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ESTIMATION OF LOSSES CAUSED BY MAJOR INSECT-PESTS INFESTING GREENGRAM

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ABSTRACT

A field experiment was conducted at instructional farm, Rajasthan College of Agriculture, Udaipur during *kharif* 2015 and 2016 to estimate the losses caused by major insect-pests infesting greengram. The infestation of insect pests in greengram significantly affected plant height, pods per plant, seeds per pod, seed yield per plant and seed yield per plot. The loss estimation in greengram due to infestation of insect pests taking into account different yield attributing traits indicated that mean plant height under treated condition was 1.14 and 1.12 times more than that in untreated condition; likewise, the mean numbers of pods were 1.12 & 1.18 times more than that under untreated condition. The mean seed per pod under treated condition was 1.19 & 1.20 times more than under untreated condition. Mean yield per plant (3.66 & 3.74 g/plant) and mean yield per plot (1.46 & 1.49 kg/plot) was significantly more in treated crop. The overall mean loss worked out to be 22.39 and 26.80 per cent due to the insect-pest infestation during 2015 and 2016, respectively.

Key words: Insect-pests, greengram, infestation, losses estimation, pulses

INTRODUCTION

Pulses are the major source of protein of the vegetarian diet in our country. Besides being a rich source of protein, they maintain soil fertility through biological nitrogen fixation in soil and thus play a vital role in furthering sustainable agriculture (Kannaiyan, 1999). Pulses, the food legumes, have been grown by farmers since millennia providing nutritionally balanced food to the people of India (Nene, 2006) and many other countries of the world. The major pulse crops that have been domesticated and are under cultivation include chickpea, cowpea, greengram, blackgram, pigeonpea, faba bean, grass bean, horse gram, lablab bean, lentil, moth bean and pea. India is the largest producer of pulses in the world and has 25.26 million hectares area under cultivation with 16.47 million tonnes production and a productivity of 652 kg/ hectare (Anonymous, 2015-16). The low productivity of greengram both at national and state level is attributed to abiotic and biotic stresses like drought, weeds, insect pests and diseases. Among these, insect pests often pose a serious threat to greengram production by increasing cost of cultivation and impairing the quality of the produce in many ways. The farmers in Rajasthan have complained of the problems of insect pests on greengram, but there is no quantitative data elucidating the losses attributed to insects in greengram. The yield loss data are needed to justify the use of inputs in their control and for the development of a comprehensive pest management strategy for the crop. Therefore, the aims of the present study were to assess yield loss due to these pests at the different growth stages of the crop. Ultimately, the outcome of the research would be used to evolve a strategy for the control of insect pests in greengram in Rajasthan.

MATERIALS AND METHODS

In order to estimate the losses caused by major insect pests in greengram (SML-668), a paired plot experiment was laid out as suggested by Le Clerg (1971). There were two sets of plots in the trial. Each set comprised 13 plots with each plot measuring 4.0 m x 3.0 m; maintaining a row to row and plant to plant spacing of 30 cm x 10 cm, respectively. One set of plots was kept protected from insect infestation by regular application of recommended bio-pesticides and the other set was exposed to natural infestation of insect pests throughout the crop growth period. Five plants were randomly selected and tagged from each plot both in the protected and unprotected sets and following observations were recorded; plant height (cm), total number of pods/plant, total number of seeds/ pod, seed yield /plant (g), plot yield (kg). The losses caused by insect pests were calculated by the formula given by Le Clerg (1971).

$$\text{Mean loss in yield} = \frac{X_1 - X_2}{X_1} \times 100$$

Where,

X_1 = Yield in treated (protected) plot

X_2 = Yield in untreated (unprotected) plot

The yield data and yield attributing characters of plant were also subjected to statistical analysis and significance was tested using 't' test as under:

Standard deviation (S.D.) =

$$\sqrt{\frac{\text{Sum of square of the deviation from the mean differences}}{\text{Number of paired plots} - 1}}$$

Standard error of mean difference (SE) =

$$\frac{\text{Standard deviation (SD)}}{\sqrt{\text{Number of paired plots}}}$$

't' calculated = $\frac{X_1 - X_2}{SE}$

Where,

X_1 = Average yield in treated plot (Protected)

X_2 = Average yield in untreated plot (Unprotected)

SE = Standard error of mean difference

SD = Standard deviation

't' = Calculated value

RESULTS AND DISCUSSION

Greengram crop was infested by many insect pests causing significant damage and consequent reduction in yield. In the present investigation the effect of insect pests on yield and yield attributing characters *viz*., plant height, pods/plant, seeds/pod, seed yield/plant (g), seed yield/plot (kg) and estimated seed yield (kg/ha) were taken into consideration (Tables 1 & 2). As observed during *kharif* 2015 and 2016, the reduction in plant height was 12.80 and 10.96 per cent, respectively; likewise, the loss in mean number of pods, mean number of seeds per pod and seed yield per plant were 10.47 and 15.28; 15.91 and 16.08; 22.54 and 27.68 per cent during both the years, respectively. On the basis of difference obtained in net yield between protected and unprotected plots, the avoidable quantitative loss was estimated as 22.39 per cent during 2015 and 26.80 per cent during 2016 due to insect pest infestation in greengram variety SML- 668. These findings are in close agreement with those of Kan Singh (2002) who reported that estimated yield loss to greengram during *kharif* season was up to the extent 48.11 per cent. The loss to greengram was estimated to range from 48.30 to

Table 1. Comparative losses due to insect pest infestation in greengram during *kharif* 2015

S. No.	Parameters	Protected	Unprotected	t- calculated value	Mean loss (%)
1	Mean plant height (cm)	44.23	38.52	16.28*	–
2	Mean number of pods/plant	17.41	15.54	14.32*	–
3	Mean number of seeds/ pod	6.57	5.52	11.14*	–
4	Mean yield /plant(g)	3.66	2.74	12.75*	–
5	Mean yield /plot(kg)	1.46	1.09	12.68*	22.39
6	Estimated mean yield (Kg/ha)	1216.18	907.97	22.92*	–

*The t-value significant at P = 0.05

Table 2. Comparative losses due to insect pest infestation in greengram during *kharif* 2016

S. No.	Parameters	Protected	Unprotected	t- calculated value	Mean loss (%)
1	Mean plant height (cm)	43.28	38.52	15.92*	–
2	Mean number of pods/plant	17.42	14.72	16.55*	–
3	Mean number of seeds/ pod	6.72	5.62	12.67*	–
4	Mean yield /plant(g)	3.74	2.64	12.88*	–
5	Mean yield /plot(kg)	1.49	1.05	14.30*	26.80
6	Estimated mean yield (Kg/ha)	1241.17	874.65	27.75*	–

*The t-value significant at P = 0.05

61.50 per cent (Goud, 2004). The loss estimated by pod borers and seed weevil (*A. ampulum)* on greengram was 55.56 per cent for pod and 62.20 per cent for seed (Deshmukh *et al.,* 2007). Abudulai *et al.* (2012) reported that the yield loss in soybean ranged from 25.8 to 42.8 per cent in untreated plots. Vikrant *et al.* (2015) reported the estimated avoidable loss due to insect pest infestation in blackgram was 55.20 per cent when sole crop of blackgram was exposed to insect infestation.

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