

Estimation of yield losses due to pod bugs in green gram

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ABSTRACT

A field experiment was conducted at Agricultural College Farm, Bapatla during *Rabi* 2024–25 to evaluate avoidable yield losses in green gram due to pod bug infestation under two sowing schedules. The experiment compared protected and unprotected crop plots for parameters such as pod and seed damage, yield loss and economic returns. Results indicated significant differences in damage and yield between protected and unprotected plots, with highest yield losses recorded during second sowing date. Protected crops consistently yielded higher returns, with favorable Benefit-Cost (B:C) ratios and Incremental Cost-Benefit Ratios (ICBR).

Key Words : *Benefit cost ratio, Green gram, Pest management, Pod bugs and Yield loss*

Green gram (*Vigna radiata* (L.) Wilczek) also known as mung bean or mung is a legume crop native to India. It is a third most important pulse crop of India after chickpea and pigeon pea. Insect pest that attacks reproductive structures of plant cause maximum yield losses. Pod borers (*Helicoverpa armigera*, *Maruca virata*), pod fly (*Melanagromyza obtuse*) and pod bugs, are important pests that attack from pod initiation to pod maturity stage of green gram crop inflicting heavy loss to seed yield. Pod bugs suck sap from developing pods and seeds, resulting in shrivelled, discoloured or aborted seeds, thereby reducing both yield and quality. Among pod bugs that infest green gram, *Clavigralla gibbosa*, *Nezara viridula*, *Riptortus* spp and *Melanacanthus* spp are major pod bugs reported from Andhra Pradesh. Pod bugs occur in large numbers and feed by sucking sap from pods till pods become too hard to pierce through, thus resulting in shrivelled grains, poor grain filling and reduced seed viability and seed yield Singh and Emden, 1979; Srujana and Keval, 2014).

MATERIALS AND METHODS

The experiment was conducted at Agricultural College Farm, Bapatla, during *Rabi* 2024–25. Green gram crop was sown at two different dates *i.e* first fortnight of November and second fortnight of November with a plot size of 25 m × 10 m each.

Experiment was conducted in two treatments: T (protected plot) and T₁ (unprotected plot) and the design used is two-sample *t*-test to compare means between treatments. Two treatments: Protected (Recommended package of practices including plant protection for non-target pests and pod bugs was imposed) and unprotected (Recommended package of practices including plant protection for non-target pests (*viz.*, sucking pest and *Maruca* pod borer) was imposed except for management of pod bugs). Per cent yield loss due to pod bugs to pods and seed damage (%), yield (kg/ha), yield loss (%) was calculated and ultimately ICBR reflected.

RESULTS AND DISCUSSION

Pod and Seed Damage:

First date of sowing: Significant differences in pod and seed damage were observed between protected and unprotected green gram crops sown during first fortnight of November 2024(01-11-24). In protected plots, pod damage due to pod bugs was 12.28 Per cent, compared to 21.67per cent in unprotected plots. Similarly, seed damage was 14.15 per cent in protected plots, whereas unprotected plots recorded a higher seed damage of 19.89 per cent.

Second date of sowing: Significant differences in pod and seed damage were observed between protected and unprotected green gram plots sown during second fortnight of November 2024 (22-

11-2024). In protected plots, pod damage due to pod bugs was 11.19 per cent, whereas unprotected plots recorded a higher pod damage of 20.45 per cent. Similarly, average seed damage was 13.68% in protected plots, compared to 20.80 per cent in unprotected plots, indicating a significant difference between treatments. Among two sowing dates, higher pod damage was recorded in first date of sowing, where green gram crop was sown during first fortnight of November. (Table 1)

Yield (Kg/ha) and Yield losses

At first date of sowing (first fortnight of November, 2024), protected green gram plots recorded an average yield of 1120 kg/ha, while unprotected plots yielded 980 kg/ha, showing a significant difference between treatments. A notable difference in avoidable yield loss was observed, with

an estimated 12.5 per cent yield reduction in unprotected plots due to pod bug infestation

At second date of sowing (second fortnight of November, 2024), average yield in unprotected plot was significantly lower (1050 kg/ha) compared to protected plot, which yielded 1280 kg/ha when protection was provided during pod development stage. A yield loss of 17.9 per cent in green gram was attributed to pod bug damage under unprotected conditions at this sowing date.

Assessment of economic returns in green gram (B:C Ratio and ICBR)

First date of Sowing: Data on grain yield of green gram (Table 1) revealed a significant increase in yield under protected conditions compared to unprotected plot sown during first fortnight of November 2024. Protected plot yielded 1120 kg/

Table 1. Pod and seed damage, yield and yield loss in protected and unprotected green gram plots

No.	Particulars	Protected	Unprotected	P(T<=t) two-tail	t Critical two-tail
First date of sowing (01-11-24)					
1	Pod damage (%)	12.28	21.67	0.002	2.07
2	Seed damage (%)	14.15	19.89	0.0006	2.1
3	Yield (Kg/ha)	1120	980	0.0463	2.07
4	Yield loss (%)	12.5			
Second date of sowing (22-11-24)					
1	Pod damage (%)	11.19	20.45	0.003	2.101
2	Seed damage (%)	13.68	20.8	0.0006	2.1001
3	Yield (Kg/ha)	1280	1050	0.002	2.2
4	Yield loss (%)	17.9			

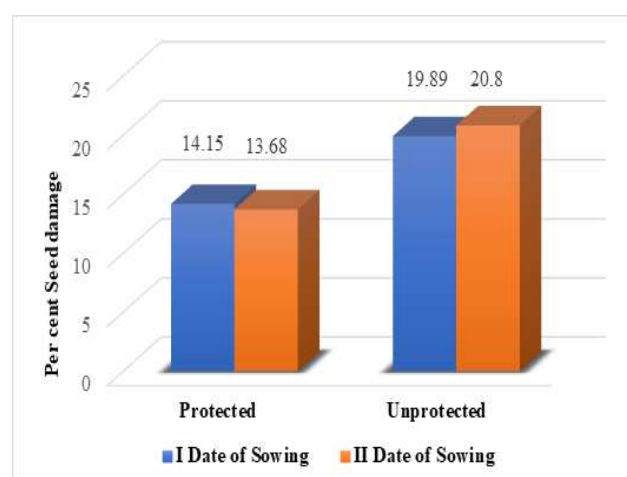
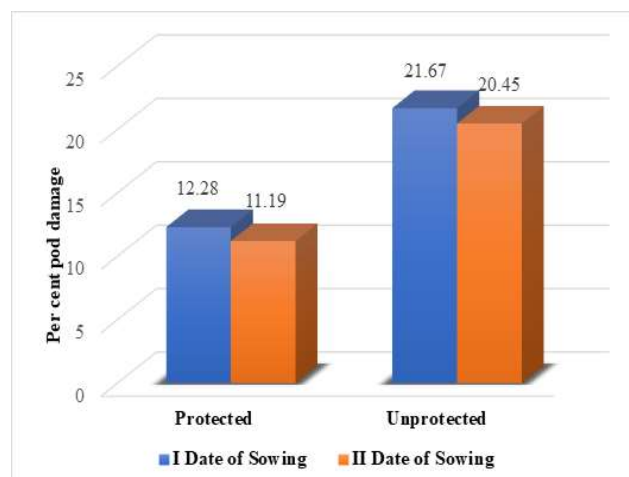


Fig 1. Pod and seed damage caused by pod bugs in green gram crop sown during different dates of sowing.

Table 2. Cost-Benefit and ICBR assessment of green gram crop sown under different sowing dates

Tr.no	Treatments	Grain yield (Kg/ha)	Gross Returns (Rs)	Cost of Cultivation (Rs. /ha)	Net Returns (Rs. /ha)	B:C Ratio	Pesticide cost including labour (Rs.)	Yield Increase over unprotected (Kg/ha)	Increased Returns (Rs.)	ICBR
First date of sowing (01-11-24)										
T1	Protected	1120	97440	37798	59642	2.58	1740	140	12180	6
T2	Unprotected	980	85260	36098	49162	2.36	-	-	-	-
Second date of sowing (22-11-24)										
T1	Protected	1280	111360	39588	71772	2.81	1740	230	20010	7.9
T2	Unprotected	1050	91350	36098	55252	2.53	-	-	-	-

ha, which was 140 kg/ha higher than unprotected plot (980 kg/ha). Benefit-cost (B:C) ratio was also higher in protected treatment, recorded at 2.58, compared to 2.36 in unprotected plot. Additionally, incremental cost-benefit ratio (ICBR) for protected plot was 6.0, indicating a substantial economic advantage over unprotected treatment. (Table 2)

Second date of Sowing: Data on grain yield of green gram (Table 1) indicated a significant increase in yield under protected conditions compared to unprotected plot sown during second fortnight of November 2024. Protected plot recorded a yield of 1280/ kg/ha, which was 230/ kg/ha higher than unprotected plot (1050/ kg/ha). Benefit-cost (B:C) ratio was notably higher in protected treatment (2.81) compared to 2.53 in unprotected plot. ICBR in protected plot was 7.9 in compare to unprotected. (Table 2)

Hussain and Saharia (1994) reported a linear relation between pod infestation and seed loss, with *Riptortus linearis* and *Nezara viridula* causing higher seed loss compared to *Maruca testulalis*. Yield losses ranged from 25.8 to 42.8 per cent in untreated plots, 11.1 per cent to 34.3 per cent in plots protected during vegetative stage, and were significantly reduced to 5.2 per cent–11.3 per cent in plots protected during reproductive stage. Similarly, Veda (1993) observed that both nymphs and adults of *Clavigralla gibbosa* feed on pigeonpea buds and flowers, leading to pod deformation and grain shriveling. Pod bugs caused 25.2 per cent pod damage, while grain damage ranged from 13.43 per cent to 31.73 per cent, with an average yield loss of 20.38 per cent.

CONCLUSION

Timely management of pod bugs in green gram significantly reduces yield loss and enhances profitability. The findings recommend adopting protective measures, especially during second sowing window, to mitigate economic and agronomic risks. Integrated pest management strategies should be incorporated to sustain yields and optimize input costs. Across both sowing dates, plots that were not protected showed significantly higher pod and seed damage, which translated into notable yield losses of 12.5 per cent during first sowing and 17.9 per cent in second. These results indicate that pod bugs are a serious yield-limiting factor, particularly when timely management practices are not employed. Economic analysis further supports importance of protection, as protected plots not only yielded more grain but also generated higher net returns and better benefit-cost ratios. ICBR values of 6.0 and 7.9 for first and second sowing dates, respectively, underscore cost-effectiveness of pest management interventions.

LITERATURE CITED

- Hussain S and Saharia D 1994.** Linear model for predicting seed loss in green gram due to pod feeders. *Journal of the Agricultural Science Society of North-East India*. 7: 98-99.
- Nair M R G K 1978.** *A monograph on crop pests of Kerala and their control*. KAU Press, Mannuthy. 162.
- Singh S R and Emden H F V 1979.** Insect pests of grain legumes. *Annual Review Entomology*. 24: 255-278

- Srujana Y and Keval R 2014.** Periodic occurrence and association of pod fly and pod bug on long duration pigeonpea (Bahar) with weather parameters. *Journal of Experimental Zoology*. 17(2): 595-597.
- Veda O P 1993.** Effect of weather factors on the incidence of pod bug. *Clavigralla gibbosa* (Spinola) (Hemiptera: Coreidae) in pigeonpea. *Indian Journal of Entomology*. 55: 351-354.

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