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**Short Communication**

# Assessment of IPM module against pod borer complex in pigeon pea (*Cajanus cajan* L.)

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## ABSTRACT

On-farm testing of IPM module in pigeon pea against pod borer complex was carried out on farmers' field of two villages of district Jaunpur by KVK Jaunpur- 1 during 2018 and 2019 with three components viz., IPM module, farmers' practice, and untreated check without plant protection measures. The IPM interventions viz., growing pod borer tolerant variety, two rows of maize as a border crop, installation of pheromone traps and bird perches with the application of botanical based insecticide azadirachtin 1% at the vegetative stage as an oviposition deterrence, application of chlorantraniliprole, and flubendiamide at critical stages of pod borer appearance during bud initiation and flowering stages. The reduction in the larval population and pod damage in IPM treated plots resulted in a significant increase in grain yield (1525 kg/ha) followed by farmers' practice (1195 kg/ha) and in untreated check (857 kg/ha) The increase in grain yield was due to an additional investment of Rs.4100/-ha towards IPM module and farmers' practice (Rs.2600/-ha). The excess expenditure incurred resulted in the highest net return of Rs.47550/-ha in the IPM module as compared to farmers' practice and in untreated check resulted in the lowest net return of Rs.18250/-ha.
**Keywords**: Pigeon pea, IPM module, Farmers practice, Net return, Pod borer complex.

## INTRODUCTION

India is the largest producer of pigeon pea (*Cajanus cajan*) contributing 90% of world production (Lateef and Pimbart, 1990). More than 200 species are reported to cause injurious to a different part of the pigeon pea plant. Among the various species of insect pests of pigeon pea, the gram pod borer (*Helicoverpa armigera*) and pod fly (*Melanagromyza obtusa*) causes serious damage in north India to result in by pod borer (*H.armigera*) and pod fly (*M.obtusa*) 55.94% , 32.47% , and 19.19% loss in pods, seeds, and seed mass, respectively (Kumar and Nath 2002). The losses due to insect pests are much higher in pulses due to the feeding of economic parts viz., buds, flowers, and pods. Among the insect pests, legume pod borer, *Maruca vitrata* (Geyer), gram pod borer, *Helicoverpa armigera* (Hubner) and pod fly, *Melanagromyza obtusa* (Malloch) are the major biotic constraints in increasing the production and productivity under subsistence farming conditions of pigeon pea irrespective of agro-ecological zones. The potential damage of the pod borer complex had been avoided due to the timely application of the new insecticide molecule like flubendiamide and chlorantraniliprole (Rajabaskar and Natarajan, 2018). Further, (Randhawa and Verma, 2011) reported that 26-28 percent of flower damage due to *M. vitrata* alone. Management of all these above insect pests is complicated as the crop gets affected by three groups of insects with different biology and variable population dynamics occurring throughout the year across wider geographical areas. Sole reliance on chemical pesticides led to the development of resistance and resurgence of secondary pests. Due to pesticide resistance in pod borer complex (Kranthi et al, 2002) and subsequent promotion of integrated pest of safe, economic, and effective pest management strategies have become serious issues. Keeping this in view, the components of the IPM module along with farmers' practice were tested to assess its yield on pigeon pea and economical impact management (IPM), the need for the development.

## MATERIALS AND METHODS

On-farm testing of IPM module in pigeon pea was carried out on farmers' fields of two villages of district Jaunpur by KVK Jaunpur- 1 during 2018 and 2019 with three components viz., IPM module, farmers' practice, and untreated check without plant protection measures. Under each module, an area of 20 percent was taken into account, and recommended package of agronomic practices was followed and plant protection measures (Table 1). Observations on insect population of *H. armigera* and *M. vitrata* were taken at flowering, pod-formation, and pod maturity stage in twenty-five randomly selected plants. Pod damage due to pod borers was calculated at harvest and percent pod damage was calculated by using the formula (Naresh and Singh, 1984). The yield data were obtained from different plots by random crop cutting method and percent yield increase were calculated by using the following formula as given below. The data thus obtained were subjected to AGRES analysis (Gomez and Gomez 1984).

Table1: IPM module component and farmers practice

| Particular | IPM module | Farmers practice | Untreated check |
|---|---|---|---|
| Variety | NA-2 | NA-2 | NA-2 |
| Border crop | Two rows of pearl millet | - | - |
| Pheromone trap | 12/ha | - | - |
| Bird perches | 50/ha | - | - |
| Vegetative stage | Azadirachtin 1%@500 ml/ha | - | - |
| 50% bud initiation stage | Chlorantraniliprole 18.5 SC@150ml/ha | - | - |
| Flowering stage | Flubendamide 480 SC@125ml/ha | Chlorpyriphos 20 EC @ 1000ml/ha | - |
| Pod maturation stage | Dimethoate 30 EC @ 1000ml/ha | Chlorpyriphos 20 EC @ 1000ml/ha | - |

## RESULTS AND DISCUSSION

The results were revealed a decrease in pod borer population taken at different stages of crop growth (Table 2). The larval population of *H. armigera* and *M. vitrata* ranged from 1.17-1.45 and 1.85- 5.82 numbers per plant, respectively in the IPM module. The larval population of *H.armigera* (6.45 No/plant) and *M. vitrata* (11.30 No/plant) was reported in farmers' practice with the highest larval population of *H. armigera* (13.20 No/ plant) and *M. vitrata* (14.47 Nos./plant) in untreated check (control). At the time of harvest, pod damage due to different pod borers viz., *H.armigera, M.vitrata* and *M.obtusa* were recorded in IPM module, farmers' practice, and an untreated check. Among the different pod borers damage recorded, the highest damage was caused due to *M. obtusa* in all the three modules tested and reported as IPM (10.21%), farmers' practice (17.16%), and untreated (19.47 %). However, the results also revealed that the lowest total pod damage due to different pod borers was reported in IPM (22.31 %) with the highest in untreated (59.58%). The reduction in the larval population and pod damage in IPM treated plots resulted in a significant increase in grain yield (1525 kg/ha) followed by farmers' practice (1195 kg/ha) and in untreated check (857 kg/ha) (Table 3). The increase in grain yield was due to an additional investment of Rs.4100/-ha towards IPM module and farmers' practice (Rs.2600/-ha) the same finding was reported by Thilagam P and Gopikrishnan A (2020). The excess expenditure incurred resulted in the highest net return of Rs.47550/-ha in the IPM module as compared to farmers' practice and in untreated check resulted in the lowest net return of Rs.18250/-ha. The highest yield obtained under improved technologies compared to farmers' practice reflected in the additional return was also reported by (Lathwal, 2010 and Raj et al, 2013).

Table 2. Evaluation of IPM module towards pod borer complex in pigeon pea.

| Treatment | Flowering stage (No/plant) | | Pod formation stage (No/plant) | | Pod damage (%) | | | Total pod damage (%) |
|---|---|---|---|---|---|---|---|---|
| | *H.armigera* | *M. vitrata* | *H. armigera* | *M. vitrata* | *H.armigera* | *M. vitrata* | *M. obtusa* | |
| IPM module | 1.45 | 5.82 | 1.17 | 1.85 | 5.17 | 6.79 | 10.21 | 22.31 |
| Farmers' practice | 6.01 | 11.30 | 6.45 | 10.81 | 13.76 | 16.59 | 17.16 | 47.47 |
| Untreated check | 7.12 | 13.20 | 8.10 | 14.47 | 27.13 | 13.21 | 19.47 | 59.58 |
| SED | 0.45 | 0.73 | 0.57 | 1.42 | 2.35 | 2.67 | 2.53 | - |
| CD<0.5% | 0.98 | 1.59 | 1.25 | 3.10 | 5.13 | 5.18 | 5.52 | - |

Table 3. Impact of economics with adoption of IPM module towards pod borer complex in pigeon pea.

| Particular | Yield kg/ha | Yield increase over check (%) | Cost of cultivation (Rs./ha) | Additional investment for plant protection (Rs./ha) | Grass Income (Rs./ha ) | Net return (Rs./ha ) | Profit (%) |
|---|---|---|---|---|---|---|---|
| IPM module | 1525 | 77.94 | 28700 | 4100 | 76250 | 47550 | 61.62 |
| Farmers' practice | 1195 | 39.43 | 27200 | 2600 | 59750 | 32550 | 44.34 |
| Untreated check | 857 | - | 24600 | - | 42850 | 18250 | - |

**CONCLUSION**

The results clearly revealed that the IPM module will bring a significant increase in the yield of pigeon pea with IPM interventions viz., growing pod borer tolerant variety, two rows of maize as a border crop, installation of pheromone traps, and bird perches with the application of botanical based insecticide azadirachtin 1% at the vegetative stage as an oviposition deterrence, application of chlorantraniliprole and flubendiamide at critical stages of pod borer appearance during bud initiation and flowering stages.

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