Original Research Article

Assessment of Integrated Pest Management module for management of pod borer in Chickpea

Abstract

Chickpea (*Cicer arietinum* L.) is very important pulse crop of India.The major biotic stresses viz. gram pod borer, gram semi-looper, termite, wilt, collar rot, black rot, root rot, ascochyta blight and botrytis grey are responsible for low yield of chickpea. Among these constraints gram pod borer (*Helicoverpaarmigera*) is one of the major insect pest of chickpea. It has been estimated that a single larva damages 30-40 pods of chickpea in its life cycle. In severe infestation of gram pod borer damage may be caused from 20-50 per cent. Krishi Vigyan Kendra, Lalitpur conducted On Farm Trial (OFT) on Assessment of Integrated Pest Management module for management of pod borer in chickpea. The practices such as cultural and mechanical, biological and need based chemical practices were followed in IPM plot. In IPM practices deep summer ploughing, use of pheromone traps @ 5 traps / ha for Monitoring purpose, Bird perches @50/ ha, HaNPV@ 250LE/ha and Emamectin benzoate@220 gm/ha gave average yield 19.85 q/ ha as compared to farmers practices i.e 14.5 q /ha. The per cent increase in yield over control was 35.91 and 37.83 during 2020-21 and 2021-22, respectively. The net return was Rs. 73120/-, Rs. 76260/- and Rs. 46550/-, Rs. 47320/- in IPM plot and Non IPM plot during 2020-21 and 2021-22, respectively. The average benefit cost ratio was 3.1 and 1.8 in IPM plot and Non IPM plot, respectively.

Comment [F1]: Mention the statistical tests used.

Key words: Chickpea, Integrated Pest Management, Pod borer.

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is one of the most important pulse cropin the world with production of 14.78 millions tons from an area of 14.56 millions hectares and productivity of 1014.60 kg/ha in 2017 (FAOSTAT, 2019).Chickpea is an important source of energy, protein, Fiber, Vitamins and mineralsfor vegetarian population. Chickpea plays a significant role in improving soil fertility by fixing atmospheric nitrogen and the crop meets up to 80 per cent of the soil nitrogen needs from symbiotic biological nitrogen fixation, so farmers have to apply less nitrogenous fertilizer than they do for other non-legume crops.India is the world's

leading producers of chickpea accounting for 11.23 million tons from the 10.56 million hectares with a productivity of 1063 kg/ha in 2017-18 (Agricultural Statistics at a Glance, 2018). In Uttar Pradesh, chickpea crop is cultivated over an area of 0.50 million hectare with an annual production of 0.58 million tones and productivity of 1156 kg/ha (Agricultural Statistics at a Glance, 2018). In 2017-18 district Lalitpur produced 17774 metric tons from 13726 hectares area with average productivity 12.95 q/ha (Agriculture Department, Lalitpur, 2018-19). The major biotic stresses viz. gram pod borer, gram semi-looper, termite, wilt, collar rot, black rot, rot, root rot, ascochyta blight and botrytis grey are responsible for low yield of chickpea. Chickpea is attacked by 57 insect species but gram pod borer is key pest that causes heavy economic loss throughout the country (Sachan and Katti 1994). Gram pod borer is a major pest (Kumar *et al.*, 2019) accounting for 21 per cent yield losses and 50-60 per cent pod damage in the crop (Kambrekar, 2012). It has been estimated that a single larva damages 30-40 pods of chickpea in its life cycle. Therefore, present studies were carried out at farmer field as on farm trial (OFT). The on-farm trial conducted under the close supervision of scientists of the KVK. The basic objectives of OFT were to identify existing practices that may help to solve major problems of many farmers in defined areas and also create awareness/ establishment of new management technologies available.

MATERIAL AND METHODS

Comment [F2]: Justify the statistical support.

Krishi Vigyan Kendra, Lalitpur conducted on-farm trial on Assessment of IPM module for management pod borer in chickpea at villages namely Raogarh, Jamunia, Jugpura, Jakhlaun and Sindhwaha during rabi season 2020-21 and 2021-22. Technological gap between improved management package and farmers practices were studied based on survey and group discussion with farmerof chickpea growers in selected villages. The farmers of these villages had small and marginal land holdings. The 8 farmers were selected for on farm trial (OFT)for pod borer management.The on-farm trial on chickpea for pod borer management technology was taken in an area of 0.2 hectare of each farmer and repeated four times. The total 1.6 hectares area was covered for trials of assessment of IPM practices for pod borer management of chickpea. The chickpea variety RVG 202 was sown with two treatments and four replications. The IPM practices for pod borer management i.e. proper tillage, line sowing, HYV RVG 202, seed treatment with Carbendazim @ 2gm/kg of seed for management of collar rot and Fusarium wilt and Use of Pheromone trap for monitoring purpose, Bird perches @50/ha, spray of HaNPV @250 LE/ha and application of Emamectin benzoate 5 % SG @ 220 gm/hawhen a critical catch level was reached (5 months or

more/trap).The farmers practices i.e. no use of seed treatment,spray of insecticide and non-application of other IPM practices.

Performance of IPM practices against pod borer was observed in terms of the percentage of infested plant per meter row and damage pod due to pod borer on the basis of affected plants and pod in relation to total pods in respective treatment. Benefit cost ratio of each treatment was also assessed. Farmers reactions were observed with the help of personal interview and data on quantitative parameters were recorded and Pod damage per cent and percent increase yield were calculated by using following formulae.

Pod damage percent= No. of damaged pod / Total No. pod observed x 100

Per cent increase yield = Demonstrated yield- Farmers yield/Farmers yield x 100

Table 1 : Comparison between improved practices and farmers practices under OFT on Chickpea

Sr. No.	Particulars	Improved practices	Farmers practices
1	Variety	RVG -202	Local
2	Seed rate	80 kg	100 kg
3	Sowing method	Line sowing with seed drill	Broadcasting
4	Situation	Rainfed	Rainfed
5	Fertilizer dose	NPK 20:60:20 and 20 kg sulphur	100 kg DAP
6	Seed treatment	Carbendazim @2 gm/kg seed	No seed treatment
7	Weed management	One hand weeding	One hand weeding
8	Plant protection measures	Use of IPM Practices	No use of IPM
	Bird perches	50 @ha	-
	Pheromone traps	5 traps /ha	-
	Flowering stage	HaNPV @ 250 LE/ha	Chloropyriphos 20 EC @ 1 lit /ha
	Pod development stage	Emamectin benzoate @ 220 gm/ha	Chloropyriphos 20 EC @ 1 lit /ha

RESULTS AND DISCUSSION

Comment [F3]: Present conclusions based on the statistica tests used.

The data given in table 1 revealed that the farmers were not aware improved crop production practices and IPM practices in chickpea crop. The incidence of pod borer during 2020-21 and 2021-22 was observed in demo and check plots and presented in table 2. On the basis of these data pod borer per cent and damage reduction over check was calculated. The number of larvae per meter row recorded in demo plots and check plotsi.e 1.4, 1.1 larvae / meter and 6.8, 5.4 larvae / meter in demo and check plots, respectively. The average no of larvae in demo and check plot recorded 1.3 and 6.1 larvae per meter respectively. The pod damage percent were 5.8, 5.0 per cent and 24.22, 20.73 percent in demo and check plots during 2020-21 and 2021-22, respectively. The average pod damage percent were 5.4 and 22.47 percent in demo and check plot, respectively. The damage reduction over check plot was 76.05 and 75.88 percent during 2020-21 and 2021-22, respectively. The average yield was 19.85 q/ha in demo plot as well as control plot was 14.5 q/ha. The per cent increase in yield over control was 35.91 and 37.83 during 2020-21 and 2021-22, respectively. The similar findings were reported by Ahmad and Chandel (2004), Singh *et al.,* (2011) and Singh *et al.,* (2020). The economic analysis for IPM technology was presented in table 3. The data presented in table 3 revealed that net profit was Rs. 73120/-, Rs. 76260/- and Rs. 46550/-, Rs. 47320/- in IPM plot and Non IPM plot during 2020-21 and 2021-22, respectively. The average benefit cost ratio was 3.1 and 1.8 in IPM plot and Non IPM plot, respectively. The present results are similar with the findings of Ahmad and Chandel (2004), Singh *et al.,* (2020)Jat et al., (2021)

Table 2: Impact of IPM technology on pod borer in chickpea

Year	**No. of larvae/meter row**		**Pod damage %**		**Damage reduction over check %**	**Yield (q/ha)**		**Per cent increase in yield**
	Demo	**Check**	**Demo**	**Check**		**Demo**	**Check**	
2020-21	1.4	6.8	5.8	24.22	76.05	19.3	14.2	35.91
2021-22	1.1	5.4	5.0	20.73	75.88	20.4	14.8	37.83
Average	1.3	6.1	5.4	22.47	75.96	19.85	14.5	36.87

Table 3: Impact of IPM Technology on economics of chickpea

Year	**Gross cost (Rs./ha)**		**Gross Income (Rs./ha)**		**Net profit (Rs./ha)**		**BCR**	
	Demo	**Check**	**Demo**	**Check**	**Demo**	**Check**	**Demo**	**Check**
2020-21	23380	24450	96500	71000	73120	46550	3.1	1.9

2021-22	23700	25200	99960	72520	76260	47320	3.2	1.8
Average	23540	24825	98230	71760	74690	46935	3.1	1.8

REFERENCES

1. Agricultural Statistics at a Glance.(2018). Directorate of Economics and Statistics, Government of India, Ministry of Agriculture, Department of Agriculture and Cooperation, New Delhi.
2. Ahmad, R., Chandel, S.F.,(2004)Farmers field evaluation of IPM module against H. armigera infesting chickpea. Archives of Phytopathology and Plant Protection. 37(2):133-137.
3. Anonymous. (2019). Report of Agriculture Department, Lalitpur, Uttar Pradesh.
4. FAOSTAT. (2019). www.fao.org/faostat/en/#data/QC.
5. Jat, B. L., Nidhi, Singh, G., Kumawat, P. (2021).Bio-rational Management of Pod Borer (*Helicoverpaarmigera* L.) in Chickpea Crop. Bhartiya Krishi AnusandhanPatrika.(36):29-31
6. Kambrekar, D. N.(2012). Management of pod borer in chickpea. The Hindu, http://www.thehindu.com/scitech/agriculture/management-of-pod-borer-inchickpea/article4143687.ece.
7. Sachan, J.N. and Katti, G. (1994). Integrated Pest Management. Proceeding of International Symposium on Pulses Research, April 2-6, 1994 IARI, New Delhi, India. pp. 23-30.
8. Singh, R. P., Singh A. K., Upadhyay, S. P. and Singh, R. K. (2020). An approach for site-specific assessment of pod borer management in chickpea. Journal of Entomology and Zoology studies. 8 (2): 726-728.
9. Singh, R.P., Pal, M., Dwivedi, A.P., Singh, M., Dwivedi, V., Singh, D.R. (2011). Assessment of technological gap and performance of combined management approach for pod borer in chickpea. Indian Journal of Extension Education.47(1-2):134-137.