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Assessment of Crop Yield Losses in Green gram due to Major Insect-pests

Devendra Saini[1*], Roop Singh Meena[2], Udai Pal Singh[1], Sudhir Pratap Singh[3] and Ashok Sakharam Chandar[4]

[1]Department of Entomology, SKRAU, Bikaner (Rajasthan), India.
[2]Assistant Professor, Department of Entomology, SKRAU, Bikaner (Rajasthan), India.
[3]Department of Entomology, SHUATS, Prayagraj (Uttar Pradesh), India.

(Corresponding author: Devendra Saini)*
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ABSTRACT: The investigation on Assessment of Crop Yield Losses in Green gram due to Major Insect-pests was carried out at Agricultural Research Station, Sriganganagar during Kharif- 2022. The infestation of whitefly, thrips and spotted pod borer significantly influenced the yield and yield attributing plant characters of mung bean. It caused 3.98, 63.98, 66.29 and 21.01 per cent reduction in plant height, number of pods, number of grain and grain weight, respectively.

Keywords: Assessment, loss, yield, insect-pest etc..

INTRODUCTION

Grain legumes are protein and energy rich dry seeds which are called pulses belonging to family Fabaceae (Leguminosae). Green gram [*Vigna radiata* (L.) Wilczek] or mung bean is an important pulse crop due to its adaptability in diverse agro-ecological nitches such as kharif/rabi, rainfed/ irrigated, mixed/ monocrop, low / high input conditions, traditional/ progressive farming etc. and its nutritional value. Mung bean is cheap source of plant-based nutritious proteins, vitamins, and minerals. It is used as fresh green pods, dry seeds as vegetables due to presence of protein, vitamin and mineral (Das *et al.*, 2014). Seeds of the crop are eaten as daal, leaves, green and dried stalk are used as fodder (Singh and Ahlawat 2005). Green gram cultivated in tropical and subtropical Asia mainly in India, China (Zhang *et al*., 2003) and in some parts of Australia, U.S. (Oklahoma), Africa, and Pakistan (Smýkal *et al.*, 2015). It is the third most largely grown pulse crop in India that is rich source of proteins, carbohydrates, minerals and vitamins for grain-based diets in South and Southeast Asia (Afzal *et al.*, 2008). India is the largest producer of mung bean and account 54% of the world production and covers 65% of the world acreage. In Rajasthan, green gram cultivated in an area 24 lakh hectares with production of 12.22 lakh tones and productivity of 495 kg ha^{-1} (Green gram Outlook Report, 2021). In Sriganganagar region, green gram cultivated on 81.96; thousand-hectare area with production of 40.39 thousand tonnes and average productivity of 493 kg ha^{-1}. Various factors have been affected the mung bean production like adverse climate, poor quality water, seeds, diseases, insects pests and others. The losses due to insect and non-insect pests to pulses are one of the major single factor responsible for low yields. Mung is attacked by 64 different species of insect pests (Nair, 1986) and of these 25 species cause enormous loss at different stages of crop growth (Lal, 1985) in India. The economically important insect pests are aphid, (*Aphis craccivora* C.L. koch), jassid (*Empoasca motti* Pruthi), thrips (*Caliothrips indicus* Bagnall), whitefly (*Bemisia tabaci* Genn.), semilooper (Plusia orichalcea Fab.), Blue butterflies (*Lampides boeticus*; *Catochrysops* spp Swainson), cutworm (*Agrotisi psilon* Hufn.), galerucid beetle (*Madurasia obscurella* Jacoby), tortricid moth (*Cydiapty chora* Meyr), spotted pod borer (*Maruca testulalis* Geyer), pod borer (*Helicoverpa armigera* Hubner), tobacco caterpillar (*Spodoptera litura* J.C Fabricius), Bihar hairy caterpillar [*Spilarctia* (Spliosoma) oblique walker), Red hairy caterpillar (Amsacta moorei Butler), stem fly (*Ophiomyia phaseoli* Tryon.), Pod bug (*Claivgralla gibbose* Spinola) and green bug (*Nezara viridula* Linn.), [Kumar *et al.*, 2004; Nitharwal *et al.*, 2013]. It attacks the crop right from the pre flowering to pod maturing stage causing huge yield loss. Due to the insect pests infestation 30 per cent yield losses reported in green gram (Soundararajan *et al.*, 2011). Whereas, Duraimurugan and Tyagi (2014) recorded 32.97 percent yield losses due to insect pest on mung bean. Although chemical control recommendations are available for protecting this crop from insect pest attacks, but as they are highly toxic to natural enemies and cause environmental pollution, it is necessary to minimize the use of insecticides or to have an eco-safe management strategy. Keeping all these facts in view, present investigation entitled Assessment of crop yield losses in green gram due to major insect-pests was conducted to assess the crop yield losses in green gram due to major insect-pests.

METHOD AND MATERIAL

Paired plot experiment was conducted during kharif-2022 to estimate the losses caused by insect pests of green gram. The seed of green gram variety "MH-421" was sown in 26 plots each of 4.0 × 3.0 m size having row to row and plant to plant spacing of 30 cm and 10 cm, respectively. Out of 26 plots, one set of 13 plots was exposed to natural infestation of insect pests. While another set of 13 plots was protected by regular spraying recommended insecticide right from appearance of the pests up to the maturity of the crop at 10 days interval. The population of sucking insect pests was recorded on three trifoliate leaves of plants. While population of spotted pod borer larvae was recorded by counting the number of larvae on five randomly selected plants. The observations were recorded 10 days interval from both protected and unprotected plots (as mentioned in materials and 24 methods 3.2). Observation on the insect pests, plant height, percent pods damage, percent grain damage, and grain yield were recorded on 5 randomly selected plants. Yield of green gram per plot was recorded at time of harvesting. The grain yield of green gram from protected and unprotected plots was recorded separately and loss in yield was estimated by using following formula suggested by Leclerg (1971).

RESULT

The losses due to the sucking and spotted pod borer in "MH 421" variety of mung bean were estimated by paired plot technique. The study revealed that the mung bean crop was infested by the whitefly; *Bemisia tabaci* Genn., thrips; *Calothrips indicus* Bag and spotted pod borer, *Maruca testulalis* Geyer. Actual amount of quantitative loss inflicted by the naturally occurring insect pests with their effects on yield attributing charaters *viz*., plant height, per cent pod damage, per cent grain damage, grain yield of mung bean and insect population per plot, was recorded and the results have been presented in Table 1.

1. Whitefly incidence in paired plots. Mean whitefly incidence data presented in Table-1 revealed that the significantly lesser infestation recorded from protected plots with 10.46 whitefly/ 3 leaves as compared to unprotected plots with 40.14 whitefly/ 3 leaves, respectively. The mean reduction in whitefly population was recorded 73.76 percent from protected plots over the unprotected.

2. Thrips incidence in paired plots. The data presented in Table 1 revealed that the minimum mean thrips population observed in protected plots with 4.53 thrips/ 3 leaves as compared to unprotected plots with 14.20 thrips/ 3 leaves, respectively. However, 68.02 per cent less thrips population was recorded from protected plots as compared to unprotected plots.

3. Spotted pod borer incidence in paired plots. It is evident from the data presented in Table 1 revealed that the minimum mean incidence of spotted pod borer was recorded from protected plots with 0.86 pod borer/ plant as compared to unprotected plots with 2.69 pod borer/ plant, respectively. However, 67.37 per cent less pest incidence was recorded from protected plots as compared to unprotected plots.

4. Effect on plant height. Plant growth was adversely affected due to insect pest infestation. In protected plots the plant mean height was 45.06 cm in comparison to mean height of 43.25 cm in unprotected. A non significant difference was observed in plant mean height in protected and unprotected plots which was 3.98 per cent.

5. Effect on per cent pods damage. Effect of insect pests on pod damage has been presented in Table-1. The mean pod damage was 7.00 per cent in protected plots, while in unprotected plots, the mean pod damage of 19.63 per cent. The mean pod damage was significantly lower in protected plots in comparison to unprotected plots. The mean pod damage in unprotected plots was 63.98 per cent higher than protected plots.

Table 1: Effect of insect pest infestation on green gram (var. MH 421), *kharif* – 2022.

S. No.	Treaties	Protected Plots	Unprotected Plots	Difference	Mean (%) reduction over protected plots	t cal*	t tab at 5%
1.	Whitefly/ 3leaves	10.46	40.14	29.67	73.76	18.460*	2.064
2.	Thrips/ 3 leaves	4.53	14.20	9.67	68.02	10.698*	2.064
3.	Spotted podborer / plant	0.86	2.69	1.83	67.37	9.479*	2.064
4.	Plant height(cm)	45.06	43.25	1.81	3.98	1.657	2.064
5.	Per cent pod damage	7.00	19.63	12.63	63.98	10.923*	2.064
6.	Per cent Grain damage	5.73	17.10	11.38	66.29	10.950*	2.064
7.	Grain yield (kg/plots)	1.87	1.47	0.40	21.01	3.849*	2.064

6. Effect on per cent grain damage. Effect of insect pests on grain damage has been presented in Table 1. The mean grain damage was 5.73 per cent in protected plots, while in unprotected plots, the mean grain damage of 17.10 per cent. The mean grain damage was significantly lower in protected plots in comparison to unprotected plots. The mean grain damage in unprotected plots was 66.29 per cent higher than protected plots.

7. Effect on grain yield/plot. Effect of insect pests on grain yield/plot has been presented in Table 1. The mean grain yield was 1.87 kg/plot in protected plots, while in unprotected plots, the mean grain yield of 1.47 kg/ha. The mean grain yield was significantly higher in protected plots in comparison to unprotected plots. The mean grain yield in unprotected plots was 21.01 per cent lower than protected plots.

CONCLUSION

The insect pest adversely affected the plant height, number of pods, number of grain, grain damage and weight of grain/ plot. Experiment conducted on assessment of losses revealed that the minimum insect pest infestation and maximum plant height, significantly higher number of pods, number of grain and grain weight was recorded from protected plots over the unprotected set of plots.

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