 mm. Shape elliptic (UPOV, IPGRI descriptor). Weight of kernel 8.06 g, kernel dark amber colour , kernel percentage of 57.17 percent, easy removal of kernel. SS-45 : tree erect, large/high trunk girth (3.21 m), with high yield of 58.55 kg per tree. Produced nut consistently with nut weight of 15.59 g, less to moderate kernel shrivel, filled moderately, 1.37 mm shell thickness. Shape board elliptical in both above assessment. Kernel percentage of 54.37 per cent, kernel easily removal.

Keywords: Walnut Selection, Characterization, Nut traits, Genotypes

Optimizing Soil Fertility for Tomato Production: Strategies for Effective Nutrient Management

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ABSTRACT

Tomatoes are a widely grown vegetable crop that require proper soil fertility management to achieve optimal growth, yield, and fruit quality. Fertilizer and manurial practices are important considerations for tomato growers to improve soil nutrient availability and maintain soil health. Fertilizer application should be based on the results of soil tests to determine the nutrient requirements of the crop. Generally, tomato plants require a balanced supply of nitrogen (N), phosphorus (P), and potassium (K) in addition to secondary nutrients such as calcium, magnesium, and sulfur. Fertilizers can be applied through various methods, including broadcast, banding, or drip irrigation systems. Manure and compost can be used as a source of organic matter and nutrients for tomato plants. Composted animal manure can provide a slow-release supply of nitrogen, phosphorus, and potassium while also improving soil structure and water-holding capacity. However, care should be taken to avoid excessive application, which can lead to soil nutrient imbalances and environmental pollution. Other important practices for soil fertility management in tomato production include cover cropping, crop rotation, and soil pH management. Cover cropping can help maintain soil organic matter, improve soil structure, and suppress weeds. Crop rotation can help prevent soil-borne diseases and reduce pest pressures. Soil pH should be maintained between 6.0 to 6.5 for optimal nutrient availability. In summary, fertilizer and manurial practices are important considerations in tomato production. Proper management can help maintain soil health, improve plant growth and yield, and minimize environmental impacts.

Keywords: management nutrient, vegetable, tomatoes, yield

Identification of bud sports in apple (*Malus* x *domestica* Borkh.) for Solid coloured development

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ABSTRACT
The present investigation Identification of bud sports in apple (*Malus* x *domestica* Borkh.) for Solid coloured development was undertaken during 2016-18 to identify bud sports at Dr Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, Solan Himachal Pradesh (India). Field surveys of existing apple plantation in different orchards/sites located in districts Kullu in Himachal Pradesh were carried out during 2016-17. Based upon pre-selection criteria as solid coloured development screening of 2125 bearing apple trees was done. After screening of apple orchards, two bud sports 'Kullu' and 'Kullu 2' were identified as solid coloured fruit as against streaked coloured pattern of mother trees of cv. Starking Delicious in different orchards in districts Kullu, Himachal Pradesh. Apart from the distinguishing character for which the bud sports were identified, they also differed in fruit shape and size, fruit firmness, fruit maturity, TSS, acidity and starch content.
Keywords: Apple, Bud Sport, *Malus* x *domestica*, Solid coloured , Spur

Screening of pearl millet germplasms against Drechslera leaf spot disease under artificial inoculation conditions in Arid Western Plains of Rajasthan

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ABSTRACT
Present investigation revealed that, forty germplasms were evaluated against *D. setariae* under artificial inoculation conditions during *Kharif* 2019 and *kharif* 2020. None of the germplasms were found immune (I), highly resistant (HR), resistant (R) and none germplasms were also reported as susceptible (S) and highly susceptible (HS) against *D. setariae* on pearl millet germplasms. Seven germplasms Local germplasm-1, Local germplasm-2, Local germplasm-4, Sardar Sahar-646, Sardar Sahar-656, Sardar Sahar-658 and Sardar Sahar-685 were observed as moderately resistant (MR). Six germplasms Local germplasm-3, Local germplasm-15, Sardar Sahar-651, Sardar Sahar-662, Sardar Sahar-664, Sardar Sahar-677 were assessed as low resistant (LR). Twelve germplasms Local germplasm-5, Local germplasm-7, Local germplasm-8, Local germplasm-16, Sardar Sahar-640, Sardar Sahar-645, Sardar Sahar-647, Sardar Sahar-654, Sardar Sahar-660, Sardar Sahar-674, Sardar Sahar-680, Sardar Sahar-714 were recorded as mesothetic (M). Six germplasms Local germplasms-6, Local germplasms-18, Sardar Sahar-636, Sardar Sahar-639, Sardar Sahar-649, Sardar Sahar-666 were observed as low susceptible (LS). Nine germplasms Local germplasms-9, Local germplasms-11, Local germplasms-19, Local germplasms-20, Sardar Sahar-642, Sardar Sahar-643, Sardar Sahar-648, Sardar Sahar-650, Sardar Sahar-713 were assessed as moderately susceptible (MS) disease reaction.
Keywords: Disease reaction, evaluation, foliar disease, germplasm, Millet.

BIOCHEMICAL PROFILING OF JAMUN (*Syzygium cuminii* Skeels.) GENOTYPES IN KARNATAKA

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ABSTRACT
Jamun (*Syzygium cuminii* Skeels.) is an underutilized fruit crop with array of medicinal properties and distributed throughout India. Fourteen genotypes were characterized for bio-chemical attributes of jamun genotypes during 2017-2020 at Department of Postharvest Technology, College of Horticulture, Bengaluru. Different jamun genotypes recorded variation in fruit characters. It was evaluated to find the variation between fruit and seed for bio-chemical parameters in all the genotypes recorded for the study. The fruit biochemical parameters revealed that total soluble solids of 15.93º B, ascorbic acid of 37.16 mg $100g^{-1}$, total phenolic content of 700.30 mg GAE $100g^{-1}$ and antioxidant inhibition of 54.33 per cent was observed in GKVK-1. Higher anthocyanin content of 75.68 mg $100g^{-1}$ was found in K-45. The biochemical parameters of seeds revealed ascorbic acid and total antioxidant capacity of 3.44 mg $100g^{-1}$ and 71.76 per cent in GKVK-1, total phenolic content of 903.74 mg GAE $100g^{-1}$ in Sl. No. 58.
Keywords: Jamun, bio-chemical parameters, total soluble solids, anthocyanins, antioxidant capacity, total phenolic content

Soil Resource Inventory for Evaluation of Soil Fertility Constraints in Duglapura Mini-watershed of Tarikere Taluk, Chikkamagaluru District, Karnataka

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ABSTRACT
An investigation was carried out to evaluate soil resource characterization, classification and productivity assessment of Duglapura mini-watershed of Tarikere taluk, Chikkamagaluru District of Karnataka during the year 2020-22 at college of agriculture, Shivamogga. Based on topography and physiological units during field survey thirteen soil profiles were identified. The soils pedons were studied for its morphological, physical and chemical properties and were classified up to the family level. Totally 88 surface soil samples at 0-20 cm depth were collected from the fixed grid points (320 × 320 m).
The texture of Duglapura mini-watershed varied from sandy clay to clay. The soils were classified under the order of *Alfisols* and *Inceptisols*. Based on the soil capability criteria, the mapping units belonged to land capability class III and class IV. Based on the soil-site suitability criteria, land suitability for crops like sorghum, maize, ragi, field bean, soybean, ground nut, chilli, tomato, mango, sapota, guava and pomegranates are marginally to highly suitable.
The soils of study area varied from slightly acidic to slightly alkaline in soil reaction. The soils showed low to high in organic carbon status, low in available nitrogen, low to medium in available phosphorus and medium to high in available sulphur status, whereas available potassium status found medium to high. Whereas DTPA extractable iron, copper and manganese were sufficient, whereas DTPA extractable zinc was deficient in 49.06 ha area.

Comparative Analysis of Energy Budgeting and Yield of Rice Crop under Various Crop Establishment Methods in Rice-Wheat Cropping System

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ABSTRACT

A field experiment was performed during the kharif season of 2021-22 at Research Farm of Bihar Agricultural University, Sabour (Bihar) to assess the energy budgeting and economic yield of rice crop under various crop establishment methods in rice-wheat cropping system. The experiment was laid out in randomize block design (RBD) with 5 different crop establishment methods i.e. dry DSR, vattar DSR, puddled transplanted rice (PTR), farmers' practice (FP) and ZT DSR. Vattar DSR based cropping system produced maximum grain yield (4613 kg ha^{-1}) of rice and noticed 22.4, 4.7, 1.8 and 0.6% higher grain yield over FP, dry DSR, ZT DSR and PTR, respectively. But FP showed significantly lower grain yield i.e. 3791 kg ha^{-1} as compare to vattar DSR, where 30 days old seedlings were transplanted that increased seedling mortality rate and reduce vigorousity in main field. Though, it was reversed in case of energy budgeting assessment where highest energy consumption was obtained in PTR (11953 MJ ha^{-1}) and FP (11953 MJ ha^{-1}) due to more traffic and lowest in ZT DSR (9206 MJ ha^{-1}). The maximum energy use efficiency (14.5) was noted in complete conservation treatment (ZT DSR-ZT wheat-ZT green gram) and significantly superior over remaining treatments.

Keywords: Rice, Energy budgeting, ZT DSR, conservation

Food Safety from Farm to Fork: Strengthening Global Food Systems for a Healthier Future

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ABSTRACT

The farm-to-fork journey includes all the stages agricultural commodities goes through, from cultivation to consumption. There has been an increase in demand and manufacture of processed food products in the Indian market. The Food Business Operators (FBOs) have a shared responsibility as they have to struggle hard for consumers satisfaction at low cost and also provide safe food. Food safety forms part of a global "one health" approach, at the interface of animal, plant and human health. To protect consumers from the risks of food contamination and prevent potential outbreaks, it is essential to take action at all stages of the food chain, "from farm to fork". To ensure food safety during processing, Good Manufacturing Practices (GMPs) have been defined. These are referred to as practices and procedures performed by a food processor, which can ensure the safety of food product. GMPs refer to the people, equipment, process, and the environment in the production process. The main components of GMPs in a plant are hygiene, training of staff, design of plant, its maintenance and sanitation, control of

operations, product information, and consumer awareness. Good record keeping practices in the plant and a GMP system verification can ensure food safety during food processing.

Green nanotechnology: new way for management of stored grain pests

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ABSTRACT
Most of the stored grain insects are cosmopolitan and serious pest in field as well as in storage condition. The larvae and adults feed on whole and broken grains of cereal, pulses, oilseeds, dried fruits, nuts, and spices by constructing the silken webs. The excessive use of pesticides and chemical compounds led to development of resistance, resurgence and has an adverse effect on environment. In the recent years, nanotechnology has emerged as a promising tool for pest control. The green nanoparticles of zinc, copper, silver and silica were biosynthesized from Spinach leaves; tulasi leaves, curry leaves and paddy husk respectively, and these nanoparticles were characterized by Zetasizer, UV-Vis spectroscopy, X-ray diffraction (XRD), and Scanning electron microscope (SEM). The biophysical characterization revealed that the shape of these nanoparticles varied from Spherical to agglomerated spindle-shaped with a mean particle size of 23.65 to 87.94 d. nm. The entomotoxic effect of these green nanoparticles were used as stored product insect protectants compared to malathion as a standard reference. Among the different concentrations (250, 500, 750, 1000, 1250, and 1500 ppm) of these nanoparticles indicated that the increasing concentration and exposure period caused increasing in mortality. Out of these concentrations, 1500 ppm proved to be superior. Similarly, of the different nanoparticles, silica nanoparticles were statistically significant followed by silver, zinc and copper nanoparticles.
Keywords: Storage pests, Charecterizaton, Nanoparticles; Mortality;

Say No to Single Use Plastic" at MAHSA University, Malaysia.

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ABSTRACT
Environmental, Social, and Governance (ESG) criteria have gained increasing prominence in recent years as investors and stakeholders look beyond financial results to evaluate a company's overall performance. ESG factors include a company's impact on the environment, social responsibility, and corporate governance practices. Prioritizing ESG factors can lead to more sustainable and positive outcomes for stakeholders such as employees, customers, and communities. In this context, MAHSA University in Malaysia has taken a proactive approach to improve its ESG performance and align with the country's Sustainable Development Goals (SDGs).
One of the key initiatives undertaken by MAHSA University is the Plastic-Free Campuses project, aimed at measurably reducing plastic waste and pollution on campus. The project has several objectives, including developing a plastic-free campus, educating students about the hazards of plastics, and promoting responsible waste management practices. The university

implemented a phase-wise ban on single-use plastics, starting from April 2022, for any event, meeting, conference, seminar, workshop, performance, speech, or gathering that takes place on campus. The ban applies to items such as plastic bags, straws, cups, containers, lids, cutlery, stirrers, plates, bottles, and banners. The university replaced these single-use plastics with environmentally responsible alternatives that are compostable or biodegradable, made solely of organic substances, or capable of being decomposed by bacteria or other living organisms.

There are compelling reasons to go plastic-free, including the fact that single-use disposable plastics have a massive carbon footprint, emit massive amounts of dioxins during production and disposal, and last forever. Additionally, plastics are hazardous to both terrestrial and marine life and are linked to increased cancer rates and other human health effects.

By implementing the Plastic-Free Campuses project, MAHSA University is taking an important step towards creating a more sustainable future. The university's commitment to sustainability extends beyond this project, as it focuses on implementing sustainable practices in areas such as water and energy management, promoting innovation and sustainable practices in its curriculum and research, and adopting sustainable procurement and waste management practices. Through these initiatives, MAHSA University can contribute to achieving Malaysia's SDGs and promoting sustainable development in the country.

Validation of Linked STMS and SSR Markers for Fusarium Wilt in Chickpea PKV Kabuli - 4

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ABSTRACT

The marker assisted backcrossing program was initiated with the cross between PKV 4 (Moderately susceptible, recurrent parent, P1) and WR-315 (Resistant, donor parent, P2) to develop Fusarium wilt resistance population to *foc*-1 during crop season September 2018-19. Total 67 different molecular markers were used for the parental polymorphism survey and seven markers found polymorphic. From the hybridization program 75 F_0 seeds were obtained Among 75 F1s plants, 45 hybrids were confirmed through using two polymorphic markers (TA 194, and TR 19). Sixty F_2 individuals from a single cross were used simultaneously for genotyping by six polymorphic markers and phenotyping in the artificial greenhouse sick pot conditions. Using morphological and molecular data linkage map was constructed and one major QTL "qfwch-02" were identified. Which covered a total map length of 93.60 cM, the average map distance between any pair of markers was 16.1 cM and major QTL "qfwCh-02" was identified on linkage group 2 for Fusarium wilt resistance against race-1 at map position 31.4 cM. This QTL explained 10.91 % phenotypic variance with LOD score 3.3 flanked by left marker TA 110 and right marker TR 19.

Developed genomic linkage map and QTLs identified will be useful for chickpea genetics and breeding applications. Moreover, linked markers found with identified QTLs for FW race-1 will be useful for molecular breeding for Fusarium wilt chickpea improvement.

Keywords- PKV-4, sick pot, linkage map, TR-19, TA-110

Molecular characterization of diverse rice (Oryza sativa) genotypes for glycemic index

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ABSTRACT
The Glycemic Index (GI) of food is a measure of the rate at which glucose is released after consuming a specific amount and is important in diabetes management. The GI and digestibility of rice starch depends upon its amylose content and structure. Considering the availability of diverse rice genotypes and their genetic variability, sixteen different rice genotypes/lines which includes six inbreed lines and four improved varieties developed by ICAR-Indian Institute of Rice Research Hyderabad and six genotypes from local market were screened for biochemical quality trait viz., amylose, carbohydrate, resistant starch along with glycemic index. The amylose content observed over the varieties ranged 10.12 % to 62.58 %. Carbohydrate content ranged from 83.08 % to 86.33 % with the mean of 84.87 and resistant starch content varied from 1.75% to 5.34 % with the mean of 3.52. Glycemic index of selected rice varied from 52.40 to 137.06 with general mean of 83.33. In our study significant variation was observed among all varieties except carbohydrates. Among all the varieties, CSR23 has significantly higher GI (137.06) and rice inbreed lines serially numbered as 84, 87, 97, 6-5 and 128 have shown significantly lower GI. Glucose uptake capacity by yeast cells was evaluated in presence of all rice genotypes/lines extract and it was observed that all the varieties except Jaya, Komal and 97 shows increase in % uptake at lower concentration (5mm) of glucose and gradual decrease at higher concentration (15mm). Allelic variations of marker RM190 for the waxy gene have also shown variations for tested rice genotypes/lines. Rice varieties such as inbreed lines 84, 87, 97, 6-5 and 128 which have lower GI are better for diabetes management.

Varietal screening of different cultivars of mustard against aphid (*Lipaphis erysimi* kalt.)

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ABSTRACT
The field experiment was carried out at experimental farm of Sam Higginbottom University of Agriculture & Technology, Allahabad during *Rabi* season of 2021-22 to know the screening of mustard genotypes against mustard aphid (*Lipaphis erysimi* kalt.). The screening of 17 mustard genotypes against mustard aphid revealed that none was free from infestation of *L. erysimi.* Although, a significant variation in aphid population was noticed among the genotypes. Significantly lowest mean infestation was registered on genotype Akash gold -555 (9.54 aphid /10 cm apical twig) followed by Bayer pro agro-522 (11.94), Pukhraj (12.13), Rani- 657(12.14) and Royal star (12.33). Significantly highest mean population was observed on T-9 (47.01 aphid/10 cm apical twig).
Keywords: Screening, cultivars, mustard aphid (*Lipaphis erysimi* kalt.).

Change Detection In Land Use Land Cover Of Chincholi Taluk Using Remote Sensing And Gis

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INTRODUCTION

Land Use Land Cover (LULC) Change Detection is an important process for analyzing and monitoring the changes in land use and land cover over a period of time. The process involves the use of Remote Sensing and GIS techniques to acquire, process, and analyze satellite imagery to create LULC maps for different periods. These maps are then compared to detect any changes that have occurred. LULC Change Detection is a valuable tool for studying the impact of human activities on the environment and for managing natural resources. It is widely used in various fields, including agriculture, forestry, urban planning, and environmental management. Remote Sensing and GIS are the key technologies used in LULC Change Detection. Remote Sensing involves the use of satellite imagery to collect data about the Earth's surface, while GIS is used to manage and analyze this data. These technologies have revolutionized the way we study and manage our environment, providing accurate and timely information for decision-making processes. In this process, the accuracy of the results is crucial, and it is important to use appropriate techniques and methods for data acquisition, image processing, and analysis. The accuracy of the results can be validated through fieldwork, ground truth data collection, and accuracy assessment. Overall, LULC Change Detection using Remote Sensing and GIS is an important tool for studying and monitoring land use changes, managing natural resources, and supporting decision-making processes in various field.

OBJECTIVE:

To generate and compare the satellite image of Chincholi Taluk for a decade from 2009-2019

METHODOLOGY

The materials and methodology used in a study on LULC change detection using Remote Sensing and GIS techniques typically include the following steps:

Data Acquisition: The study requires obtaining satellite imagery LISS 3 for the study area and time period of interest.

Data Pre-processing: The raw satellite data is processed to remove errors, noise, and cloud cover. This involves atmospheric correction, radiometric calibration, and image enhancement.

Image Registration: The processed images are registered or aligned spatially to ensure that they are aligned to the same geographic location.

Image Classification: The study uses supervised or unsupervised classification algorithms to classify the satellite images into different LULC classes. These classes can include forest, agriculture, water bodies, bare soil, urban areas, and mining areas.

Accuracy Assessment: The accuracy of the LULC classification is assessed using ground truth data, such as field surveys, aerial photography, or other reliable sources. Change Detection Analysis: The LULC maps for different time periods are compared to identify and quantify changes that have occurred in the study area. This includes identifying areas where there has been a change in land use or land cover, and the magnitude of these changes. Data Analysis: The study analyzes the data to identify the drivers of change, such as human activities, natural factors, or a combination of both. Results and Discussion: The study presents the results and discusses the implications of the findings for land use planning and management.

RESULT:
According to the analysis of the 2009 Liss3 image, Chincholi taluk had a total land area of approximately 1525.02 square kilometers, with various land use categories.The largest land use category in Chincholi taluk was agriculture land, covering 1192 square kilometers (77.15 %). This suggests that agriculture was a major activity in the taluk at that time, and was likely a significant source of livelihood for its residents.

Forests covered 158 square kilometers (10.23 %) of the taluk, indicating the presence of a significant amount of natural vegetation in the area. This is important for biodiversity conservation and as a source of resources for the local community.Water bodies, which included rivers, lakes, and other bodies of water, covered 17.7 square kilometers (1.15%) of the taluk.
These were important for irrigation, drinking water, and other uses.Barren land covered 155.06 square kilometers (10.04%)), indicating a significant amount of unproductive land in the taluk. This land may have been unsuitable for agriculture or other uses due to factors such as poor soil quality, topography, or other environmental conditions.Built-up land covered only 2.26 square kilometers (1.44%), suggesting that urbanization and industrialization had not had a major impact on the landscape of Chincholi taluk at that time.

CONCLUSION

A change detection analysis was conducted by comparing the LULC maps generated from the 2009 and 2019 Liss3 satellite images of Chincholi taluk. The aim of the analysis was to identify and quantify changes in the land use patterns in the taluk over the past decade.
The change detection map generated as a result of the analysis provides a visual representation of the changes that have occurred in the land use patterns of Chincholi taluk over the past decade. The map shows the areas where land use changes have occurred, and can be used to identify the drivers of these changes.
This change in LULC can be attributed to various factors such as urbanization, population growth, agricultural practices, and climate change. The increase in built-up land may be due to urbanization and population growth, while the decrease in barren land may be due to afforestation efforts or land reclamation projects. The decrease in water bodies may be due to natural factors such as drought or human factors such as overuse or pollution.

Medicinal Potency and uses of Winter cherry (*Withanis somnifera*) for Human Health

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ABSTRACT

Indian ginseng, poison gooseberry, or winter cherry or Ashwagandha (*Withanis somnifera*) is commonly used herb in ayurveda and unani as a rasayana (Tonic). The roots are widely used for medicine for more than 4000 years. In addition to the traditional drugs made from this plant. Health drinks, herbal tea, functional foods, nutraceuticals and cosmeceuticals are some of the value added products on which enterprises can be set up. Recent researchers have found the medicinal use of aswaghadha in memory enhancing, improving male semen count,

neurodegenerative disease, Alzeimer's diseases, anti stress and anti tumor and anti arthritic, skin disease. Being hardy and drought tolerant species with its enormous bio compounds, its usage is forever regarded and continuous to enjoy the monopoly in many parts of India like Madhya Pradesh, Rajasthan, Gujarat, Punjab, Uttar Pradesh, Haryana. The high demand of roots and leaves in medicinal use promote marginal farmers to grow ashwagandha on large scale. Value addition Value added products from Ashwagandha include root powder, capsules, root extract, herbal beer *etc.* In addition to the traditional drugs made from this plant. Health drinks, herbal tea, functional foods, nutraceuticals and cosmeceuticals are some of the value added products on which enterprises can be set up.

Keywords*:* Winter cherry, value addition, medicinal and Uses

Biochemical profiling of jamun (*syzygium cuminii* skeels.) Genotypes in karnataka

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ABSTRACT

Jamun (*Syzygium cuminii* Skeels.) is an underutilized fruit crop with array of medicinal properties and distributed throughout India. Fourteen genotypes were characterized for bio-chemical attributes of jamun genotypes during 2017-2020 at Department of Postharvest Technology, College of Horticulture, Bengaluru. Different jamun genotypes recorded variation in fruit characters. It was evaluated to find the variation between fruit and seed for bio-chemical parameters in all the genotypes recorded for the study. The fruit biochemical parameters revealed that total soluble solids of 15.93º B, ascorbic acid of 37.16 mg $100g^{-1}$, total phenolic content of 700.30 mg GAE $100g^{-1}$ and antioxidant inhibition of 54.33 per cent was observed in GKVK-1. Higher anthocyanin content of 75.68 mg $100g^{-1}$ was found in K-45. The biochemical parameters of seeds revealed ascorbic acid and total antioxidant capacity of 3.44 mg $100g^{-1}$ and 71.76 per cent in GKVK-1, total phenolic content of 903.74 mg GAE $100g^{-1}$ in Sl. No. 58.

Keywords: Jamun, bio-chemical parameters, total soluble solids, anthocyanins, antioxidant capacity, total phenolic content

Utility of microbial nanotechnology for the effective and sustainable water treatment

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ABSTRACT

Nanoparticles (NPs) have evoked a great interest among the researchers because of their characteristics like, large surface area, the multiple applications, stability, easy and effective manipulations, enhanced interaction, etc. The utilization of microorganisms with nanotechnology has offered a greener approach for the management of wastewater treatment. The hazards associated with chemically synthesized nanoparticles can be reduced by the application of microorganisms. The biogenesis of the NPs *via* microbes is an eco-friendly, sustainable, and highly efficient technology. NPs carries significant sorption and catalytic

property and minimize the cost for upscale treatment of water bodies. Water bodies are contaminated by various sources and natural remediation is one of a key role of consortium of microbial cells, by metabolizing the highly toxic pollutants into the less toxic form. Thus, research based on microbes having the ability of bioremediation and bioconversion is needed. Furthermore, application of microbes for the green synthesis of nanoparticles along with fungal, and bacterial enzymes could be a potential strategy. Microbial extracts and enzymes act as reductive agents for the metal complex salt and produce metallic nanoparticles. Such nanoparticles offer superior solubility in an aqueous medium due to the co-precipitation of bioactive elements on the nanoparticles. Overall, green NPs are a great alternative to the existing ways of NPs synthesis and thereby for the water treatment.

Keywords: Biogenesis; Green synthesis; Nanoparticles; Remediation.

Remote sensing application in climate smart agriculture

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ABSTRACT

Remote sensing technology has revolutionized the way we approach agriculture, providing us with unprecedented insights into our crops, soil and other resources. Remote sensing technology helps us to monitor crop growth and health, evaluate soil moisture and nutrient levels, and spot possible stress regions by utilizing satellite and aircraft pictures. This knowledge is essential for creating and putting into practice efficient management methods that maximize crop output while minimizing environmental damage. Precision agriculture is one of the main uses of remote sensing in farming. High-resolution photography is used in precision agriculture to obtain information on the type of soil, crop production, fertilizer uptake, and other factors. This information is then used to develop site-specific management plans that target the specific needs of each crop, leading to more efficient and effective use of resources and an overall improvement in crop yield. Another important application of remote sensing in agriculture is drought monitoring. With the increasing frequency and intensity of droughts worldwide, accurate and timely information on soil moisture levels is crucial for effective drought response and management. Remote sensing technology provides this information in near real-time, allowing farmers to make informed decisions about irrigation and other water management practices. Additionally, remote sensing technology has proven to be an invaluable tool in disaster response and recovery efforts in agriculture. In the aftermath of natural disasters such as hurricanes and earthquakes, remote sensing can be used to quickly assess the extent of the damage to crops and infrastructure. This information is then used to prioritize recovery efforts, reducing the time required for the agricultural sector to return to normal operation. In conclusion, remote sensing has become an indispensable tool in modern agriculture. Its ability to provide real-time, accurate data on crops, soil and other natural resources has the potential to transform the industry, leading to more sustainable and profitable agriculture practices. As technology continues to advance, the applications of remote sensing in agriculture are likely to become even more sophisticated, providing farmers with the information and tools they need to ensure the long-term success of their operations.

Keywords: Remote sensing, Precision agriculture and modern agriculture.

Role of Cover crops on physio-chemical properties of soil

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ABSTRACT

Sustainability in agriculture is one of the major concerns of humanity as of today. The current global scenario firmly emphasizes the need to adopt eco-friendly agricultural practices for sustainable food production. A cover crop is a crop of a specific plant that is grown primarily for the benefit of the soil rather than the crop yield. They also offer a natural way to reduce soil compaction, manage soil moisture, reduce overall energy use, and provide additional forage for livestock. Cover crops are commonly used to suppress weeds, manage soil erosion, help build and improve soil fertility and quality. Besides having all these multiple benefits in the economic lives of the farming communities, the use of cover crops in actual field throughout the country is very less. Cover crops has the capability to reduce the bulk density of the soil by increasing the Carbon content of the soil as well as increasing the water holding capacity and porosity of the soil. Additionally, it also helps in soil aggregation and infiltration thus reducing the runoff loss of water and nutrients. Cover crops are also efficient in making the nutrients available to the plants which are not readily available say, phosphorous. Thus, growing cover crop forms an important component for sustainability of agro-ecosystem and maintaining soil health and quality.

Keywords- Cover crops, Eco-friendly, Soil aggregation, Soil health and Sustainability

Effect of Hot Air Puffing on Proximate Composition of Sorghum

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ABSTRACT

Hot air puffing, a widely used food processing technique, enhances sensory characteristics while preserving nutritional value. This study examines the impact of hot air puffing on sorghum's proximate composition. Sorghum grains were subjected to hot air puffing using various temperature and time combinations. Proximate composition analysis was conducted on raw and puffed sorghum samples, evaluating moisture content, crude protein, crude fat, and ash content. The study revealed significant changes: decreased moisture content, unchanged crude protein and crude fat, decreased, and a slight increase in ash content. These findings contribute to understanding the nutritional alterations during hot air puffing and its implications for incorporating puffed sorghum in food products. Further research is recommended to explore additional nutritional components and sensory attributes.

Keywords: hot air puffing, sorghum, proximate composition, moisture content, crude protein

Biotic and Abiotic Stress in Vegetable Crops Under Changing Climate and Their Management

Tazeem Fatma Jafri, Khursheed Hussain, Harshavardhan T., Sonika Jaryal

ABSTRACT

Climate change is a widely accepted fact. Food security for the 21st century will be the main challenge for humankind in the years to come, given the declining production efficiency of agro-ecosystems due to the depletion of natural resource bases, serious effects of climate change on diversity and abundance of insect-pests, and the extent of crop losses. India has more challenges from the effects of impending climate change because it is a tropical nation. Pest damage varies in India's many agro-climatic areas due mostly to the diverse effects of abiotic elements including temperature, humidity, and rainfall. This comprises the exacerbation of yield losses as a result of probable changes in crop diversity and an uptick in insect pests as a result of climate change. Climate change also makes such losses more prevalent, which exacerbates the negative effects of multiple stresses. Abiotic stresses, which include low or high temperatures, water shortages or surpluses, high salinity, heavy metals, and UV radiation, are harmful to plant growth and development and have a significant negative impact on agricultural yields globally. Biotic stress, also known as decay, is brought on by infectious diseases that manifest in harvested fruit and are typically brought on by bacteria, fungi, or yeasts. To combat these biotic and abiotic stresses, plants have evolved a number of defence mechanisms. They detect the environmental stress, become activated, and then produce the necessary biological reactions. They accomplish this by sending inputs through several signal transduction pathways from sensors on the cell surface or in the cytoplasm to the transcriptional machinery in the nucleus. The plant becomes more resilient to the stress as a result of differential transcriptional modifications. Signalling pathways serve as a crucial link between detecting the stress environment and producing the proper biochemical and physiological response.

Keywords: Climate change, Biotic Factor, Abiotic Factor, Agricultural Yield, Biochemical Response Physiological Response.

Nutritional status of Radish

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ABSTRACT

Raphanus sativus (radish) have been used to treat several diseases; therefore, radish has attracted increasing scientific attention due to its nutritional and phytochemical composition. Scope and ap proach The available evidence on the nutrient and bioactive composition of radish was systemati cally assessed. Four databases (PubMed, Embase, Web of Science, and Cochrane trials) were sea rched, up to September 26th, 2020, for key articles assessing
the chemical composition of radish. Two independent reviewers carried out screening, selection of articles, and data extraction. Key findings and conclusions Of 1214 references, 63 met our incl usion criteria. We found 609 chemical compounds within 23 categories. Red (30% of all studied varieties), white (13%), and black (6%) radish were the most studied varieties. Nutrients and phy tochemicals were reported mainly in roots and leaves. The largest categories were flavonoids (38 .8% of the reported data), non-
flavonoid polyphenols (8.4%), terpenes and derivatives (8.2%), fat and fatty related compounds (

6.4%), and glucosinolates and breakdown products (5.6%). Leaves have high concentrations of macronutrients, calcium, potassium, sodium, fiber, fatty acids, and nonflavonoid polyphenols wh ile sprouts are a major source of flavonoids, specifically anthocyanins, β-carotene and vitamin C.

IMPACT OF CLIMATE CHANGE ON POLLINATORS

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ABSTRACT
Climate change is a pressing global issue with far-reaching ecological consequences, including its impact on pollinators. Pollinators play a vital role in maintaining ecosystem functioning and biodiversity, as they facilitate the transfer of pollen between flowering plants, enabling their reproduction. However, the warming climate, altered precipitation patterns, and other associated changes pose significant challenges for pollinators. This abstract presents an overview of the impacts of climate change on pollinators, highlighting the potential consequences for their populations, behavior, and interactions with plants.

Climate change affects pollinators through various direct and indirect pathways. Rising temperatures and altered weather patterns can disrupt the phenology of both plants and pollinators, leading to a mismatch in their timing and reduced reproductive success. Changes in precipitation patterns may affect floral resource availability, impacting the foraging behavior and nutritional quality of nectar and pollen. Additionally, extreme weather events such as droughts, floods, and storms can cause habitat destruction and fragmentation, leading to loss of nesting sites and food sources for pollinators.

The impacts of climate change on pollinators are not uniform and vary across species and regions. For instance, studies have shown that some pollinator species, such as bumblebees, are more vulnerable to climate change due to their limited thermal tolerance and dependence on specific flowering plants. Furthermore, high-elevation and tropical pollinators face significant threats as their suitable habitats shift or contract due to rising temperatures.

Climate change also interacts with other stressors, exacerbating the challenges faced by pollinators. Pesticides, habitat loss, invasive species, and diseases pose additional threats to their survival and health. Combined with climate change, these stressors can create complex and cumulative impacts on pollinator populations.

To mitigate the negative effects of climate change on pollinators, several strategies can be implemented. These include reducing greenhouse gas emissions, enhancing habitat connectivity and restoration, promoting the use of native plants, and adopting sustainable agricultural practices. Additionally, more research is needed to understand the specific vulnerabilities of different pollinator species and develop targeted conservation efforts.

In conclusion, climate change poses significant challenges for pollinators, with potential consequences for ecosystem stability and food security. Urgent action is required to mitigate these impacts and ensure the long-term survival of pollinator populations. Through a combination of scientific research, policy interventions, and public awareness, we can strive towards a sustainable future that supports both pollinators and the ecosystems they inhabit.

Impact of Climate Change on Plant Diseases and their Management

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ABSTRACT

Climate change, characterised by increasing temperatures, changing precipitation patterns, and extreme weather events, has become a major worldwide issue with far-reaching effects. Extensive study has been done on its effects on a variety of ecological systems, including plant health. This abstract analyses potential management options for plant diseases and gives a general overview of how climate change affects plant diseases. Multiple mechanisms contribute to how climate change affects the dynamics of plant diseases. Longer growing seasons, increased humidity levels, and rising temperatures all contribute to the multiplication and spread of several plant diseases. Furthermore, the delicate balance between host plants and their diseases is upset by shifting rainfall patterns and a rise in the frequency of extreme weather events like droughts and floods. These modifications may speed up the onset of diseases, disrupt their cycles, and encourage the spread of new illnesses to previously unaffected areas. Climate change's effects on plant diseases extend beyond agricultural production to natural ecosystems and forests as well. Forest infections are inflicting more and more serious harm, which is causing a loss in tree species and the instability of the forest ecosystem. Plant diseases are becoming more common and severe, which threatens ecological stability, biodiversity, and food security worldwide. In order to mitigate the detrimental effects of climate change on plant health and ensure sustainable food production in the face of changing climatic circumstances, proactive measures, such as integrated disease management strategies, early detection systems, and research collaborations, are crucial.

Keywords: Climate change, plant diseases, Host plants, Disease cycle, Integrated disease management

Agricultural Extension a boon for managing biotic and abiotic stress in rainfed areas

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INTRODUCTION

Various technologies are developed and recommended for management of biotic and abiotic stress in rainfed areas. Timely and proper adoption of these technologies needs to be accelerated for harvesting positive impacts on farmers field in terms of economics. Among various crop production factors management of insect pests and plant diseases are the crucial factors determining the crop yields on farmers field. The impact of climate change and weather variabilities, created enormous difficulties at farmers level to harvest crop yields with its full potential, mainly in agronomical crops of the region like soybean, redgram, gram while to some extend horticultural crops like papaya, banana and chilli. Dryspell of more than 15 days and heavy rainfall coupled with high humidity and low solar radiation increased the infestation of stem borer in soybean, fusarium and phytopthora wilt in redgram . Soybean followed by gram is the major cropping system of the region which created the problem of wilting in gram. Undernutrion of micronutrients and low organic carbon content of the soil created unhealthy and virus infected growth of papaya, banana, and chilli. Extension functionaries needs to be work

efficiently to disseminate recommended technologies effectively , timely and in simplest way at farmers level Hence it necessitate to quantify the role Extension agronomist of the RAEEC and subject matter specialist for strengthening the agricultural extension work un rainfed areas.

METHODOLOGY:

The major crops of the Marathwada region of Maharashtra are soybean, redgram, cotton, gram while to some extend horticultural crops like papaya, banana, tomato and chilli ect. For harvesting good yield with low cost of production, various technologies viz., nutrient management , weed management, pest management water management, mechanization have been recommended by the Vasantrao Naik Marathwada Agricultural Unuversity, Parbhani, other SAUs and ICAR centres at regional and national level. These technologies must have to reach at farmers level in right time and by right way. In this regards, agricultural extension services are run by the Vasantrao Naik Marathwada Agricultural University, Parbhani, other SAUs with the formation of Regional Agricultural Extension Education Centres (RAEEC) and KVks. Regional Agricultural Extension Education Centres (RAEEC) under Directorate of Extension Education, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani are established at Ambajogai, Latur, Aurangabad and Parbhani to disseminate the agricultural technology among the farmers of Marathwada region comprising eight district. RAEEC Ambajogai is working for Beed and Osmanabad, RAEEC Latur for Latur and Nanded, RAEEC Parbhani for Parbhani and Hingoli while RAEEC Aurangabad for Aurangabad and Jalana districts. These extension centres are actively involved in disseminating the technologies at farmers level. RAEEC developed system to approach 60000 farmers of each district with collaborative work with Agriculture department. Situation need message is going to pass up to farmers level through the system channel i.e. from scientists – SMS /extension agronomist – DSAO – Taluka Agriculture Officer –Mandal Agriculture Officer – Agriculture Supervisor – Agrilture Assistant – Farmer through conducting Monthly district field visits, workshop, trainings and whatsapp. On farmers field expression of various insect pest damage and plant diseases may be different than their typical expressions under study. Manny times single approach of management may not be sufficient to manage them, hence technological interventions should be made to manage the insect pests and diseases though integrated approach This articles includes integrated management strategies to manage biotic and abiotic stress on farmers field, concluding with a brief outline of future directions which might lead to the integration of described methods in a system-based approach for more effective management of biotic and abiotic stress.

RESULTS:

Sate Agriculture Universities and ICAR research institutes have released various technologies for increasing production and productivity of rainfed areas. Technological intervention through extension activities is important for widescale adaptation of these recommendations.

Cropping System:

Mixed cropping, intercropping and crop rotation are important practices that are widely emphasized around the world to break the life cycle of insect pests and to avoid the inoculums buildup of soilborne pathogens and these practices are proved most effective tool on farmers field to cope up from biotic and abiotic stress. Crop rotation is also associated with enhanced soil fertility, improvement in soil chemical and physical properties, good soil water management and soil erosion control.

Sowing method:

In soybean , use of BBF technology of sowing is proved to be climate resilient, cost effective by reducing seed rate and insect pest population on farmers field.

Soil Amendments :

Organic amendments to the soil are traditionally used for improving soil conditions and crop productivity, but they can also aid in suppressing soilborne pathogens. On farmers field, its evident fact that crops sown on soil with good organic amendments does not shows the viral expressions even though plant is infected.

Soil Fertility and Plant Nutrients :

Soil fertility and chemistry including soil pH, organic matter and available nutrient status can all play a major role for healthy growth of plant . Soil nutrition, along with the use of fertilizers and amendments, have shown direct impact for developing tolerance against various biotic and abiotic stress. Adequate nutrition can make the plant more tolerant or resistant to diseases as mineral nutrients are components of plants which regulate metabolic activity which is related with plant resistance and pathogen virulence.

CONCLUSIONS:

Among various crop production constraints management of biotic and abiotic stress is the key of potential crop production in rainfed areas. Many high-value crops and vegetable crops are vulnerable to the wide range of insect pests and diseases that either reduce the yield, marketability or many aspects combined. The phase-out of many chemicals and rising awareness towards resistance development, environmental health, and climate change necessitates the quest for suitable integrated management options. Many non-chemical options such as resistant cultivars/varieties, cropping system, sowing methods, soil amendments, soil fertility management and plant nutrients application methods proved more effective in management of insect pests and diseases if integrated with chemical methods . Therefore Published research must be implemented in integrated way to harvest its benefits on farmers field and for that RAEEC and KVKs are playing important role in bridging the technological gaps on farmers field effectively .

Land Suitability Analysis for Finger Millet in Banka Block, Bihar Using Remote Sensing and GIS Technique

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ABSTRACT

Land sustainably supports to make of precise decisions on the optimum use of land resources through the evaluation of pertinent information about the opportunities and constraints for land use. Such a study aids in the development of crop management and other agricultural support service providers. In this situation, it is essential for agricultural land use planning to evaluate the geographical distribution of suitable places where crops may be cultivated or not. Keeping this background in concern, a present study entitled "Land suitability analysis of Finger millet in Banka Block, Bihar" was done using remote sensing and GIS techniques to analyze the land suitability for Finger millet in the area of interest. To fulfill these objectives, satellite image data were downloaded from the USGS earth explorer of Landsat 8 (rabi season, 2022) and Carto DEM to analyze the agricultural land use pattern and topographical features. For ground truthing surface soil and soil profile investigation were carried out to assess the physical-chemical analysis, and finally, all the thematic data were overlayered to assess the land suitability for finger millet in different Land Mapping Units (LMUs). Results revealed that soil reaction ranges

found to be acidic to neutral (5.90 to 7.12) and EC was found to be normal (varied from 0.02 to 0.13 dSm^{-1}) which comes under almost non-saline in nature in all panchayats. However, the organic carbon in soils was found to be low and varies from (0.20 to 0.41 %), ESP (2.84 to 6.43 %), CEC (6.68-22.20 cmol (p+)/kg), and BS (65 to 74.25%). In terms of land suitability class, all the LMUs were found to be marginally suitable (S3), while in terms of potential suitability, LMU1, LMU3, LMU4, and LMU5 were found to be highly suitable (S1) for finger millet.
Keywords: Land suitability, land mapping unit, LANDSAT 8, USGS

Impact of climate change on insect pest, disease and their management
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ABSTRACT
Climate change has profound implications for insect pests, diseases, and their management. Rising temperatures and shifting climatic patterns can result in the expansion of pest ranges, allowing them to invade new areas or increase their populations. This poses challenges for pest management strategies, as new pests may emerge, and existing approaches may become less effective. Furthermore, climate change can alter the life cycles of insects and diseases, accelerating their development and increasing the frequency and intensity of outbreaks. This requires adaptive and timely control measures to mitigate their impacts. In addition, pests and diseases have the potential to develop resistance and resilience under changing environmental conditions, making management more challenging. Moreover, climate change can disrupt natural pest control mechanisms by affecting the interactions between pests, natural enemies, and host plants, further exacerbating pest problems. To effectively address these challenges, it is crucial to integrate climate change considerations into pest management strategies, develop resilient and sustainable approaches, and promote the conservation of natural enemies and biodiversity.
Keywords: Pest ranges, life cycles, challenges, Management

Screening of Brinjal (*Solanum melongena* L.) genotypes across locations in Kashmir Valley for Alternaria Leaf Spot.
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Purpose
Brinjal or Aubergine or eggplant (*Solanum melongena* L.) globally grown as warm season crop in most tropical and subtropical parts and in some temperate regions in summers. It is one of the highly nutritional vegetable crop with low calorific value, rich medicinal importance and used as a staple vegetable crop in many regions for liking towards its taste and availability in most seasons. The present investigation was carried out to screen suitable brinjal germplasm against Alternaria leaf spot (*Alternaria alternata*) disease incidence in field conditions.
Methods
The experiment was carried out at three locations across the Kashmir valley viz., Vegetable experimental field Shalimar, Bandipora and Kupwara with 11 suitable genotypes and local check. The RCBD design layout was followed with the spacing of 60 x 45 cm. All recommended package of practices were followed to raise the good crop. The observations on yield attributing

traits and disease incidence were recorded throughout growing period of crop. All the genotype were screened for disease incidence in field condition and sample from infected plants were collected to identify the pathogen i.e. *Alternaria alternata*.

Results:

The results revealed that the mean disease incidence was 5.92% ranging from 1.02 to 11.76 %. Maximum disease incidence was observed with the genotype B12 (11.76%), followed by B2 (9.35) , B11 (9.25), B8 (8.66) while minimum disease incidence was recorded with the genotype B6 (1.02) , B5 (1.14) . The highest reduction in yield due to disease incidence was reported in B7 (-38.59 %) followed by B9 (-23.20%), B5 (17.72%) and B10 (-14.57 %) as compared to local check.

Conclusion:

The study revealed that the genotypes viz., B6, B5 were immune, and genotypes viz., B4, B3 showed resistant reaction.

Keywords: Brinjal, Alternaria, Leaf spot, Screening for disease

Biotic and Abiotic Stress in Vegetable Crops Under Changing Climate and Their Management

Tazeem Fatma Jafri, Khursheed Hussain, Harshavardhan T., Sonika Jaryal

ABSTRACT

Climate change is a widely accepted fact. Food security for the 21st century will be the main challenge for humankind in the years to come, given the declining production efficiency of agro-ecosystems due to the depletion of natural resource bases, serious effects of climate change on diversity and abundance of insect-pests, and the extent of crop losses. India has more challenges from the effects of impending climate change because it is a tropical nation. Pest damage varies in India's many agro-climatic areas due mostly to the diverse effects of abiotic elements including temperature, humidity, and rainfall. This comprises the exacerbation of yield losses as a result of probable changes in crop diversity and an uptick in insect pests as a result of climate change. Climate change also makes such losses more prevalent, which exacerbates the negative effects of multiple stresses.Abiotic stresses, which include low or high temperatures, water shortages or surpluses, high salinity, heavy metals, and UV radiation, are harmful to plant growth and development and have a significant negative impact on agricultural yields globally. Biotic stress, also known as decay, is brought on by infectious diseases that manifest in harvested fruit and are typically brought on by bacteria, fungi, or yeasts. To combat these biotic and abiotic stresses, plants have evolved a number of defence mechanisms. They detect the environmental stress, become activated, and then produce the necessary biological reactions. They accomplish this by sending inputs through several signal transduction pathways from sensors on the cell surface or in the cytoplasm to the transcriptional machinery in the nucleus. The plant becomes more resilient to the stress as a result of differential transcriptional modifications. Signalling pathways serve as a crucial link between detecting the stress environment and producing the proper biochemical and physiological response.

Keywords: Climate change, Biotic Factor, Abiotic Factor, Agricultural Yield,Biochemical Response Physiological Response.

Removal of Textile Dye Effluent Using Activated Carbon Prepared From Sesame Oil Cake

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ABSTRACT
Textile dyeing industries are one of the most polluted industries which create lots of problems for environmental pollution. The textile dyeing industry produces in large amount of production and release of waste water effluent. The adsorption process using various agricultural waste products can be applied for the removal of dye effluent from wastewater. In the present study activated carbon prepared from waste i.e. sesame was used for effluent treatment. The powdered sesame was treated with 5% NaCl for 24 hours. The acid activation process of 2.5 N H_2SO_4 was treated for 24 hours. Pyrolysis of carbon was done at 300˚c temperature for 2 hours. For dye effluent treatment different concentrations of adsorbent 0.1%, 0.25%, 0.5% and 1.0% and time period 30, 60 and 90 minutes were used respectively. The resultant activated carbons were subjected to ball milling and characterized by using various analytical techniques. The clarity of the effluent was found at 1.0% concentration for 30 minute and the absorbency was recorded as 0.213nm. The adsorbent of porosity, ash content and moisture content were recorded as 0.3600%, 0.160% and 0.033%. The adsorbent of sesame bulk density was 4.600g/cm^3. The methylene blue was recorded 88 mg/g of the adsorbent. The point zero charge, pH, particle size and iodine number were recorded i.e. 5.64pzc, 6.52, 1326.66nm and 16.40m^2/g respectively.
Keywords: Sesame, oil cake, activated carbon, dye effluent, adsorbent, FTIR, pH, SEM

Influence of Genotypes and Row Spacing on Growth and Yield of Mustard (*Brassica juncea* L.)

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ABSTRACT
A field experiment was conducted during *Rabi* season 2022-2023 at Crop Research Centre, School of Agricultural Sciences, Shri Guru Ram Rai University, Dehradun, Uttarakhand. The experiment was laid out in factorial randomized block design (FRBD) with three replications and nine treatments. The treatments comprised of three levels of row spacing *viz.* S_1 (35 x 15 cm), S_2 (40 x 15 cm) and S_3 (45 x 15 cm) and three different mustard cultivar *viz*. Pusa Mustard-28, RH-749 and Pant Sweta. The maximum growth and yield parameters was recorded with the treatments of V_1S_3 (45 x 15 cm + Pusa mustard-28) *viz.* plant height, Number of branches\plant, Number of siliqua\plant, Number of seed\siliqua, Straw yield and Seed yield which was found significantly higher than other treatments.
Keyword- Cultivar (Pusa Mustard-28, RH-749 and Pant Sweta), Growth, Mustard, Row spacing & Yield

Different transplanting dates, spacing and number of seedlings have an impact on the productivity and profitability of hybrid rice

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ABSTRACT

Field experiment was conducted to evaluate the effect of different transplanting dates, seedling rates and spacings on yield and economics of hybrid in Selaqui, Dehradun (Uttarakhand), at the Crop Research Farm, Department of Agronomy, Maya College of Agriculture and Technology, during the 2016 kharif season. Experiment comprised 18 treatments, including 3 transplanting dates (15 July, 27 July, and 09 August), 2 seedling rates (1 seedling hill^{-1} and 2 seedling hill $^{-1}$) and 3 spacings (20 X 10 cm, 20 X 15 cm and 20 X 20 cm). The experiment was replicated three times and using a randomized block design. The test crop was rice of the "Arize 6444 variety". Results revealed that hybrid rice transplanted at 15 July with 20 x 20 cm spacing and 2 seedlings hill^{-1} proved to be the best for obtaining maximum grain (64.33 q ha^{-1}), straw (80.67 q ha^{-1}) and biological yield [145.00 q ha^{-1}) and returns (gross (₹ 93330 ha^{-1}), net returns (₹ 42514 ha^{-1}) and B:C ratio (1.83)].

Keywords: Date of transplanting, Hybrid rice, Number of seedlings hill^{-1}, Productivity, Profitability and Spacing

The ecological study of waterborne disease-causing bacteria in natural drinking water sources in Pithoragarh, Uttarakhand

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Purpose

Water is the most important element for the human body, and adequate water intake is necessary. It is vital for all known forms of life; it is the only substance that exists naturally in all three states at temperatures and pressures commonly experienced on Earth. The state of Uttarakhand has various natural water sources, which supply water to the large population and are the main sources of drinking in different areas. Due to this, most of the population uses this water without treatment, which leads to waterborne diseases such as dysentery, diarrhea, cholera, etc. The main aim of this research work is to identify the bacteriological investigation.

Methods

The present study is conducted in Pithoragarh city and its nearby villages, different natural water sources were selected for this study, and microbiology analysis was done by using various culture media such as EMB for *E.coli,* XLD for *Shigella,* BGA for *Salmonella,* etc.

Results

This study clearly shows the presence of harmful microorganisms in the natural water sources of Pithoragarh, all samples were found contaminated by various microorganisms. *E.coli* was present in the highest number among other microbes, *salmonella,* and *shigella* were also abundant in the natural sources.

Conclusion

This study indicates that these natural water sources are not potable for drinking purposes; it is suggested that water can be purified through various methods such as boiling and filtration. Overall, drinking clean and safe water is crucial for maintaining good health and preventing waterborne diseases.

Keywords: Natural water sources, Culture media, Water borne diseases, Microbes

Performance Evaluation Of Developed Rice Puffing Machine

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INTRODUCTION

Puffed rice is produced in cluster of small units often located in urban areas. Among various states in India, Karnataka has the largest number of clusters of puffed rice making units. Most of the processing units in Karnataka are either small or cottage based industries. It is estimated that there are about 2000 such units in Karnataka and the major clusters are situated in Davanagere, Hubballi, Dharwad, Raichur and Belagavi

MATERIAL AND METHODOLOGY

The rice puffing machine consist of hopper, mesh heating cylinder, Heating Unit, casing cylinder, Transmission unit, Universal joint bearing, Power supply and power requirement, Speed and temperature controlling devices, Supporting frame, Casing cover and power consumption. Two types of power transmission was used in the developed machine, one from electric motor of 0.5 hp capacity for the other one for heating coil connected directly to electric source. After achieving 200-250^{o}C temperature in the heating mesh cylinder. The IR-64 rice variety was selected for the study and it was conditioned before actual puffing operation. The salt treatment is also one of the important operations to impart characteristic taste and to improve the expansion ratio of puffed rice Salt treatment was carried out by making salt solution using 10 g of salt and 0.5 g of soda in 62.5 mL of potable water. The solution then mixed with rice sample in the ratio of 40 mL.kg^{-1}. Hence, 10 ml of salt solution was mixed with 250 g of rice sample.

RESULTS:

The IR-64 rice variety was selected for the study and it was conditioned before actual puffing operation as per the procedure explained. The rice was sprinkled with water up to three moisture contents (22, 24 and 26%) and mixed thoroughly, covered with jute bags and kept for conditioning for 24 h then dried in the shade for 9 h and heaped over night. Then the conditioned rice was pre-heated at a temperature of 150° at cylinder speed of 30 rpm for 3 passes. After achieving 200-250^{o}C temperature in the heating mesh cylinder, the specified feed rate of conditioned rice in to the heating mesh cylinder will result in puffed rice within a short span of around 10-12 sec. The capacity of developed rice puffing machine ranges between 4-5 kg/h.

CONCLUSION

The important operational parameters to be considered for effective rice puffing were puffing temperature, heating cylinder speed and found optimized at 220oC and 30 rpm, respectively. The developed rice puffing machine was found to have the puffing efficiency and puffing capacity of 81% and 4.58 kg h-1

Keywords: IR-64, Rice, Puffed Rice and Puffing machine

Zero Energy Cool Chamber (Zecc) For Shelf-Life Enhancement Of Fenugreek Leafy Vegetables

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Introduction:

The ZECC work based on evaporative cooling system i.e. cooling effect created due to evaporation of water. The ZECC maintains higher relative humidity inside the cooling chamber than that of outside the environment which helps in lowering the temperature inside the cool chamber as compared to ambient temperature. The temperature variations inside the Zero energy cool chamber is found to be very low as compared to outside temperature fluctuations.

Material and Methodology

In the present investigation, the zero energy cool chamber was used to store the fenugreek at predetermined temperature of 15 °C and 90% relative humidity. The fenugreek was packaged using different packaging materials *viz.*, No packaging, Polyethylene terephthalate (PET), polypropylene (PP) and Low Density Polyethylene (LDPE). The data on temperature and relative humidity was measured through digital temperature and humidity recorder. The zero energy cool chamber (ZECC) was constructed using the design specification according to the IARI Pusa, New Delhi. The storage structure was constructed easily with the locally available materials like bricks, sand, bamboo, straw, gunny bag, etc. The ZECC was constructed on elevated level surface with continuous water supply. It was constructed on floor size 165× 115 cm using 400 bricks. The double layer brick wall was constructed all the four sides up to 67.5 cm using brick by leaving 7.5 cm gap in between for filling up sand. The gap was filled up by using fine sand to the total height. Top surface cover was constructed using bamboo strips (150 ×100 cm)

Results:

*L** value in ZECC storage condition were deceased for all the treatments. The least change in the *L** value was obtained in the sample packaged with LDPE (from 49.03 to 46.67) on 10^{th}day of storage. *a** value in ZECC storage condition increased among all the treatments. The least change in the *a** value was obtained in the sample packaged with LDPE (from -21.12 to -12.99) on 10^{th}day of storage. *b** value in ZECC storage condition also increased among all the treatments. The least change in the *b** value was obtained in the sample packaged with LDPE (from 14.15 to 17.95) on 10^{th}day of storage. Microbial populations in ZECC storage condition also increased from initial to 37.67, 39.67, 39.33 and 39.12 after 2, 6, 8and 10 days of storage, respectively and found within the permissible (5×10^6).

Conclusion:

It was concluded that the fenugreek packaged using different packaging materials *viz.*, No packaging, PET, PP and LDPE in ZECC condition could be stored for duration of 2, 6, 8 and 10 days, respectively with better quality attributes and within safe limit of microbial load

Keywords: ZECC, No Packaging, PET, PP, LDPE and Fenugreek

A dual purpose, high yielding Little millet (*Panicum sumatrense*) variety 'GV-4' (Ambika) for cultivation in Gujarat.

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Purpose
Little millet (*Panicum sumatrense*) is an important millet crop having high nutritional values as it is good source of protein, very rich in carbohydrate, fat, mineral and vitamins and should be considered as essential food for nutritional security. As little millet being neglactable crop, very few varieties are there having high yield and high nutrient content. The aim of this research is to develop high yielding and nutri-rich little millet variety from the local germplasm collections.

Methods
Single plant with desirable traits and high yield with medium maturing and resistant to diseases like Blast (Leaf, Neck and Panicle) and moderately resistant to grain smut and sheath blight was selected from the germplasm accession and was forwarded as single plant to progeny rows. The promising culture was evaluated over seven years at Waghai location with checks including multi-location trails at Waghai, Vanarasi and Dahod starting from 2017-18 to 2020-21 and also tested in All India Co-ordinated trials under AICRP-Small millets in 5 states across 8 locations from 2016-17 to 2018-19. The reaction of the cultures against important pest and disease was also screened and as per the standard procedures the grain qualities were analyzed.

Results
The little millet variety ‘GV-4’ (Ambika) is a pure line selection from the local germplasm collected from the Dang District. A little millet variety ‘GV-4’ was tested as a genotype name ‘WV-126’. The genotype 'WV 126' tested under the various state trials found to be superior for grain yield (2933 kg/ha) by 21.20, 13.78, 44.39 and 31.44 % over the existing checks *i.e.* GV-2 (LC), GNV-3 (LC), CO-2 (NC) and OLM-203 (NC), respectively over thirteen trials and seven years (2014-15 to 2020-21) of study. The genotype matures in 120-125 days includes under medium duration variety. The genotype WV-126 has 9-10 branches per panicle and 35.5 cm average panicle length. This genotype has special attributes of synchronized maturity and non-lodging growth habit. The genotype WV-126 is rich in calcium (17.1 mg/100g), protein (12.91 g/100g), fat (3.3 %), crude fiber (7.5 %), carbohydrates (70.40 g/100g) and minerals (2.7 g/100g). This genotype is resistant to diseases like blast (leaf, neck and panicle) and moderately resistant to grain smut and sheath blight when compared to local check GV-2 and GV-3 and national check CO-2, OLM-203 and JK-8.

Conclusions
Considering the superior performance of the little millet culture 'WV-126' over the local check varieties namely GV-2 and GNV-3 as well as national check variety CO-2 and OLM-203, the WV-126 was released as a new variety GV-4 (Gujarat Vari-4/ Ambika) for large scale cultivation in Gujarat during 2021.

Keywords: Little millet, high yielding variety, yield attributing characters, nutritional quality etc.

Impact Of Climate Change On Population Dynamics Of Melon Fruit Fly, *Bactrocera cucurbitae* (Coquillett): A Review

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Abstract
This review examines the impact of climate change on the population dynamics of the melon fruit fly (*Bactrocera cucurbitae*) an economically significant pest. Changes in temperature, precipitation, phenology and geographical distribution have direct effects on its development, reproduction and interactions. Understanding the response mechanisms and vulnerabilities of the melon fruit fly to climate change is crucial for developing targeted pest management strategies and informing agricultural adaptation measures. Future research in this field is essential for mitigating the consequences of climate change on agricultural systems and ensuring food security.
Keywords: Climate change, Population dynamics, Melon fruit fly, *Bactrocera cucurbitae*

Introduction:
The melon fruit fly (*Bactrocera cucurbitae*) is an economically significant insect pest that affects a wide range of fruit crops worldwide. Belonging to the Tephritidae family, this species has a global distribution primarily found in tropical and subtropical regions where it inflicts substantial damage to melons, cucumbers and other cucurbitaceous crops. The melon fruit fly has a complex life cycle consisting of four distinct stages: egg, larva, pupa and adult. Females lay eggs inside the fruit and the resulting larvae feed on the flesh causing extensive damage and rendering the fruit unmarketable (NAPPO, 2005).
Studying the impact of climate change on the population dynamics of the melon fruit fly is of great significance due to several reasons. Firstly, climate change is causing alterations in temperature patterns and precipitation regimes worldwide. Temperature influences the development, survival and reproduction of the melon fruit fly, while precipitation affects its habitat suitability, resource availability and reproductive success. Understanding how climate change influences these factors can provide insights into the potential changes in the population dynamics of the melon fruit fly (Parmesan, 2006 and Bale *et al*., 2002).
Secondly, climate change is altering the timing and intensity of phenological events such as flowering and fruiting of host plants. The melon fruit fly's life cycle is intricately linked to the phenology of its host plants (Riegler and O'Neill, 2007). Any shifts in phenology due to climate change can have cascading effects on the population dynamics of the melon fruit fly, potentially affecting its abundance, distribution and interaction with other species. Furthermore, climate change is leading to range shifts and expansions of many insect species. The melon fruit fly's geographical distribution may also be influenced by changing climatic conditions, resulting in new colonization opportunities or interactions with native species. Understanding the potential range shifts and distributional changes of the melon fruit fly is crucial for effective pest management and conservation strategies.
In light of these factors, investigating the impact of climate change on the population dynamics of the melon fruit fly is essential for predicting and mitigating the potential consequences of climate change on agricultural productivity, food security and ecosystem dynamics. By gaining insights into the response mechanisms and vulnerabilities of this insect pest to climate change, we can develop more targeted and sustainable pest management strategies, inform crop

adaptation measures, and enhance conservation efforts to minimize the negative impacts of climate change on agricultural systems and ecological communities.

Relationship between weather parameters and Melon fruit fly

1) Climate Change and Temperature:

Climate change has led to alterations in temperature patterns and trends worldwide. The increase in greenhouse gas concentrations has contributed to rising global temperatures resulting in shifts in seasonal and regional temperature patterns (IPCC, 2014).

Relationship between Temperature and Melon Fruit Fly:

Temperature plays a crucial role in the development, survival and reproduction of the melon fruit fly. Higher temperatures generally accelerate the insect's life cycle, leading to faster development from egg to adult (Papadopoulos *et al*., 2001). Additionally, warmer temperatures can enhance the melon fruit fly's reproductive capacity by increasing the rate of egg production and shortening the time required for sexual maturity (Diniz *et al*., 2013).

Direct and Indirect Effects of Temperature on Population Dynamics:

Studies have demonstrated both direct and indirect effects of temperature on the population dynamics of the melon fruit fly. For example, high temperatures can increase the insect's metabolic rate, shortening the generation time and potentially leading to higher population growth rates (Muirhead *et al*., 2011).

Indirectly, temperature influences the melon fruit fly's interactions with its environment and host plants. It affects the availability of suitable habitat, host plants and resources necessary for larval development and survival (Tang *et al*., 2010). Warmer temperatures can also impact the phenology of host plants, altering their flowering and fruiting patterns which can subsequently influence the timing and abundance of suitable oviposition sites for the melon fruit fly (Yang *et al*., 2016). Additionally, temperature can affect the insects physiological and behavioural responses, such as diapause induction and activity patterns, which can further impact population dynamics (Mitsui *et al*., 2006).

2) Climate Change and Precipitation:

Climate change is known to influence precipitation patterns and variability globally. Increased greenhouse gas concentrations in the atmosphere contribute to changes in the hydrological cycle, resulting in altered precipitation regimes. The effects of rainfall and humidity on the habitat suitability, resource availability and reproductive success of the melon fruit fly (*Bactrocera cucurbitae*) are crucial to understanding the species population dynamics.

Rainfall and humidity affect the melon fruit fly in several ways. Changes in precipitation patterns can directly impact the availability of suitable oviposition sites as the fly's larvae develop within fruits. Excessive rainfall can lead to fruit rot, reducing the number of suitable sites and negatively affecting the fly's reproductive success (Drew *et al*., 2010). Conversely, drought conditions may reduce overall fruit availability, potentially impacting the fly's population size and distribution (Katayama *et al*., 2018).

Moreover, changes in precipitation influence the availability of water resources and the overall humidity of the environment. Adequate humidity is essential for the melon fruit fly's survival and development. Insufficient humidity can lead to desiccation of eggs and larvae, affecting their survival rates (Clarke *et al*., 2005). Conversely, high humidity can promote fungal and bacterial growth, potentially causing fruit decay and reducing the suitability of the melon fruit fly's habitat (Drew *et al*., 2010). Variations in precipitation affected the fruit fly's population density and spread (Jayanthi *et al*. 2015 and Kurashima *et al*. 2020).

While these studies provide valuable insights, further research is needed to fully understand the

population responses of the melon fruit fly to changes in precipitation, considering various climate scenarios and the interaction with other environmental factors.

3) Climate Change and Phenology:

Climate change has been observed to impact the timing of seasonal events including the flowering and fruiting of host plants. Changes in temperature and precipitation patterns can influence the phenology of plants leading to shifts in their growth and reproductive cycles.

The implications of phenological shifts on the life cycle and population dynamics of the melon fruit fly (*Bactrocera cucurbitae*) are significant. The melon fruit fly's life cycle is closely tied to the phenology of its host plants as it requires suitable fruits for oviposition and larval development. With climate change-induced shifts in phenology the timing and availability of host plants for the melon fruit fly may be altered. If the flowering and fruiting of host plants occur earlier or later than usual, it can impact the synchronization between the fly's life cycle and the availability of suitable fruits. As a result, the melon fruit fly may experience disruptions in oviposition opportunities, larval feeding resources and overall reproductive success. Furthermore, changes in phenology can also affect the interaction between the melon fruit fly and other species. For instance, alterations in the timing of host plant phenology may lead to mismatches between the fruit fly and its natural enemies or pollinators, potentially influencing population dynamics and ecological interactions.

Several studies have investigated the phenological responses of the melon fruit fly to climate change. For example, a study by Siderhurst *et al*. (2011) examined the effect of temperature on the phenology of the melon fruit fly and its host plants. The research found that warmer temperatures advanced the timing of both the fly's emergence and the host plants fruiting.

4) Climate Change and Distribution:

Climate change has the potential to influence the geographical distribution and range expansion of the melon fruit fly (*Bactrocera cucurbitae*). As temperatures and environmental conditions shift, the fly's suitable habitat may expand or contract. Warmer temperatures can enable the fly to establish populations in areas previously unsuitable for its survival, leading to range expansions into new regions. Changes in precipitation patterns and availability of water resources can also play a role in shaping the fly's distribution.

The impacts of range shifts on the population dynamics of the melon fruit fly are significant. Colonization of new areas can result in population growth and increased abundance as the fly exploits previously unoccupied habitats and hosts. This expansion can lead to economic losses and challenges for agricultural systems in the newly colonized areas. Furthermore, the introduction of the melon fruit fly to new regions may disrupt native ecosystems and have implications for native species, including potential competition for resources or predation pressure. Several studies have examined the distributional responses of the melon fruit fly to changing climatic conditions. For example, a study by Wang *et al*. (2019) investigated the potential impact of climate change on the future distribution of the melon fruit fly in China. The research used ecological niche modeling techniques to predict range shifts under different climate scenarios.

Strategies and mechanisms that the melon fruit fly population may employ to adapt to changing climatic conditions include:

Phenotypic plasticity: The melon fruit fly may exhibit phenotypic plasticity allowing individuals to adjust their behaviour, physiology or life cycle in response to environmental changes. For example, they may adjust their reproductive timing or diapause patterns in response to variations in temperature and precipitation (Mitsui *et al*., 2006).

Genetic adaptation: Over time the melon fruit fly population may undergo genetic adaptation to better cope with changing climatic conditions. Genetic variations that confer tolerance or resistance to temperature extremes or other environmental stressors may become more prevalent in the population (Clarke *et al*., 2010).

Human activities, particularly agricultural practices and pest management strategies can both exacerbate and mitigate the effects of climate change on the melon fruit fly population dynamics: Exacerbation: Intensive agricultural practices that rely heavily on chemical pesticides can lead to negative impacts on the melon fruit fly population dynamics. Indiscriminate use of pesticides may disrupt natural enemies and reduce the fly's natural control, potentially leading to increased pest populations and exacerbating the effects of climate change (Papadopoulos *et al*., 2008).

Mitigation: Implementing integrated pest management (IPM) approaches can help mitigate the effects of climate change on the melon fruit fly. IPM combines various strategies such as cultural practices, biological control and judicious pesticide use to minimize pest populations while reducing reliance on chemical inputs (Jang *et al*., 2017). These approaches enhance the resilience of agroecosystems and can help mitigate the impacts of climate change on the melon fruit fly population.

Conclusion

The impact of climate change on the population dynamics of the melon fruit fly, *Bactrocera cucurbitae* is significant. Climate change significantly affects the population dynamics of the melon fruit fly. Changes in temperature, precipitation, phenology and distribution affect its development, survival, reproduction and interactions. Further research is needed to uncover adaptation mechanisms and understand the combined effects of climate variables. Understanding this impact is vital for effective pest management, conservation, agricultural adaptation and biodiversity preservation. Continued research will contribute to mitigating the negative consequences of climate change on agricultural systems and ensuring food security.

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Agricultural Extension a boon for managing biotic and abiotic stress in rainfed areas

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INTRODUCTION

Various technologies are developed and recommended for management of biotic and abiotic stress in rainfed areas. Timely and proper adoption of these technologies needs to be accelerated for harvesting positive impacts on farmers field in terms of economics. Among various crop production factors management of insect pests and plant diseases are the crucial factors determining the crop yields on farmers field. The impact of climate change and weather variabilities, created enormous difficulties at farmers level to harvest crop yields with its full potential, mainly in agronomical crops of the region like soybean, redgram, gram while to some extend horticultural crops like papaya, banana and chilli. Dryspell of more than 15 days and heavy rainfall coupled with high humidity and low solar radiation increased the infestation of stem borer in soybean, fusarium and phytopthora wilt in redgram . Soybean followed by gram is the major cropping system of the region which created the problem of wilting in gram. Undernutrion of micronutrients and low organic carbon content of the soil created unhealthy and virus infected growth of papaya, banana, and chilli. Extension functionaries needs to be work efficiently to disseminate recommended technologies effectively , timely and in simplest way at farmers level Hence it necessitate to quantify the role Extension agronomist of the RAEEC and subject matter specialist for strengthening the agricultural extension work un rainfed areas.

METHODOLOGY:

The major crops of the Marathwada region of Maharashtra are soybean, redgram, cotton, gram while to some extend horticultural crops like papaya, banana, tomato and chilli ect. For harvesting good yield with low cost of production, various technologies viz., nutrient management , weed management, pest management water management, mechanization have been recommended by the Vasantrao Naik Marathwada Agricultural Unuversity, Parbhani, other SAUs and ICAR centres at regional and national level. These technologies must have to reach at farmers level in right time and by right way. In this regards, agricultural extension services are run by the Vasantrao Naik Marathwada Agricultural University, Parbhani, other SAUs with the formation of Regional Agricultural Extension Education Centres (RAEEC) and KVks. Regional Agricultural Extension Education Centres (RAEEC) under Directorate of Extension Education, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani are established at Ambajogai, Latur, Aurangabad and Parbhani to disseminate the agricultural technology among the farmers of Marathwada region comprising eight district. RAEEC Ambajogai is working for Beed and Osmanabad, RAEEC Latur for Latur and Nanded, RAEEC Parbhani for Parbhani and Hingoli while RAEEC Aurangabad for Aurangabad and Jalana districts. These extension centres are actively involved in disseminating the technologies at farmers level. RAEEC developed system to approach 60000 farmers of each district with collaborative work with Agriculture department. Situation need message is going to pass up to farmers level through the system channel i.e. from scientists – SMS /extension agronomist – DSAO – Taluka Agriculture Officer –Mandal Agriculture Officer – Agriculture Supervisor – Agrilture Assistant – Farmer through conducting Monthly district field visits, workshop, trainings and whatsapp. On farmers field expression of various insect pest damage and plant diseases may be different than their typical expressions under study. Manny times single approach of management may not be sufficient to manage them, hence technological interventions should be made to manage the insect pests and diseases

though integrated approach This articles includes integrated management strategies to manage biotic and abiotic stress on farmers field, concluding with a brief outline of future directions which might lead to the integration of described methods in a system-based approach for more effective management of biotic and abiotic stress.

RESULTS:

Sate Agriculture Universities and ICAR research institutes have released various technologies for increasing production and productivity of rainfed areas. Technological intervention through extension activities is important for widescale adaptation of these recommendations.

Cropping System:

Mixed cropping, intercropping and crop rotation are important practices that are widely emphasized around the world to break the life cycle of insect pests and to avoid the inoculums buildup of soilborne pathogens and these practices are proved most effective tool on farmers field to cope up from biotic and abiotic stress. Crop rotation is also associated with enhanced soil fertility, improvement in soil chemical and physical properties, good soil water management and soil erosion control.

Sowing method:

In soybean , use of BBF technology of sowing is proved to be climate resilient, cost effective by reducing seed rate and insect pest population on farmers field.

Soil Amendments :

Organic amendments to the soil are traditionally used for improving soil conditions and crop productivity, but they can also aid in suppressing soilborne pathogens. On farmers field, its evident fact that crops sown on soil with good organic amendments does not shows the viral expressions even though plant is infected.

Soil Fertility and Plant Nutrients :

Soil fertility and chemistry including soil pH, organic matter and available nutrient status can all play a major role for healthy growth of plant . Soil nutrition, along with the use of fertilizers and amendments, have shown direct impact for developing tolerance against various biotic and abiotic stress. Adequate nutrition can make the plant more tolerant or resistant to diseases as mineral nutrients are components of plants which regulate metabolic activity which is related with plant resistance and pathogen virulence.

CONCLUSIONS:

Among various crop production constraints management of biotic and abiotic stress is the key of potential crop production in rainfed areas. Many high-value crops and vegetable crops are vulnerable to the wide range of insect pests and diseases that either reduce the yield, marketability or many aspects combined. The phase-out of many chemicals and rising awareness towards resistance development, environmental health, and climate change necessitates the quest for suitable integrated management options. Many non-chemical options such as resistant cultivars/varieties, cropping system, sowing methods, soil amendments, soil fertility management and plant nutrients application methods proved more effective in management of insect pests and diseases if integrated with chemical methods . Therefore Published research must be implemented in integrated way to harvest its benefits on farmers field and for that RAEEC and KVKs are playing important role in bridging the technological gaps on farmers field effectively .

Effects of Accelerated and Natural Ageing on Soybean Seed Quality

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ABSTRACT
Soybean seeds are an essential agricultural commodity with significant economic importance. The quality of soybean seeds, including their germination capacity and vigor, plays a crucial role in crop establishment and subsequent yield. Seed aging is a natural process that leads to a decline in seed quality over time. However, accelerated aging techniques are employed to mimic and hasten the natural aging process, allowing for efficient evaluation of seed quality within a shorter time frame.
This study aimed to assess and compare the changes in soybean seed quality under accelerated aging conditions and natural aging over a designated period. The experiment involved subjecting fresh soybean seeds to accelerated aging conditions using controlled environmental factors, such as elevated temperature and humidity. Simultaneously, a batch of soybean seeds was stored under ambient conditions for an equivalent duration to serve as a natural aging treatment.
The assessment of seed quality parameters included germination percentage, seedling vigor, electrical conductivity, seed moisture content, and biochemical analysis. The accelerated aging treatment induced a rapid decline in germination percentage and seedling vigor compared to the naturally aged seeds. Furthermore, the electrical conductivity, an indicator of membrane integrity, increased significantly in the accelerated aging group, indicating higher seed deterioration.
Biochemical analyses revealed changes in enzymatic activity, such as reductions in superoxide dismutase (SOD) and catalase (CAT) activities, and increased levels of lipid peroxidation, as evidenced by higher malondialdehyde (MDA) content in the accelerated aging group compared to the naturally aged seeds. These results suggest that accelerated aging treatments can effectively simulate the natural aging process of soybean seeds, leading to similar seed quality deterioration patterns.
Understanding the changes in soybean seed quality under accelerated and natural aging conditions is crucial for seed producers, breeders, and researchers to develop effective seed storage and preservation strategies. The findings of this study provide valuable insights into the dynamics of seed aging and contribute to the development of improved seed quality management practices, ultimately enhancing crop productivity and sustainability in soybean production systems.
Keywords: Accelerated Ageing, Natural Aging, Superoxide Dismutase (SOD), Catalase (CAT), Malondialdehyde (MDA), Dynamics, Quality,

Rainfall Forecasting in Narmada Basin of Gujarat (India) by Artificial Neural Network Technique

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ABSTRACT
Rainfall is a very important parameter in hydrological model. Many techniques and models have been developed for rainfall forecasting. In this study an artificial neural network (ANN) based model was developed for rainfall forecasting. Proposed model used Multilayer perceptron (MLP) network with feed forward back propagation algorithm for training. Several models have been

developed in hydrological forecasting yet; the Artificial Neural Network (ANN) model provides a quick and flexible means of creating reasonable output. It has also been shown a higher performance level when compared with conventional methods. This study present a method of rainfall forecasting by developing an ANN- based model using major weather variables such as dry bulb temperature, wet bulb temperature, relative humidity, pan evaporation, vapour pressure as inputs while the rainfall as the target output. As part of the ANN model development procedures, the data sets of 11956 data in the study area was partitioned into two parts with 70% of the entire data sets used as the training data while the remaining 30% used as the testing and the validation data. The proposed model has been able to predict values with suitable results. The prediction is made on the bases of previous data. For the evaluation of the results and the ability of the developed prognostic models, appropriate statistical indexes such as the coefficient of determination (R2), the Root mean square error (RMSE), Mean square error (MSE), Nash-Sutcliffe efficiency (EF), Akaike information criteria (AIC), Bayesian information criteria (BIC) were used. The findings from this analysis showed that the ANN model 5-5-3-1 provides satisfactory results based on statistical indexes.

Evaluation Of Sugarcane Genotypes Against Pokkah Boeng Disease Under Field And Pot Conditions

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ABSTRACT
Sugarcane *(Saccharum officinarum L.*) belonging to poaceae family is a significant agro-industrial crop that is grown around the world in tropical and subtropical regions of the world. It is a vegetatively propagated crop grown in more than 80 countries countries and yields 166.19 MT of sugar for both industrial and domestic use. India grows sugarcane on an area of 46.03 million hectares, producing 3705 million tonnes annually with an average productivity of 80.50 tonnes per hectare. Sugarcane is affected by more than 150 diseases among them Pokkah boeng disease caused by *Fusarium proliferatum* is a fungal airborne disease. During recent years the disease has appeared moderate to severe form in various cane growing belts of Bihar, the incidence ranged from 5-25% in various varieties. To access the resistancy as well as susceptibility, Sugarcane genotypes were evaluated against Pokkah boeng disease and it was observed that more number of the genotypes were susceptible to Pokkah Boeng disease under pot condition as compared to field condition. Out of 25 sugarcane genotypes 4 genotypes were found to be resistant, 12 genotypes were found moderately susceptible and remaining 9 genotypes were found to be susceptible under pot condition whereas 10 genotypes were found resistant, 9 genotypes were found moderately susceptible and remaining 6 genotypes were found susceptioble under field condition.

Keywords : Sugarcane, Evaluation, Genotypes, Pokkah boeng, Pot & Field conditions.

Sericin as an effective UV protectant

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ABSTRACT
Sericin is a globular protein extracted from silk cocoons during degumming process. UV rays create molecules called free radicals, which destroy collagen and elastin in skin cells and causes wrinkles, dark spots, premature aging and melanoma in severe conditions. UV protectant blocks free radicals from entering the skin by reflecting the sun's rays and protecting healthy cells. Sericin being rich in antioxidants scavenges off the free radicals and upholds it utility in cosmetics. It is an effective biocompatible material possesses gelling ability, moisture retention capacity and skin adhesion. The application of Muga and Eri sericin was found to enhance the viability of human keratinocytes prior to UVA and UVB irradiation. The topical application of sericin suppresses UVB-induced acute damage and tumour promotion by reducing oxidative stress. Hence sericin can be used as UV protectant additive in skin care products *viz.*, Creams, lotions, sunscreens etc in cosmetics.
Keywords: Sericin, UV protectant, Skin care, Irradiation.

Mitigation And Adaptation Option Towards Combating Climate Change - Enhancing Income And Livelihood

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ABSTRACT
Under the context of climate change and global warming, all-important sectors of the society are badly affected. On the other hand food grain requirement are gradually increasing due to the rapid growth rate of population particularly in the developing countries like India, China, Pakistan and Bangladesh. So there is know alternative option to us to stop the climate change as it is occurring naturally as reduce such activity or identified the sink and expand is area, which are basically term as mitigation options. On the other hand we may not able to combat climate change but to advice community to adjust yourself to sustain your life and livelihood which is basically termed as adaptation options.The main sources of GHG emission are agriculture and allied activities, enteric fermentation which contribute maximum (43%) whilethe manure deposited on grazing land, synthetic fertilizer and rice production contributes16%, 15 % and 11% respectively. There is a chronic panic among the scientific community, multi-level stakeholders and common people about the ill effects of climate change. The UN Framework convention on Climate change (UNFCCC) and theKyoto protocol provide some ways out to cut GHG emission from each countries to a certain level through incorporating some innovative adaptation and mitigation options. As for example, increase the adaptation and mitigation potential of farming systems through better preserve soil fertility and freshwater flows, reduce impacts on deforestation, biological diversity, and GHG emissions (Celia et al. 2013) as well as the improved farm management practices, soil carbon sequestration,etc. The management practices in agriculture can enhance the soil organic carbon through reducing the amount of bare fallow, restoring degraded soils, improving pastures and grazing land, increased irrigation use

efficiency, crop and forage rotation, and no-tillage practices(Chan *et al.*, 2003). Several adaptation measures from agriculture, agro forestry and livestock sectors are changing planting dates,planting different varieties or crop species, development and promotion of alternative crops,developing new drought and heat-resistant varieties, more use of intercropping, using sustainable fertilizer and tillage practices, improving soil drainage, no-till, improved crop residue and weed management, more use of water harvesting techniques, better pest and disease control for crops, implementing new or improving existing irrigation systems,Reducing water leakage, soil moisture conservation – mulching,improved livestock management, providing housing and shade, change to heat-tolerant breeds, in stocking rate, altered grazing and rotation of pasture.Some mitigation options originated from agriculture and forestry section are carbon sequestration within agricultural system demandshift, reduction of emission from land use change through the expansion of biofuels, reduction of emission from drained peat lands, forest emission reduction and forest carbon sequestration. Similarly carbon sink can be expanded throughsequestering carbon in agricultural systems carbon sequestration refers to enhancing carbon storage in soils and biomass above and below ground through afforestation, reforestation and re-vegetation, such as restoration of degraded lands, agro-forestry, cropland and grazing management. All the above-mentioned mitigation and adaption options may play a curtail role to provide benefitsfor the developing countries to better food security and established climate resilience.

Keywords: GHG, Climate, Mitigation, Carbon and Global warming

Effect of Lead Nitrate on Germinating Characteristics of Rice (*Oryza sativa* L.)

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ABSTRACT

The worrisome condition of lead contamination in Southeast Asia had threatened the food and nutritional security of the ever-increasing human population, prompting the current inquiry. Five rice cultivars—HUR 1304, HUR 36, HUR 3022, HUR 1309, and HUR 109—were used in the current lab experiment, which included three levels of lead nitrate—control, 2 mM, and 4 mM—and three replications. In both the presence and absence of lead nitrate, the impact of lead nitrate on germination indicators, morpho-physiological, and biochemical parameters of seedlings was studied. According to the findings, the control had the highest levels of germination (%), radicle length, plumule length, dry matter seedling^{-1}, number of leaves seedling^{-1}, chlorophyll content, carotenoids, membrane stability index, and super oxide dismutase. Alpha amylose, total soluble sugar, soluble protein, catalase, and ascorbate peroxidase were all significantly greater in Pb $(NO_3)_2$ @ 4 mM than they were in the control group. HUR 1304 stood out among the genotypes with longer radicle and plumule lengths. Nevertheless, during the course of the experiment, HUR 109 demonstrated noticeably higher sucrose, total soluble protein, catalase, and ascorbate peroxidase levels. All rice cultivars with higher lead nitrate concentrations showed a decrease in germination percentage

Keywords: Lead nitrate, cultivars, ascorbate peroxidase, chlorophyll and morpho-physiological.

Production potential of pigeonpea (*Cajanus cajan* (L.) Millsp.) as influenced by plant geometry and Precision application of irrigation water

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ABSTRACT
A field experiment was conducted at Agronomy Farm, College of Agriculture, Parbhani during *kharif* season of 2012-13 and 2013-14. The experiment was laid out in split plot design with three main plot treatments and four sub plot treatments. The main plot treatments were irrigation schedules as rainfed (no irrigation), two irrigations (at bud initiation and pod development stage) and three irrigations (at bud initiation, flowering and pod development stage). Sub plot treatments were four plant geometries i.e. 120 x 45 cm, 60-120 x 60 cm, 75-150 x 45 cm and 90-180 x 45 cm. All the growth, yield and yield attributes *viz*., plant height, number of functional leaves, leaf area, number of branches, dry matter production, number of pods plant^{-1}, seed yield (q ha^{-1}), straw yield (q ha^{-1}), gross monetary returns (Rs ha-1), net monetary returns (Rs ha-1)and benefit to cost ratio were significantly higher with application of three irrigation (I_2) treatment than two irrigation (I_1) and rainfed pigeonpea (I_0). The plant geometry of 90-180 x 45 cm recorded significantly higher number of functional leaves, leaf area, number of branches, dry matter, pods plant^{-1}, pod weight (g) and seed yield plant^{-1} during both the years but plant height, seed yield (q ha^{-1}), straw yield (q ha^{-1}), gross monetary returns (Rs ha-1), net monetary returns (Rs ha-1)and benefit to cost ratio were higher with plant geometry of 75-150 x 45 cm than any other due to higher plant population ha^{-1}. Treatment combination of three irrigations (I_2) with 75-150 x 45 cm plant geometry recorded significantly higher seed yield (q ha^{-1}), net monetary returns (Rs ha-1)and benefit to cost ratio during both the years. Interaction effects of irrigation and plant geometries on different growth, yield and yield attributes were not visible during both the years of experimentation.
Keywords: Pigeonpea, Plant geometry, Irrigation, Paired row planting

Yield attributes and economics of pigeonpea (*cajanus cajan* (L.) Millsp.) as influenced by precision application of irrigation water and plant geometry

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ABSTRACT
A field experiment was conducted at Agronomy Farm, College of Agriculture, Parbhani during *kharif* season of 2012-13 and 2013-14. The experiment was laid out in split plot design with three main plot treatments and four sub plot treatments. The main plot treatments were irrigation schedules as rainfed (no irrigation), two irrigations (at bud initiation and pod development stage) and three irrigations (at bud initiation, flowering and pod development stage). Sub plot treatments were four plant geometries i.e. 120 x 45 cm, 60-120 x 60 cm, 75-150 x 45 cm and 90-180 x 45 cm. Gross monetary returns (Rs ha^{-1}), net monetary returns (Rs ha^{-1})and benefit to cost ratio were significantly higher with application of three irrigation (I_2) treatment than two irrigation (I_1) and rainfed pigeonpea (I_0). Gross monetary returns (Rs ha^{-1}), net monetary returns (Rs ha^{-1})and benefit to cost ratio were higher with plant geometry of 75-150 x 45 cm than any other due to higher plant population ha^{-1}. Different plant geometries did not show any significant impact on quality parameters like protein content (%) and test weight (g) during both the years of

experimentation. Treatment combination of three irrigations (I_2) with 75-150 x 45 cm plant geometry recorded significantly higher net monetary returns (Rs ha^{-1})and benefit to cost ratio during both the years.

Keywords: Pigeonpea, Plant geometry, Irrigation, Paired row planting

Molecular tools for management of Insect Pest in Crop Plants

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ABSTRACT

The transgenic crops developed for insect resistance need to be compatible with other components of integrated pest management programmes for pest resistance to be durable and impact on agricultural systems. The ideal transgenic technology should be commercially feasible, environmentally benign (biodegradable), and easy to use in diverse agroecosystems as well as show a wide-spectrum of activity against the crop pests. It should also be harmless to the natural enemies, target the sites in insects that have developed resistance to the conventional pesticides, flexible enough to allow ready deployment of alternatives (if and when the resistance is developed by the pest), and preferably produce acute rather than chronic effects on the target insects.

Introduction

Recent advances in plant molecular biology have opened new avenues for the production of genetically engineered plants and in the precise transfer of novel genes into crop plants from diverse sources. A series of genes has been transferred through various transformation techniques including genes for several agronomically important traits such as herbicide resistance, enzyme inhibiters (amylase inhibiters, protease inhibiters), lectin proteins, disease and insect resistance. The application of transgenic technology has resulted in useful GM insect-resistant varieties by genetic engineering (GE). Crops expressing Cry toxins derived from Bacillus thuringiensis (Bt) have been planted globally and are a vital tool for pest control. Molecular techniques employed for identifying and monitoring establishment and dispersal of specific biotypes of natural enemies. Production, formulation and storage of entomopathogenic fungi can be dramatically improved through biotechnology and genetic engineering.

GMCs are plants used in agriculture, the DNA of which has been modified using genetic engineering methods. The aim is to introduce a new trait to the plant which does not occur naturally in the species. With the advent of genetic transformation techniques, it has become possible to clone and insert genes into the crop plants to confer resistance to insect pests (Bennett, 1994). The first genetically modified plant was produced in 1983, using an antibiotic-resistant tobacco plant. The first genetically modified food approved for release was the Flavr Savr tomato in 1994. China was the first country to commercialize a transgenic crop in 1993 with the introduction of virus-resistant tobacco. A series of genes has been transferred through various transformation techniques including genes for several agronomically important traits such as herbicide resistance, quality improvement, disease and insect resistance, virus resistance, slow ripening and softing (Willmitzer, 1988; Shi et al. 1994) [66, 56] . The introduction of transgenic technology has added a new era to pest control and becoming vital component of integrated pest management worldwide. In the past two decades, transgenic technology has been developed to generate insect-resistant crops for reducing both yield loss and pesticide utilization (Christou et al. 2006) [14]. Resistance to insects has been demonstrated in transgenic plants

expressing genes for delta-endotoxin from Bacillus thuringiensis (Bt), protease inhibitors, α-amylase inhibitors, enzymes and plant lectins (Sharma et al. 2000; Padul et al. 2012) [54-55, 46] . Bacillus thuringiensis (Bt) insect-resistant crops are one of the most outstanding achievements in plant transgenic technology, which have achieved significant success economically and ecologically. Most of the plant derived genes produce chronic rather than toxic effects and some insect pests are not sensitive to some of these factors. The potential of plant derived genes can be realized by deploying them in combination with host plant resistance and exotic genes. Genes conferring resistance to insects have been inserted into crop plants such as maize, cotton, potato, tobacco, potatoes, rice broccoli, lettuce, walnuts, apples, alfalfa and soybean (Griffiths, 1998) [26] . The need for genetic transformation of crops to improve crop production in the developing world has been discussed by Sharma and Ortiz (2000) [54-55]. There is an urgent need to develop a scientifically sound strategy to deploy exotic genes for minimizing the extent of losses caused by insect pests. Equally important is the need for following the biosafety regulations, more responsible public debate, social attitude and better presentation of the benefits for a rational deployment of the genetically transformed plants.

Importance of Biotechnology

There is a continuing need to increase food production, particularly in the developing countries and this increase has to come from increased yields from major crops grown on existing cultivable lands. The most important objective is to alter the amino acid compositions to improve the nutritional properties of seeds. De Lumen (1990) [18] has discussed some of the molecular approaches to improve the nutritional and functional properties of seeds for food purposes. Genetic engineering can be used to improve protein quality by way of increasing the proportion of a specific amino acid within a protein. Genes from bacteria such as Bacillus thuringiensis (Bt) and Bacillus sphaericus (Gill et al. 1992; Charles et al. 1996) [25, 15] have been the most successful group of organisms identified for use in genetic transformation of crops for pest control on a commercial scale. Protease inhibitors, plant lectins, ribosome inactivating proteins, secondary plant metabolites, vegetative insecticidal proteins from Bt and related species, and small RNA viruses can also be used alone or in combination with Bt genes to generate transgenic plants for pest control (Hilder and Boulter, 1999) [30] .

Application of Biotechnology for Insect Pest Management

Biotechnology has a significant role in improving efficacy, cost-effectiveness and in expanding the markets for the bio insecticides. Molecular techniques employed for identifying and monitoring establishment and dispersal of specific biotypes of natural enemies. (Tipvadee, 2002) [62]. It provides opportunities for the development of insect natural enemies conferring beneficial traits such as pesticide resistance, cold hardiness and sex ratio alteration. A number of insect-specific baculoviruses (NPVs) have been modified to contain genes which, when expressed in the host insect, produce insecticidal effects (Bishop, 1989). Development and deployment of transgenic plants with insecticidal genes for pest control will lead to reduction in insecticide sprays and increased activity of natural enemies (Sharma et al. 2000) [54-55] .

Gene's transfer for resistance to insects *Bacillus thuringiensis* (Bt)

Bacillus thuringiensis is a soil inhabiting gram-positive, faculatitive bacterium, which produces proteinaceuos crystalline inclusion bodies during sporulation. Ishiwata discovered this bacterium in 1901 from diseased silkworm (Bombyx mori) larvae. Berliner (1915) [7] isolated it from diseased larvae of Ephetia kuhniella and designated it as Bacillus thuringiensis. Bt toxins are highly effective for many insect pest, like lepidopterans, coleopterans, dipterans and other related species (Talukdar, 2013) [61]. Genetic manipulation of Bt genes encoding for proteins toxic to

insects offers an opportunity to produce genetically modified strains with more potent. Bt is a potent insecticide containing crystal protein endotoxin. The Bt-crystal (Cry) insecticidal protein (δ-endotoxin) genes are highly specific and represent a class of numerous proteins with insecticidal action on larvae from various orders. Cry1 and Cry2 aretoxic for lepidopteran pests, Cry2A for lepidopterans and dipteran pests, and Cry3 for coleopteran pests (Malone et al. 2008) [41]. Bt-cry protein is toxic to insects, but non-toxic to humans and animals. When the insect larvae feed on transgenic plant, crystals and spores are ingested into the midgut of the insect. Since the pH is alkaline in nature, so the the crystals become toxic to insect midgut leading to septicaemia. The first transgenic crop was grown in 1994 and large-scale cultivation was taken up in 1996 in USA (McLaren, 1998) [42] and subsequently grown in several countries including Argentina, Australia, China, Colombia, Indonesia, Mexico, South Africa, and India (James, 2011) [36]. The adoption of Bt crop varieties by farmers has been rapid reflecting the benefits of these crops such as reduced insecticide use, lower production costs and higher yields (Brookes and Bar foot 2005) [10] . Bt-maize and Bt-cotton are the only insect-resistant GM crops for commercial planting in world (Ibrahim mabubu et al. 2016) [34]. The first generation of insect-resistant crops that were commercialized expressed single Bt-Cry genes. Each produce a single Bt-toxin active against important lepidopteran pests and kill a narrow set of target pests, which poses a relatively high risk that insect will evolve resistance to the toxin. This narrow range of action and concerns about the evolution of pest resistance accelerated to the development of Bt-crops producing more than one toxin. Second generation Bt crops have between two to six different toxins (Tabashnik et al. 2009) [59]. According to Gatehouse et al. (2008) [23, 41] second and third generations have mitigated this risk by stacking or pyramiding different genes such as multiple but different Cry genes and Cry genes combined with other insecticidal proteins, which target different receptors in insect pests but also provide resistance to a wider range of pests and delay evolution of resistance in pests. In comparison to singletoxin Bt crops, multi-toxin Bt-crops can be more effectively control pests and reduce crop damage, which may increase environmental and economic benefits. The effect of Bt toxins on a range of lepidopteran insects has been studied including, Helicoverpa armigera (Estela et al. 2004) [20] , Heliothis virescens (Ryerse, 1990) [49] , Ostrinia nubilalis (Hua et al. 2001; Li et al. 2004) [33, 39] and Spodoptera littoralis (Avisar et al. 2004) [2]. VIP 3 has been isolated from B. thuringiensis supernatants, which is highly toxic to Agrotis and Spodoptera (Estruch et al. 1996) [19]. VIP 3A+ Cry 1Ab expressing line (Cot 102/67B) gives maximum mortality of susceptible and resistance strain of Heliothis virescens as compared to individual toxin expressing line and non Bt line. Bacillus israeliensis has been used extensively for the control of mosquitoes (Barjac de and Sotherland, 1990) [4] . *Bacillus thuringiensis* var. morrisoni and B. israelensis carry four genes that encode mosquito and blackfly toxins Cry IVA, Cry IVB, Cry IVC and Cry IVD (Bechtel and Bulla, 1976) [5].

Resistance Management Principles for Bt Crops

Recently there have been reports of field resistance to Bt crops in pink bollworm, Pectinophore gosspiella, cotton bollworm (Helicoverpa spp. armyworm (Spodoptera frugiperda) and western corn rootworm, Diabrotica virgifera virgifera (Tabashnik et al. 2008) [60] . A refuge strategy is necessary to ensure long term resistance management. The main approach for delaying evolution of resistance to Bt crops is the refuge strategy. Farmers are mandated to maintain an abundance of host non-Bt crops as a refuge surrounding their Bt crops (Gould, 1998) [27] . Gene pyramiding strategy also play important role in insect pest resistance management. Genes, that have been used in genetic transformation of crops, are either too specific or are only mildly

effective against the target insect pests. Some insect species are also insensitive to some of these genes. Therefore, to convert transgenes into an effective weapon in pest control, e.g., by delaying the evolution of insect populations resistant to the target genes, it is important to deploy genes with different modes of action in the same plant. Activity of Bt in transgenic plants can be enhanced by serine protease inhibitors (MacIntosh et al. 1990) [40]. Activity of Bt can also be increased in combination with tannic acid (Gibson et al. 1995) [24] . According to Hoffmann et al. (1992) [31] tobacco plants expressing *Bacillus thuringiensis* var. kurstaki HD-73 delta endotoxin or cowpea trypsin inhibitor (CpTI) for their efficacy against Helicoverpa zea in the field. Mortality of H. zea larvae was significantly higher and leaf damage significantly lower for the genotypes containing *Bacillus thuringiensis* gene compared with nontransgenic control. Transgenic sugarcane plants engineered to express either the potato proteinase inhibitor II or the snowdrop lectin gene showed increased antibiosis to larvae of sugarcane grubs (Antitrogus consanguineus) in glasshouse trials (Nutt et al. 1999) [44] . Grower education, adoption, and compliance are essential to the implementation and success of a long term resistance management strategy. Bt crops are to be used as part of an integrated pest management programmme to enhance pest management goals. Coordinated annual performance monitoring and surveillance is necessary to detect or follow resistance development. IRM strategies should be tailored to address specific regional resistance management concerns, as appropriate. Deployment of IPM tactics with different modes of action, including conventional pesticides, Bt toxins expressed in crops with different modes of action, biological control methods and other control methods, it is essential for sustainable pest management goals. Continued resistance management research should be conducted to evaluate the effectiveness of and be used to modify, as necessary, IRM, strategies for Bt crops. Immediate and coordinated remedial action for suspected and confirmed incidents of resistance is necessary.

Alpha amylase inhibitors

The enzyme inhibitors impede digestion through their action on insect gut. Digestive enzymes alpha-amylases and proteinase, which play a key role in the digestion of plant starch and proteins (Franco et al. 2000). Carbohydrate metabolism in insects has been targeted through the use of aamylase inhibitors. Amylase inhibitors from wheat (WAAI) and common bean (BAAI) have been identified. Since the metabolic energy requirement is essential for larval development, this energy is received by starch hydrolysates (Carlini, 2002) [12]. Insect pests like, Callasobruchus maculates seed weevils and maxican bean weevil, Zabrotus subfaciatus, Red flour beetle, Tribolium castaneum (Herbst) are extensively starch dependent insects and utilize a-amylase for their survival (Strobl, 1998; Cinco, 2008) [58, 16] . Transgenic tobacco expressing WAAI gene has been reported to increase mortality of the lepidopteran larvae between 30 to 40% (Carbonero et al. 1993) [11]. Genes encoding for BAAI have been expressed in pea by the pha1 gene promoter to direct high levels of expression in seeds to increase the levels of resistance to Collosobruchus spp. (Shade et al. 1994; Schroeder et al. 1995) [52, 51] . Amylase inhibitors occur in many plants as part of the natural defense mechanisms. Amylase inhibitors are of great interest as potentially important tools of natural and engineered resistance against pests in transgenic plants (Ishimoto, 1989; Valencia, 2000) [35, 63].

Protease Inhibitors

Protease inhibitors inhibit the protease activity of various proteolytic enzymes, causes hyper production of digestive enzymes which enhances the loss of sulphur amino acids, which leads to stunted growth and weaker insects. (Johnson et al. 1989; Hilder et al. 1992) [37, 29, 31] . Serine proteinases have been identified in extracts from the digestive tracts of insects from many

families, particularly those of Lepidoptera (Houseman, 1989) [32] and many of these enzymes are inhibited by proteinase inhibitors. Serine proteinase inhibitors have anti- nutritional effect against several lepidopteran insecspecies (Applebaum, 1985) [1]. Trypsin inhibitors at 10% of the diet were toxic to larvae of the Callosobruchus maculates (Gatehouse, 1983) [22] and Manduca sexta (Shulke, 1983) [57] . The transgenic plants were resistant against herbivorous insects such as Callosobrchus maculatus, Heliothis spodoptera and Diabrotica and Tribolium sp. (Johnson et al ., 1989) [37] transformed tobacco plants with gene coding tomato and potato inhibitor proteins and the transgenic plants found resistant to M. sexta. The possible role of protease inhibitors (PIs) in plant protection was investigated as early as 1947, when Mickel and Standish observed that the larvae of certain insects were unable to develop normally on soybean products. Subsequently the trypsin inhibitors present in soybean were shown to be toxic to the larvae of flour beetle Tribolium confusum (Lipker, 1954) [38].

Plant lectin

Plant lectins are a heterogenous group of sugar binding proteins, which have a protective function against a range of organisms (Sharma et al. 2000) [54-55]. The most likely mechanisms underlying the entomotoxic activity of lectins involve interactions with different glycoproteins or glycan structures in insects, which may interfere with a number of physiological processes in these organisms. Since lectins possess at least one carbohydrate-binding domain and different sugar specificities and considering the variety of glycan structures in the bodies of insects (Vandenborre et al. 2011; Vandenborre et al. 2010) [64, 65] , possible targets for lectin binding are numerous. Antinutritional effects are often observed as a result of lectin ingestion and could affect several biological parameters in insects, such as larval weight, larval development period, adult emergence fecundity, pupation and survival (Oliveira et al. 2011) [45]. The snowdrop lectin (Galanthus nivalis agglutinin or GNA) has received particular attention due to its toxic effects against hemipterans and other economically important insect pests. Powell et al. (1998) [47] showed GNA binding to cell surface carbohydrate moieties in the midgut epithelium of brown rice plant hoppers (Nilaparvata lugens). Lectins produce chronic effects on survival and development of insect pests belonging to different insect orders (Czapla and Lang, 1990; Habibi et al. 1992) [17, 28] . Transgenic tobacco expressing pea expressing pea lectin has shown adverse effects against H. virescens (Boulter et al. 1990) [9].

Secondary plant metabolites

Secondary plant metabolites such as alkaloids, steroids, foliar phenolic esters (rutin, cholorogenic acid, etc.) terpenoids, cyanogenic glycosides, glucosinolates, saponins, flavonoids, pyrethrins and non-protein amino acids act as potent protective chemicals. Some of the secondary plant metabolites are produced in response to insect feeding, infection by pathogens, and abiotic stress factors. These compounds are called phytoalexins (Sharma and Agarwal, 1983) [53] . Secondary metabolites present in plants apparently function as defense (toxic), which inhibits reproduction and other processes (Rattan, 2010) [48] . Detarium microcarpum, Sclerocarya birrea, Piper guineense as seed protectants for maize (Sitophilus zeamais), Cassia nigricans Vahl oil and the plant as grain protectants of stored wheat weevil, Tribolium casteneum, as well as containing biologically active compounds, that may serve as candidates for new formulations in the treatment and prevention of livestock diseases and pest management (Ayo, 2010) [3]; Lantana camara as grain protectants of cowpea seeds Causus maculates (Schery 1954; Champagne et al . 1989) [50, 13] . Arabidopsis mutants deficient in linoleic acid cannot synthesise jasmonate and are susceptible to the fungal gnat (Bradasia impatiens). Xu et al. (1993) [67] observed enhanced resistance in rice by wounding methyl jasmonate and abscisic acid in

transgenic plants.

Future of transgenic crops for insect pest management

Over the next years, there is continuing need to increase food production. The implementation of agricultural machinery and food technology plays a prominent role in this increase, as well as the amplification of planted land. With the wide food supply, insect attacks will probably increase in the same proportion. Transgenic crops have clearly increased profitability for farmers in developed and developing countries. We need to pursue the management strategy that reflects the pest biology, insect plant interactions and their influence on the natural enemies to prolong the life span of the transgenics. Refugia can play an important role in resistance management and should take into account the pest complex, the insect hosts and the environment. Expression of more than one gene (gene pyramiding) and single chain antibody genes, which would be compatible with the likely trends in pesticide discovery using biology derived target based methods. Equally important is the need to follow the biosafety regulations and make this technology available to farmers, who cannot afford the high cost of seeds marketed by the private sector.

Conclusion

The continuous use of pesticides for crop protection had resulted in damaging impact on biological ecosystems. The use of target specific compounds with low persistence of intrinsic plant resistance mechanisms are safer alternative strategies for effective insect pests' management. The transgenic crops developed for insect resistance need to be compatible with other components of integrated pest management programmes for pest resistance to be durable and impact on agricultural systems. The ideal transgenic technology should be commercially feasible, environmentally benign (biodegradable), and easy to use in diverse agroecosystems as well as show a wide-spectrum of activity against the crop pests. It should also be harmless to the natural enemies, target the sites in insects that have developed resistance to the conventional pesticides, flexible enough to allow ready deployment of alternatives (if and when the resistance is developed by the pest), and preferably produce acute rather than chronic effects on the target insects. However, the use of biotechnology brings questions regarding the potential impact of those genetically modified organisms (GMOs) or plants to human, animal and environment. National biosafety and regulatory systems for proper management of GMOs must be in place to enable the full exploitation of biotechnology.

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Screening of Brinjal (*Solanum melongena* L.) genotypes across locations in Kashmir Valley for Alternaria Leaf Spot.

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Purpose:
Brinjal or Aubergine or eggplant (*Solanum melongena* L.) globally grown as warm season crop in most tropical and subtropical parts and in some temperate regions in summers. It is one of the highly nutritional vegetable crop with low calorific value, rich medicinal importance and used as a staple vegetable crop in many regions for liking towards its taste and availability in most seasons. The present investigation was carried out to screen suitable brinjal germplasm against Alternaria leaf spot (*Alternaria alternata*) disease incidence in field conditions.
Methods:
The experiment was carried out at three locations across the Kashmir valley viz., Vegetable experimental field Shalimar, Bandipora and Kupwara with 11 suitable genotypes and local check. The RCBD design layout was followed with the spacing of 60 x 45 cm. All recommended package of practices were followed to raise the good crop. The observations on yield attributing traits and disease incidence were recorded throughout growing period of crop. All the genotype were screened for disease incidence in field condition and sample from infected plants were collected to identify the pathogen i.e. *Alternaria alternata* .
Results:
The results revealed that the mean disease incidence was 5.92% ranging from 1.02 to 11.76 %. Maximum disease incidence was observed with the genotype B12 (11.76%), followed by B2 (9.35) , B11 (9.25), B8 (8.66) while minimum disease incidence was recorded with the genotype B6 (1.02) , B5 (1.14) . The highest reduction in yield due to disease incidence was reported in B7 (-38.59 %) followed by B9 (-23.20%), B5 (17.72%) and B10 (-14.57 %) as compared to local check.
Conclusion:
The study revealed that the genotypes viz., B6, B5 were immune, and genotypes viz., B4, B3 showed resistant reaction.
***Keywords**:* Brinjal, Alternaria, Leaf spot, Screening for disease

Seasonal incidence of Fall armyworm, *Spodoptera frugiperda* on maize in relation to meteorological parameters in Aligarh, India

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ABSTRACT

A field experiment was conducted to study the seasonal incidence of fall armyworm, *Spodoptera frugiperda,* during 2020 and 2021 at the Faculty of Agricultural Sciences, Aligarh Muslim University, Aligarh. The relationship between weather parameters and larval population of Fall armyworm, *Spodoptera frugiperda*, in the kharif season of 2020 and 2021 revealed that *S. frugiperda* incidence began in the third week of July (29th SMW) with a mean population of 1.07 larvae/ plant and 13.33 and 1.35 larvae/ plant and 16.67 per cent plant damage, respectively. Infestation increased and touched its peak (2.08 larvae/ plant) in the first week of August (31st SMW) and (2.47 larvae/ plant) in the second week of August (32nd SMW), respectively. The percent of plant damage increased with time and reached up to 48.33 and 58.33 percent during the last week of September (39th SMW). The cob damage by *S. frugiperda* started at 12.22 % and 13.33% in the first week of September and peaked (36.67%) and (42.22%), respectively in the last week of September. The *S. frugiperda* larval population exhibited a positively significant correlation with mean temperature (r = 0.54) and (r = 0.64), while negatively non-significant with mean relative humidity (r = -0.23) and (r = -0.23), negatively non-significant with rainfall (r = -0.62) and (r = -0.51), respectively.

Keyword: Maize, Fall armyworm, Seasonal incidence, Meteorological parameters

Integrated Nutrient Management in Cauliflower

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ABSTRACT

Integrated Nutrient Management (INM) refers to the practice of using a combination of organic and inorganic fertilizers to enhance soil fertility and crop productivity. Cauliflower is an important vegetable crop that is widely grown in many parts of the world. In recent years, the use of INM techniques has gained popularity among cauliflower growers as a means of improving yield and quality of the crop. This abstract aims to review the various INM practices that have been used to enhance the growth and yield of cauliflower. Several studies have shown that the use of INM techniques such as the application of farmyard manure, vermicompost, and biofertilizers in combination with chemical fertilizers has resulted in significant improvements in the yield and quality of cauliflower. The application of INM techniques has also been found to improve soil health and reduce the harmful effects of chemical fertilizers on the environment. Additionally, INM practices have been shown to enhance the nutritional value of cauliflower, making it a more nutritious and healthy vegetable. Over all, the use of INM techniques in cauliflower cultivation has proven to be a promising approach for enhancing crop productivity and sustainability. Further research is needed to identify the most effective INM practices for different soil types and climatic conditions, as well as to determine their long-term effects on soil health and crop productivity.

Keyword: Integrated Nutrient Management, Cauliflower, Crop, Organic Fertilizers, Inorganic Fertilizers

Weed Management Practices on Weed Density of Lentil (*Lens culinaris* Medik. L.).

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ABSTRACT
The experimental results revealed that hand weeding at 40 DAS significantly resulted in lower weed density, lower weed dry matter and recorded highest weed control efficiency. Amidst the chemical weed management, the lowest total weed density, weed dry matter and maximum weed control efficiency were recorded under pendimethalin + imazethapyr 1000 g ha^{-1} PE which was at par with pendimethalin + imazethapyr 750 g ha^{-1} PE and pendimethalin + imazethapyr 500 g ha^{-1} PE treatment. The tallest plants (31.50 cm), maximum dry matter accumulation (51.37 g) and crop growth rate between 30-60 DAS and 60 DAS-harvest (30.55 g m^{-2} day^{-1}) were observed under HW at 40 DAS. Among chemical weed management practices tallest plants (24.19 cm), highest dry matter accumulation (43.30 g), crop growth rate at 30-60 DAS and 60 DAS-harvest (25.26 g m^{-2} day^{-1}) were observed with the application of pendimethalin + imazethapyr 1000 g ha^{-1} PE, it was closely followed by pendimethalin + imazethapyr 750 g ha^{-1} PE and pendimethalin + imazethapyr 500 g ha^{-1} PE treatment.

Mycorrhiza and Phosphate Solubilizing Bacteria: Potential Bioagents for Sustainable Phosphorus Management in Agriculture

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ABSTRACT
Phosphorus (P) is a critical nutrient that plays an essential role in improving soil fertility for optimum plant growth and productivity. It is one of the most deficient macro-nutrients in agricultural soils after nitrogen and is considered inadequate for plant growth and production. To P availability in soils, the farmers are applying huge amounts of synthetic P fertilizers that adversely affect the wider environment, groundwater, soil fertility and microbial population. Many beneficial microbes are known to release and supply soluble P for improving growth and yield of a variety of plants in a sustainable manner in P deficient soils. Thus, inoculation of these microbes, including arbuscular mycorrhizal fungi (AMF) and phosphate solubilizing bacteria (PSB) to soil to enhance crop production without harming the environment, is an alternative approach to chemical fertilizers. The combined role of AMF and PSB in P solubilization is not well understood and the application and mode of action of these microbial groups are often naive due to variation in the environment. Therefore, the current review article would develop a better understanding of the interactive role and mechanisms of AMF and PSB in improving P availability from both organic and inorganic sources in a sustainable crop production system. Finally, the current review would loop out further avenues for researchers interested to commercially produce effective AMF and PSB-based biofertilizers for sustainable management of phosphorus over a wide range of agricultural crops worldwide.

Promising arranged impacts of Ashwagandha on broiler execution and carcass characteristics: A comprehensive review

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ABSTRACT
Poultry production contributes significantly to closing the world's food deficit. Many countries prohibit the use of antibiotics as growth promoters due to increased disease/resistance to antibiotics and the presence of antibiotics in the bird's tissues. That's why the world is turning to other ways to improve bird production and prevent disease. Ashwagandha is commonly known as winter cherry, *Withania somnifera* is abundant in many countries around the world and is considered a potent herbal medicine due to its special chemical, chemical, biological and physiological properties. The plant has antioxidant, cardioprotective, immunomodulatory, antiaging, neuroprotective, antidiabetic, antibacterial, antistress, antitumor, hepatoprotective and growth promoting activities. In chickens, the addition of lily juice to feed has been shown to improve feed intake, weight gain, feed quality and conversion rate, as well as reduce mortality, increase survival, improve disease, reduce stress, and protect chicken health. In this review, the distribution, chemical structure and biological effects of *W. somnifera* and its effects on chicken production, survival, physiological characteristics, good meat, bad blood, immunity and economic activity are presented.

Keywordss: Ashwagandha, Antioxidant, Immunomodulatory, Cardioprotective and Antidiabetic

Reviewing the freerange chicken: Using resources to improve the economic status of rural people

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ABSTRACT
The backyard poultry production system is the most popular poultry farming practice in rural part of country. Backyard poultry production contributes about 15 percent of total poultry output today in India. Backyard poultry production is mostly based on traditional local breeds, producing both chicken meat and eggs. The laying potential of indigenous birds in terms of egg production is quite poor which ranges from 80 to 100 eggs/ bird/ year and their body weight gain is also very low. Backyard production requires an enclosed area which is having a few hens and a cock. Birds feed by scavenging or are provided with household scraps and crop by-products. In the recent past, improved backyard varieties (like Vanaraja, Gramapriya, Srinidhi, Giriraja, IBL80, Chabro, etc.) developed mostly by public sector and a few by private sector (like Kuroiler, Rainbow rooster) are substantially contributing to the total egg and chicken meat production in rural areas of the country. Poultry manure can be used directly as fertilizer and preparation of vermicompost that can further used as fertilizer in kitchen gardening. Vermicompost can also be sold for income generation. Backyard poultry production can make a useful contribution to achieve nutritional security among rural masses and subsidiary source of income for poor households or weaker section of society.

Keywords: Backyard poultry, Egg, Chicken meat and Laying potential

A review: Rabbit Farming in India

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ABSTRACT
The domestic rabbit belongs to genus *Oryctolagus cuniculu*s which has 38 important breeds and 77 varieties of European rabbits. The domestic rabbit is known to produce quality meat, fur and fine quality animal fibre. Keeping of rabbit has gained momentum in the recent years among the developing countries including India, owing to their small body size, rapid growth rate, high prolificacy, early maturity, shorter generation interval and ability to utilize forage and fibrous agricultural by-products. There has been a rising awareness in recent years on the virtues of broiler rabbit production as an alternative means of alleviating food shortages. Countries like India is also one of the fastest developing, which are also facing meat shortage of 4.66 g/day against the recommended requirement of 87 g/day.
Keywords: Rabbit, Fur, Prolificacy and Fibre

The use of non-conventional feed resources for livestock feeding in the tropics: A review

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ABSTRACT
Non-conventional feed resources (NCFR) use as replacement or as a supplement in the nutrition of livestock is discussed in this paper. Shortage of feed resources for livestock and poultry feeding diverted majority of research in the field of animal nutrition to look into possibilities to overcome this nutritional crisis. The possible and perhaps the most viable proposition could be the inclusion of non-conventional feed resources in livestock rations with suitable and complete feed technology that can utilize the feed sources with maximum efficiency. The purpose of this review, potentially available NCFR include agro-industrial by products, some common tropical browse plants and leaf meals. Some of these products are low in energy, proteins and contain high concentrations of lignin, silica and several anti- nutritional substances. The numerous multipurpose browse plants and leaf meals have been recognized as having significant potential in agro-forestry systems in the tropics. Browse plants that have been identified and have recently been studied include *Gmelina arborea, Myrianthus arboreus, Terminalia catappa, Dacroydes edulis* and *Tephrosia braceteolata*. Plant leaves are source of protein, such that there has been growing realization in use of plant leaf meals in livestock diets. Many authors have conducted studies on these leaves to estimate their nutritive values and usefulness in livestock nutrition. Such plants as wildflower, cassava leaf meal, *Microdermus puberula* leaf meal, *Vernonia amygdaliana* leaf meal and *Gliricidia sepium* leaf meal. It is obtained from results these studies have shown beneficial and economic values from the inclusion of these leaf meals in the diet of livestock.
Keywords: Non-conventional feed resources browse plants, leaf meals, agro-industrial by products, animal organic wastes.

The impact of LEDs on the growth of ornamental plants

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ABSTRACT

A key environmental component that affects plant growth and development is light. Plants use light for photosynthesis and for signalling purposes in various assimilation processes. The amount of natural light during specific times of the day frequently limits crop productivity in intensive horticulture systems. Several blooming species get artificial lighting to promote photosynthesis, induce an inductive photoperiod, or both. To increase plant output and product quality, physiological and biochemical changes are made, which have an impact on the morphology and operation of the plants. The use of light emitting diodes in floriculture, among other different artificial light sources, enables increased light (and energy) use efficiency in greenhouse production. It is understood that monochromatic wavelengths or their combination can be used with LED technology to enhance plant development. Blue, red, green, and far-red LED wavelengths have been found to positively affect plant shape, photosynthetic efficiency, blooming, and the production of secondary metabolites, which protects plants from oxidative stress. LED have been linked to the activation or suppression of genes that are involved in a number of processes, such as the creation of bioactive chemicals, the stimulation or inhibition of flowering, and so forth. To boost crop productivity and quality under various LED illuminations, it is necessary to understand the mechanisms underlying these interactions between LED wavelengths and genes. In the study of Maekew (2007), LED activity affected the development of anthocyanins in detached petals of carnations. LED effect on chrysanthemums in the study Kurilcik et al. (2008) enhanced root development and photosynthetic rate. Future plant growth and development will be revolutionised by LED technology.

Keywords: Light emitting diodes, Photosynthesis, Spectral light quality(red LED,blueLED,).

An overview of small-scale poultry production for food shortages in low-income countries

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ABSTRACT

Poultry production is an activity carried out by small farmers all over the world. The percentage of those engaged in this business exceeds the percentage of those engaged in all types of livestock in the country. Poultry ("scum") is the most important species worldwide, but at least eight other bird species are held as regional favorites for one species or the other. Many species or varieties within a species provide genetic material of real value and their seeds must be

preserved for future generations. Generally, live chicken, meat and egg production is less in very expensive or semi-intensive production machines, but it also reduces input (think, feed and medicine) costs. Poultry contributes to poverty reduction, home food security, job creation and is an asset that can be quickly converted into income. Women and children are often the main beneficiaries of small-scale production as leaders and owners. Housing is inadequate, mostly due to the scarcity and quality of stored food, and there are few health measures other than vaccination against Newcastle disease and avian flu. Trading or selling excess chicken is illegal, but the process is good for business. Usually there are few policies related to conventional production. There is an opportunity for owners to increase production and thus contribute to clean human well-being by managing education and improving the health and well-being of birds.

Impact of Biomedical Waste on Climate Change

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ABSTRACT

Any solid or liquid waste, including its container and any intermediate products, that is produced during the diagnosis, treatment, administration of medication, or immunization of humans or animals is referred to as biomedical waste. Hospitals, nursing homes, clinics, laboratories, medical, dental, and veterinary offices, home healthcare providers, and funeral homes are typical sources of biomedical waste. The current investigation was carried out at the Rajasthan University of Veterinary and Animal Sciences' Animal Biomedical Waste Disposal Technology Center in Bikaner, India. During present study a total of 50 biomedical waste samples were collected, weighing between 100 and 200 grams in pre-sterilized containers of various colors and then processed at an animal biomedical waste disposal technology center. The samples of biomedical waste were grown aerobically. To obtain isolated bacterial colonies, each sample of biomedical waste was streaked in primary, secondary, and tertiary form on Nutrient agar plates. These petri plates underwent a 24-hour, 37°C incubation period. For the isolation of Staphylococcus, Escherichia, and Bacillus, the isolated colonies were cultivated on Mannitol salt agar (MSA), Eosine Methylene blue agar (EMB), and Mannitol egg yolk polymyxin (MYP) agar plates, respectively, and incubated for 24 hours at 37°C. The growth was analyzed for colonial morphology and colour, and different types of colonies were subcultured on different nutrient agar plates in order to produce pure culture. Out of 50 biomedical waste samples tested in the current study, 16 samples (32% of the total) tested positive for Staphylococcus aureus, 14 samples tested positive for Escherichia coli, and 5 samples tested positive for Bacillus spp. (10%). The correct handling of biomedical wastes is extremely important in today's one health environment. This will guarantee the preservation of the ecological balance, biodiversity, and general wellbeing of the global community.

Keywords: Biomedical waste, Selective media, Microorganism

Global Warming: A Huge Effect on Climate Change and its Impact on Living Organism

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ABSTRACT
Global warming is the unusually rapid increase in Earth's average surface temperature over the past century, primarily due to the greenhouse gases released by people burning fossil fuels. The greenhouse gases consist of methane, nitrous oxide, ozone, carbon dioxide, water vapour, and chlorofluorocarbons. The weather prediction has been becoming more complex with every passing year, with seasons more indistinguishable, and the general temperatures hotter. Since the industrial and scientific revolutions, Earth's resources have been gradually depleted. Furthermore, the start of the world's population's exponential expansion is particularly hard on the environment. Simply put, as the population's need for consumption grows, so does the use of natural resources, as well as the waste generated by that consumption. Due to this consequences the number of hurricanes, cyclones, droughts, floods, etc., has risen steadily since the onset of the 21st century and it causes huge impact on human health, animal health, environment health and economic effects on the world wide. Control of global warming is very necessary for protection of our earth and living organism.
Keywords: Global warming, Climate change, living organism

Effect of precision nitrogen management techniques on nutrient use efficiency and soil health in wheat in rice-wheat cropping system

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ABSTRACT
The current study, titled "Effect of precision nitrogen management techniques on nutrient use efficiency and soil health in wheat in rice-wheat cropping system," was conducted in the *rabi* season of 2021–22 at the Crop Research Centre of Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, (U.P.). The experiment used a split plot design with three replications, and the treatments included four precise nitrogen treatments (N1- Control, N2- State recommendations, N3- LCC based nitrogen Application, and N4- SPAD based treatments) as subplot treatments, along with three conservation tillage treatments (C1- Conventional tillage, C2- Reduced tillage, and C3- Furrow irrigated raised bed (FIRB). In terms of precise nitrogen management, the SPAD and LCC treatments had the highest values of nutrient use efficiency (NUE), which was calculated using partial factor productivity (PFP), agronomic nitrogen use efficiency (ANUE), and apparent nutrient recovery (ANR). When soil health metrics including Organic Carbon (%) (OC), pH, and Electrical Conductivity (EC) were taken into consideration, it was shown that precision nitrogen management and reduced tillage both improved soil health parameters.
Keywords: Precision nitrogen management, Wheat and Soil health

Quality Forage: boom of sustainable dairy animal production

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ABSTRACT
Improved forage and feed species are an option of sustainable dairy animal production; it is mainly dependent on the production of adequate amounts and superiority of forages and fodder, especially in dry area. In India seasonal fluctuations of feed supply is a major problem in dry regions, particularly in low rainfall areas. To address these problems in the country, improve the quality of forages to support farm productivity, climate change resilience, and environmental sustainability, particularly in arid and semiarid regions. The country has a long history and is of some exemplary practices in indigenous improved forage production, but the input of improved forage to the total biomass production in feed resources is still low due to many factors like scarcity of forage land and water for irrigation, lack of consciousness, forage seed and variety, and policy recommendations. Despite the potential profits of feed and forage grasses and legumes, the availability of species adapted to a wide range of situations in actual use in the livestock sector has been insufficient. Therefore, it is strongly suggested that climate-resilient forage species be popularized to sustain livestock production and the environment, particularly in the country's arid and semiarid regions.
Keywords: Quality Forage, Sustainable dairy production.

Percent parasitism of Chiku moth, *Nephopteryx eugraphella* (Ragonot) on sapota under Western Maharashtra conditions

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In addition, 12 different species of predators and parasitoids were seen in association with sapota, including the larval-pupal parasitoid, *Xanthopimpala* sp., and the sapota chiku moth, *Nephopteryx eugraphella* Rogonot (Lepidoptera:Pyralidae), which was studied for its parasitism percentage in relation to weather parameters; showed greater parasitism (10.82 to 17.72%) in chiku moth larvae between the months of June and August.
Keywordss: Parasitismandchiku moth

1. Introduction

Manilkara achras (Mill.) Fosberg's name for the sapota (also known as *Achras zapota* Linn) belongs to the sapotaceae family and is also known as chico, chiku, ciku, dilly, nasberry, and sapodilla (Purseglove, 1968). It is a tropical plant that originated in Mexico and Central America and is now commonly farmed there. Maharashtra, Gujarat, Karnataka, Tamil Nadu, Andhra Pradesh, Kerala, Uttar Pradesh, West Bengal, Punjab, and Haryana are now among the states where it is grown. Gujarat, Karnataka, and Maharashtra are the three states with the most land planted in this crop. Maharashtra has a total area under sapota cultivation of 17,910 hectares, with a productivity of 8.73 tonnes per ha and an annual production of 1,56,470 tonnes (Anonymous, 2017). 'Kalipatti' is a distinguished kind of sapota and is widely produced in Gujarat and Maharashtra among the 41 types grown throughout India. The sapota tree was

attacked by about 25 insect pests (Butani, 1979). N. eugraphella, a prominent pest of sapota and active all year on sapota trees in Western Maharashtra, is one of the several insect pests that affect the plant. In Maharashtra, sapota farming is expanding daily, and at the same time, *N. eugraphella* is becoming a bigger threat. The goal of the current work was to identify any naturally available biocontrol chemicals that would be effective against different stages of the Chiku moth in Western Maharashtra's prevailing agro-climatic conditions.

2. Materials and Methods

During the insect pests' peak activity period, natural enemies (mostly predators and parasitoids) were seen at intervals of two weeks. From the orchard, the infected leaves, buds, and juvenile stages of the pests were removed and taken to the lab for more research. Predator visible stages were noted, whereas immature parasitiod stages were individually reared in plastic vials (5.5 cm height and 4.0 cm dia.) till adult emergence. The parasitoids that emerged from the bugs' various life stages were gathered and identified. The information was then transformed to percent parasitism.

3. Result and Discussion

Along with abiotic factors, natural enemies were crucial in reducing the insect population density in sapota orchards. In the current inquiry, the insect pests, primarily the chiku bud borer, chiku moth, and leaf miner, were observed during population dynamics studies in the sapota orchard. During the study periods of both years (2016–17 and 2017–18), the actions of natural defenders (parasitoids and predators) were simultaneously recorded at biweekly intervals. In the orchard, predatory chrysopids and spiders were seen, but their presence was sporadic and sparse. However, *Xanthopimpla* sp., a larval- pupal parasitoid, was discovered in both years parasitizing *N. eugraphella* larvae from June to October (Table 1; Plate 1). In 2016–17 and 2017–18, respectively, the parasitism rate varied from 2.78 to 17.95% and 3.57 to 17.50%. The parasitism was found to range from 3.17 to 17.72%, according to the pooled mean of the two years. The first fortnight of June saw the start of this parasitoid's activity, which peaked in the second fortnight of July with a mean parasitization rate of 17.72%. Following that, it progressively fell to 3.17 percent in the second half of October and vanished after November in both years. Gupta and Gangarde (1955) had described the unnamed hymenopterous larval-pupal parasites. Sran and Sandhu (1979) observed three separate species of larval and pupal parasites, namely Eurytomasp., *Xanthopimpla sp.,* and *Cadurcia sp.,* which collectively induced up to 35% parasitism on the chiku moth at Ludhiana. Similar to this, Patel (1996) reported the presence of three parasites on the chiku moth, including Apanteles sp. as a larval parasite, *Xanthopimpla* sp., and Compsilura sp. as a larval-pupal parasite. In light of the activity of *Xanthopimpla* sp. parasitizing chiku moths, the reports of earlier researchers (Sran and Sandhu, 1979; Patel, 1996) may support the current data.

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Table 1: Activity of *Xanthopimpla* sp. on *N. eugraphella* infesting sapota

Month & Fortnight	**Parasitism (%)***		
	2016-17	**2017-18**	**Mean**
April- I	0.00	0.00	0.00
II	0.00	0.00	0.00
May- I	0.00	0.00	0.00
II	0.00	0.00	0.00
June- I	6.25	4.55	5.40
II	11.76	12.50	12.13
July- I	13.89	13.51	13.70
II	17.95	17.50	17.72
August- I	11.90	12.50	12.20
II	10.53	11.11	10.82
September- I	5.88	5.71	5.80
II	4.76	5.26	5.01
October- I	6.52	7.50	7.01
II	2.78	3.57	3.17

*The observations are average of 20 individuals

Allelic Variation and DNA Polymorphism Level of SSR Markers in Coloured Cotton Genotypes

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Purpose

Cotton (*Gossypium hirsutum* L.) with naturally coloured lint, other than white, is commonly referred as coloured cotton. Cultivation of coloured cotton was discouraged and almost abandoned owing to its low yield, poor fibre quality and non-uniformity of colours. Recently, it is gaining increased importance in view of their eco-friendly nature. Understanding molecular variation or diversity is indispensable to identify diverse genotypes for developing superior cultivars signifying importance of this study.

Methods

A total of 33 cotton genotypes comprising 21 tetraploid brown (*G. hirsutum)*, 10 diploid brown (*G. arboreum)* and 2 tetraploid white coloured cotton genotypes were screened using 50 Simple Sequence Repeats (SSR) markers. CTAB DNA extraction method was followed for isolating DNA and genotypic data was analyzed using GenAlEx V 6.41 and Powermarker V 3.25 softwares.

Results

The fifty 50 SSR markers generated a total of 186 polymorphic loci with an average of 3.72 alleles per SSR locus. Number of different alleles (Na) was oscillated from 1 to 7 alleles in marker CGR-6378 (least diverse) and HAU-1430 (most diverse), respectively. The higher mean of alleles shows the diversity or variation present on the chromosomes as these SSR loci were

distributed throughout the genome. The Polymorphic Information Content (PIC) value displayed by the each marker varied from as low as 0.11 in three markers (CGR-5167, HAU-0590 and SHIN-1400) to as high as 0.89 in NAU-5433. Average PIC value of 0.59 per SSR locus was noticed indicating highly informative nature of the markers. Thirty four markers had PIC value higher than 0.50 inferring potentiality of the markers chosen while converse was true for sixteen markers. In current study, observed high number of alleles might be due to the fact that genotypes used included tetraploid and diploid species of brown and white coloured genotypes contributing to their diverse nature.

Conclusions

The study concludes the prevalence of high allelic variation and DNA polymorphism level for SSR markers in coloured cotton genotypes insinuating opportunities for developing superior cultivars.

Keywords: Coloured Cotton, SSR, CTAB, DNA Polymorphism, PIC.

Study of biology of pulse beetle, *Callosobruchus chinensis* L. and screening of promising variety of Bengal gram *Cicer arietinum* L. with the management through botanicals '*in-vitro'*

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ABSTRACT

Chickpea, *Cicer arietinum* L. is considered as "king of pulses" and also known as cici, bengal gram or garbanzo beans and old-world pulse because it was first time grown in the Levant and ancient Egypt, belongs to family fabaceae. Among various thrests in limiting the production of chickpea, pulse beetle *Callosobruchus chinensis* L. is a serious issue of concern particularly in storage . An investigation was carried out to determine the susceptibility status of 22 genotypes of chickpea against C. *chinensis*. The study on biological parameters revealed that the average egg period of C. *chinensis* was 5.33 days; larval + pupal period was 22.0 days and total egg to adult period recorded as 28.66 days. Adult male and female longevity was recorded as 8.0 and 10.33 days, respectively. However, pre oviposition and oviposition period were observed as 0.66 and 9.0 days, respectively. The fecundity was 78.4 along with 86 per cent hatchability and sex ratio (male: female) was observed as 1:0.82. The mean development period ranged from 21-29 days and growth index (GI) was recorded in between 0.031-0.074. On the basis of Growth index, grouping of genotypes showed that six genotypes viz., CL 2, CL 4, CL 6, CL 8, CL 13 and CL 21 and two genotype CL 15 and CL 18 into categorized resistant and highly susceptible, respectively,. These genotypes may be utilized as potential donor in the development of highly tolerant varieties against C. *chinensis* in future breeding programme. Different materials viz., oils and leaf powder of different plant were tested for their efficacy against the pest, C. *chinensis*. Treatment clove oil @ 1 ml/kg seed was found more effective on the basis of oviposition. Chickpea seeds treated with clove oil @ 1 ml/kg and *neem* leaf powder @ 15 g/ kg seed were also found more effective on the basis of adult mortality, adult emergence and seed damage. The treatment eucalyptus leaf powder @ 15 g/ kg seed was found least effective.

Sprinkler irrigation system in hamirpur district of bundelkhand region

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ABSTRACT
Pulses are main crop in Hamirpur district of Bundelkhand region. The irrigation facilities in Hamirpur district are very limited due rainfall deficit recorded in region continuously. Only 27.7% land are irrigated, remaining 72.3 % land comes under rainfed situation. Canals are main source of irrigation, which causes physiological wilt in pulse crop. This situation has a great scope of water saving irrigation methods viz. sprinkler and drip irrigation system. Keeping theses points in mind we were demonstrated this irrigation system in Hamirpur district of Uttar Pradesh to maximize the irrigation water use efficiency and to avoid the losses of pulse production due to physiological wilt. The crop was sown with row spacing of 30 cm apart and plant to plant spacing was about 10 cm. The Sowing was completed in month of October with seed drill. Two irrigations were given at vegetative and pod formation stage of the crop with sprinkler irrigation system. The data were analyzed statistically using appropriate application. The plots having demonstrations produced about 34.8 % higher yield and cost of cultivation was decreased by about 11%. The benefit: cost ratio of 2.52 was computed.

Keywords: Pulses, Irrigation, Sprinkler, Hamirpur, Bundelkhand

***In vitro* evaluation of botanicals against *Claviceps fusiformis*, causing ergot of bajra**

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PURPOSE:
Ergot caused by *C. fusiformis* is one of the most widely spread and destructive disease of pearl millet. Pathogen induces honey dew, sclerotia which accounts 70% loss in susceptible varieties and estimated 58-70% grain yield reduction in hybrids. Therefore, present *in vitro* study was planned in CRD with some botanicals/ plant extracts against *Claviceps fusiformis*
METHOD: Those botanicals reported earlier effective against many pathogens and which are locally available was evaluated *in vitro* against *claviceps* ergot of pearl millet applying poisoned food technique (Nene and Thapliyal, 1993) and using PDA as basal medium. All the plant extracts were evaluated @ 5% and 10%. The percent inhibition was calculated by the following formulae given by Vincent (1927).
$R = \{(C - T) / C\} \times 100$
Where, R = Per cent inhibition, C= Radial growth of pathogen colony in control, T= Radial growth of pathogen colony in treatment
RESULT: Neem was found most effective at 5% and 10% inhibited mycelial growth (36.66% and 48.14%) with least mycelial growth (57 mm and 43 mm) followed by Onion and Garlic (34.81 % and 45.18%) and (34.07 % and 44.07 %) with least mycelial growth (58.67 mm and 49.33 mm) and (59.33 mm and 50.33 mm) resp.
CONCLUSION: Neem may be used as an effective botanical to control *Claviceps fusiformis* that causes ergot of bajra.

Keywords: Ergot, *Claviceps fusiformis*, *in vitro*, inhibition, botanicals

Standardization of dehydration technology for efficient utilization of floral glut of rose (*Rosa spp* L.) and gerbera (*Gerbera jamesonii* L.) in kadiyapulanka, Coastal Andhra Pradesh

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ABSTRACT
The present investigation entitled "Standardization of dehydration technology for efficient utilization of floral glut of rose (*Rosa spp* L.) and gerbera (*Gerbera jamesonii* L.) in Kadiyapulanka, Coastal Andhra Pradesh." was carried out at the Floriculture and Landscape Architecture laboratory, College of Horticulture, Dr.Y.S.R. Horticultural University, Venkataramannagudem, West Godavari district of Andhra Pradesh. This study was conducted under three objectives. From the first and second objective rose and gerbera flowers embedded in silica gel and dried in vacuum drier at 40 ºC temperature for 4 h and 5 h duration respectively under low pressure treatment can be recommended for drying of rose and gerbera on large scale. The third objective was to "Identify the cost effective method of dehydration in rose and gerbera". Economic analysis of different drying techniques in rose revealed that flowers embedded in sand:silica gel (50:50 v/v) dried at low microwave power level for 1:00 min was the cost effective method that can be recommended. Similarly, flowers embedded in sand:silica gel (50:50 v/v) dried in microwave oven at medium microwave power level for 2:00 min was found to the optimum method of drying in gerbera. Hence, the above findings can be recommended to the aspiring entrepreneurs to efficiently exploit the unutilized flowers available at low cost during glut and prepare wide variety of value added dry flower products on commercial scale.

Keywords: Rose, Chrysanthemum, drying techniques, silica gel.