



Short Communication



Effect of weather parameters on the incidence of thrips, *Thrips tabaci* Lindeman and its predator, *Coccinella septempunctata* Linn. on garlic crop

Ramgopal Dudwal¹, B.L. Jat¹ and Alka Kataria²

¹Department of Entomology, SKN College of Agriculture Jobner, Jaipur, Rajasthan, India

²The IIS University, Jaipur, Rajasthan, India

Corresponding author e-mail: rgdudwal1986@gmail.com

(Received: 12/10/2020; Revised: 10/03/2021; Accepted: 05/06/2021)

ABSTRACT

The incidence of thrips was studied at Horticulture Farm, S.K.N. College of Agriculture, Jobner (Rajasthan) on garlic crop during Rabi season. The incidence of thrips on garlic crops was commenced in the first week of February and reached its peak in the second week of March. The predator, *Coccinella septempunctata* Linn. was commenced in the second week of February and reached the maximum in the second week of March. The weather parameters viz., temperature, relative humidity, and sunshine (hrs) had a non-significant correlation with thrips incidence on garlic crop, whereas, predator, *C. septempunctata* possess significant positive correlation.

Keywords: Incidence, Garlic, *Thrips tabaci*, *Coccinella septempunctata*.

INTRODUCTION

Garlic, *Allium sativum* L. is the second most important cultivated clove crop of the country after onion. It is used as a spice or a condiment, in pharmaceutical preparations and flavoring and seasoning vegetables and meat dishes. Garlic is a rich source of proteins, phosphorus, potash, calcium, magnesium, and carbohydrates. The garlic clove contains the enzyme alliinase (allicin), a major flavoring component used to reduce blood cholesterol. It has been reported to possess anti-microbial properties, hypercholesterolemic action, anti-diabetic action, and anticarcinogenic properties. The inhalation of garlic oil or garlic juice has generally been recommended against pulmonary tuberculosis, rheumatism sterility, impotency, cough, and red eyes diseases.

India ranks second after China in the area (171.45 lakh ha¹) and third in production (923.25 thousand metric tonnes) of garlic with average productivity of 5.38 tonnes ha¹ (Anonymous, 2009). The major garlic-producing states of the country are Madhya Pradesh, Orissa, Rajasthan, Karnataka, and Gujarat. India is one of the garlic exporting countries of the world. In Rajasthan, garlic is extensively grown in Chittorgarh, Baran, Jodhpur, Jhalawar, Kota, Bundi, Jaipur, and Sikar districts in an area of 215660 hectares with an annual production of 101937 tonnes and productivity of 4.73 tonnes ha¹ (Anonymous, 2010a). It was also observed that thrips after each spray goes down with the application of chemical and Bio-pesticide but chemicals always showed better (Das et.al., 2017).

It is well fact that the incidence of insect pests depends upon climatic conditions, crop growth stages, and natural enemies of a pest at a particular time. The weather parameters viz., temperature, relative humidity, rainfall, mean bright sunshine hours, etc. play an important role in the incidence of thrips in garlic crop (Anonymous, 2000a; Changela, 1993 and Chhatrola et. al. 2006).

MATERIALS AND METHODS

The present investigations were conducted at Horticulture Farm, S.K.N. College of Agriculture, Jobner (Rajasthan) on garlic crops during the Rabi season. Geographically, Jobner is located at a longitude of 780280 East latitude, 260260 North, and an elevation of 427 meters from mean sea level (MSL) in the Jaipur district of Rajasthan. The region's climate is typically semi-arid, characterized by extremes of the temperature both during summer and winter. During summer, the temperature may rise as high as 470C and in winter it may fall as low as 2-30C. The total rainfall is 480 mm which is mostly received from July- September. This region provides a safe long growing season for most of the crops.

To study the effect of weather parameters, viz., maximum and minimum temperatures, relative humidity, sunshine (hours), and rainfall on the incidence of thrips on garlic crop, the local variety was sown on 29th October, in five plots of 1.5 x 1.5 m² size keeping row to row and plant to plant distance of 15 and 10 cm, respectively.

The crop was left for natural infestation of insect pests. For recording the thrips population, five plants were randomly selected and tagged in each plot. The absolute population of thrips (nymphs) was recorded in the morning hours visually or using a magnifying lens at the weekly interval from the appearance of thrips to the harvesting of the crop (Mote, 1981). The data on weather parameters, viz., maximum and minimum temperatures, relative humidity, sunshine (hours), and rainfall were obtained from the meteorological section. The simple correlation was computed between the mean population of thrips and weather parameters.

The population of coccinellid predator, *Coccinella septempunctata* Linn. was recorded from ten randomly selected and tagged plants, in each plot at weekly interval and the simple correlation was computed with thrips population.

The following formula was used for calculating correlation coefficient

$$r = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{N\sum x^2 - (\sum x)^2} \sqrt{N\sum y^2 - (\sum y)^2}}$$

Where,

r=Simple correlation coefficient

x=Independent variable i.e. abiotic component

y=Dependent variable i.e., pest

N=Number of observations

RESULTS AND DISCUSSION

The incidence of thrips, *T. tabaci* was studied on the garlic crop variety local during Rabi Season under unsprayed conditions. The thrips population was recorded on five randomly selected tagged plants from each plot at weekly intervals. The population of coccinellid predators (*Coccinella septempunctata* Linn.) was also recorded on ten randomly selected plants per plot.

The data presented in the table revealed that the thrips population on garlic crop first commenced in the first week of February (2.45 thrips /plant) which gradually increased and reached its peak in the second week of March (38.67 thrips /plant) at 30.30 C maximum and 11.50 C minimum temperature, 41.00 percent relative humidity and 9.7 sunshine hours thereafter, declined and completely disappeared in the first week of April. The

correlation studies revealed that the thrips population could not be affected by weather parameters, however, it had a non-significant positive correlation with the temperature and sunshine hours and a non-significant negative correlation with the relative humidity. There was no rainfall occurred during the crop period.

During the cropping season, a low-level population of coccinellid predators except *C. septempunctata* was observed, therefore, only the population of *C. septempunctata* was recorded. The data presented in the table revealed that the population of *C. septempunctata* first observed in the second week of February (0.67 /plant) and reached a maximum during the second week of March (3.33 /plant), thereafter, started to decline. The population of *C. septempunctata* was persisted as long as the thrips population was found on the crop. The population of the predator, *C. septempunctata* had a significant positive correlation (r = 0.939) with the thrips population.

In the present investigation, the incidence of thrips commenced in the first week of February (2.45 thrips /plant) which gradually increased and reached to peak in the second week of March (38.67 thrips /plants) at 30.30C maximum, 11.50C minimum temperatures, 41.00 percent relative humidity and 9.7 sunshine (hours), the most favorable for the buildup of population thereafter, it declined and completely disappeared in the first week of April. The present findings are in partial agreement with those of Chhatrola et al. (2003) who reported that the thrips population was active throughout the season on garlic crop, however, it remained comparatively higher during the first week of January to the third week of February. Likewise, Godhani et al. (2000) reported the incidence of thrips on garlic from the first fortnight of December and peak during the second fortnight of February. Changela (1993) reported peak incidence of thrips during the fourth week of January on garlic crop also support the present results. At Karnal, the initiation of thrips on garlic was started from the third week of March, and later on the pest population as well as percent plant damage increased (Anonymous, 1999) support the present findings. The results are also following that of Anonymous (2000a and 2010b), Ullah et al. (2010), and Hussain et al. (1997).

Table 1. Effect of weather parameters on the incidence of *T. tabaci* and *C. septempunctata* on garlic crop during Rabi.

Standard Meteorological Week (SMW)	Mean population of <i>T. tabaci</i> (per plant)	Mean population of <i>C. septempunctata</i> (per ten plants)	Temperature (°C)		Relative humidity (%)	Sunshine (hrs)	Rainfall (mm)	
			Maximum	Minimum				
5	2.45	0.00	22.10	5.00	53.00	8.6	0.00	
6	7.89	0.67	21.70	4.10	60.00	8.3	0.00	
7	16.32	1.00	23.30	6.30	53.00	6.9	0.00	
8	21.02	1.33	28.10	8.50	51.00	9.5	0.00	
9	29.21	1.67	28.10	7.10	47.00	9.7	0.00	
10	34.65	2.67	28.30	8.60	42.00	9.4	0.00	
11	38.67	3.33	30.30	11.50	41.00	9.7	0.00	
12	22.38	2.33	32.90	11.20	37.00	8.0	0.00	
13	16.07	1.67	36.40	17.00	39.00	8.6	0.00	
14	8.62	1.00	39.00	19.40	32.00	8.7	0.00	
Correlation coefficient with mean thrips population (r)		0.939	0.183 NS	0.046 NS	-0.342 NS	0.506 NS	-	

The present results are in agreement with those of Chhatrola et al. (2003) who reported that the temperature and sunshine hours had a non-significant correlation with thrips population and relative humidity had a significant negative correlation. The present findings are also corroborated with that of Domiciano et al. (1993) and Hamdy and Salem (1994) who reported that the thrips population in onion crop was negatively correlated with relative humidity and positively correlated with temperature and sunshine hours. Lorini and Dezordi (1988) reported that fluctuations in thrips population resulted in the climatic conditions that support the present findings.

The biotic factors particularly coccinellids predators also played a significant role in reducing the infestation of sucking insect pests. In the present investigation only coccinellid predator, *Coccinella septempunctata* Linn. was observed, feeding on thrips in garlic crop. It was first observed in the second week of February (0.67 /plant) i.e., one week after thrips incidence and reached the maximum during the second week of March (3.33 /plant). The population persisted as long as thrips incidence was found on the crop. The population of *C. septempunctata* was significantly positively correlated ($r = 0.939$) with the thrips population. The present findings are partially corroborated with Kadri and Goud (2005) who reported that coccinellids were a major predator of thrips and possessed a positive correlation with thrips incidence.

CONCLUSION

The weather parameters viz., maximum and minimum temperatures, relative humidity, sunshine hours, and rainfall play a significant role in planning the pest management schedule. In the present study the incidence of thrips could not be affected by weather parameters significantly, however, temperature, and sunshine (hours), showed a non-significant positive correlation and relative humidity showed a non-significant negative correlation with thrips incidence in garlic crop.

REFERENCES

- Anonymous, 1999. *Annual report on garlic*, Associate Agricultural Development Foundation, Nasik. pp.15.
- Anonymous, 2000a. Studies on seasonal incidence of onion thrips. *Annual Report*. National Research Centre for Onion and Garlic, Nashik, pp. 65-66.
- Anonymous, 2010b. *Annual Report*. All India Network Research Project on Onion and Garlic, ARS, Durgapura, Jaipur (Rajasthan), pp. 284-285.

- Changela, N.B. 1993. *Bionomics, population dynamics and chemical control of thrips, Thrips tabaci Lindeman on garlic*. M. Sc. thesis submitted to Gujarat Agricultural University, Sardar Krushinagar, pp. 82-83.
- Chhatrola, D.P.; Vyas, H.J. and Baraiya, K.P. 2003. Influence of abiotic factors on population buildup of thrips, *Thrips tabaci* Lindeman in garlic. *Indian Journal of Plant Protection*, **31**(2): 98-100.
- Chhatrola, D.P.; Vyas, H.J. and Baraiya, K.P. 2006. Effect of irrigation, date of sowing and nitrogen on the incidence of garlic thrips, *Thrips tabaci* Lindeman. *Indian Journal of Entomology*, **68** (2): 121-124.
- Das, A. K., Hasan, W. and Singh, S.K. 2017. Management of onion thrips, thrips tabaci using chemical and bio-pesticide for quality onion production. *Trends in biosciences*, **10**(22): 4384-4388.
- Domiciano, N.L.; Ota, A.Y. and Trdardi, C.R. 1993. Appropriate time for the chemical control of *Thrips tabaci* Lindeman on onion, *Allium cepa* L. *Anais da Sociedade Entomologica do Brazil*. **22** (1): 71-76.
- Godhani, B.G.; Raghvani, K.L.; Makwana, P.M.; Juneja, R.P. and Buhecha, K. V. 2000. Seasonal incidence of thrips, *Caliothrips indicus* Bagnall. (Thysanoptera: Thripidae). on garlic. *Insect Environment*, **6**: 130.
- Hamdy, M.K. and Salem, M. 1994. The effect of plantation dates of onion, temperature and relative humidity on the population density of the onion thrips, *Thrips tabaci* Lindeman in Egypt. *Annals of Agricultural Science* (Cairo), **39** (1): 417-424.
- Hussain, T.; Iqbal, M.; Ullah, F. and Anwar, M. 1997. Population trends, varietal preference and chemical control of garlic thrips, *Thrips tabaci* Lindeman. *Sarhad Journal of Agriculture*, **13** (2): 175-180.
- Kadri, S. and Goud, K.B. 2005. Survey and seasonal incidence of onion thrips, *Thrips tabaci* Lindeman. *Karnataka Journal of Agricultural Science*, **18** (2): 510-512.
- Lorini, I and Dezordi, J. 1988. Population fluctuations of *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) in onion crop. *Anais-da-Sociedade-Entomologica-do-Brasil*, **19** (2): 361-365.
- Mote, U.N. 1981. Effect of time of application of few insecticides against onion thrips, *Thrips tabaci* Lindeman. *Indian Journal of Entomology*, **43**: 236-239.
- Ullah F.; Mulk, M.; Farid, A.; Saeed, M.Q. and Sattar, S. 2010. Population dynamics and chemical control of onion thrips. *Pakistan Journal of Zoology*, **42** (4): 401-406.

Citation: Dudwal, R., Jat, B.L. and Kataria, A. 2021. Effect of weather parameters on the incidence of thrips, *Thrips tabaci* Lindeman and its predator, *Coccinella septempunctata* Linn. on garlic crop. *International Journal of Agricultural and Applied Sciences*, **2**(1):134-136. <https://doi.org/10.52804/ijaas2021.2116>

Copyright: © Dudwal 2021. Creative Commons Attribution 4.0 International License. IJAAS allows unrestricted use, reproduction, and distribution of this article in any medium by providing adequate credit to the author(s) and the source of publication.