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# Estimation of Crop Losses Due to Insect Pests in Brinjal (*Solanum melongena*)

***Laxman Singh Saini[1*], B.L. Jat[2], Akhter Hussain[3] and M.S. Meena[4]***
*[1]Ph.D. Scholar, Department of Entomology, SKNCOA, SKNAU, Jobner, Jaipur (Rajasthan), India.*
*[2]Professor, Department of Entomology, SKNAU, Jobner, Jaipur (Rajasthan), India.*
*[3]Associate Professor, Department of Entomology, SKNAU, Jobner, Jaipur (Rajasthan), India.*
*[4]Ph.D. Scholar, Department of Entomology, RCA, MPUAT, Udaipur (Rajasthan), India.*

*(Corresponding author: Laxman Singh Saini*)*
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**ABSTRACT: The present field experiment aimed to estimate yield losses in brinjal due to insect pests. The results revealed that the mean fruit yield from plots treated with alternate sprays of malathion 50 EC at 0.05% and acephate 75 SP at 0.05% was 340.77 q/ha and 343.46 q/ha in 2022 and 2023, respectively. In contrast, the yield from untreated plots was 213.38 q/ha and 210.92 q/ha in the same years. The yield differences between treated and untreated plots were statistically significant, with an increased yield of 127.38 q/ha and 132.54 q/ha in 2022 and 2023, respectively. This represented a yield increase of 59.70% and 62.84%, while the avoidable loss was 37.38% and 38.59% in 2022 and 2023, respectively. The study concluded that yield losses due to brinjal shoot and fruit borer can be effectively mitigated by the protective application of insecticides to the brinjal crop**.

**Keywords:** Brinjal, Yield losses, Insect pests and Treatment.

## INTRODUCTION

Brinjal (*Solanum melongena* L.), also known as eggplant, garden egg, and aubergine (a French term), belongs to the Solanaceae family. It is a widely cultivated vegetable in subtropical and tropical regions. Often referred to as the "King of Vegetables" and commonly known as the "poor man's vegetable," brinjal originated in India. India is the world's second-largest producer of brinjal. It ranks as the third most important vegetable crop in the country, with major production in states such as West Bengal, Orissa, Andhra Pradesh, Gujarat, Bihar, Madhya Pradesh, Maharashtra, and Karnataka. In India, brinjal crops are susceptible to numerous insect pests, with the most significant ones being aphids (*Aphis gossypii* Glover), leafhoppers (*Amrasca biguttula biguttula* Ishida), whiteflies (*Bemisia tabaci* Gennadius), brinjal shoot and fruit borers (*Leucinodes orbonalis* Guenee) and Epilachna beetles (*Epilachna vigintioctopunctata* Fab.). These pests are major contributors to the reduced production and productivity of brinjal. Kumar *et al.* (2015) reported about 20 to 89 per cent yield loses in brinjal due to infestation of insect pests. Moreover, weather parameters also play a pivotal role in the biology ofany insect pests. Temperature, humidity, sun shine hours and wind velocity are the most crucial weather parameters influencing the rate of growth and development of insect pests (Shukla and Khatri 2010).

## MATERIALS AND METHODS

The experiment were carried out in *kharif*, 2022 and 2023 at horticulture farm, S.K.N. College of Agriculture in Simple Paired Plot Design (Paired t-test) with two treatments *viz*., treated and untreated, each replicated thirteen times. The plot size was $3.0 \times 2.0$ m$^2$ with row to row and plant to plant distance of 60 cm and 50 cm, respectively. The varieties were used for the experiment, transplanted on 2$^{th}$ August 2022 and 4$^{th}$ August 2023. The plots were treated with alternate sprays of malathion 50 EC @ 0.05 and acephate 75 SP @ 0.05 per cent at weekly interval along with culture measures. The fruit yield of treated and untreated plots was recorded at each picking of the fruits. The data of fruit yield obtained were converted into quintal per hectare to interpret the results of crop losses inflicted by incidence of insect pests on brinjal by paired 't' test. The avoidable loss and increase in yield of fruits over control (untreated) was calculated for each treatment by following formula (Pradhan, 1964).

$$\text{Avoidable loss (\%)} = \frac{\text{Yield in treated plot} - \text{Yield in untreated control plot}}{\text{Yield in treated plot}} \times 100$$

$$\text{Increase in yield (\%)} = \frac{\text{Yield in treated plot} - \text{Yield in untreated control plot}}{\text{Yield in untreated control plot}} \times 100$$

## RESULTS AND DISCUSSION

In treated plots, the mean fruit yield obtained was 340.77 and 343.46 q ha$^{-1}$ whereas, in untreated plots, it was 213.38 and 210.92 q ha$^{-1}$in*Kharif*, 2022 and 2023, respectively (Table 1 and Fig. 1). The calculated t-value in both the years of study was greater than t- tabulated value (2.18, df - 12) at 5 per cent level of significance and was proved to be significant. Therefore, the yields obtained in two treatments (treated and untreated) during the study differed from each other significantly. In present investigation, the difference between the mean fruit yield of treated to untreated (increase in yield over untreated) were 127.38 and 132.54 q ha$^{-1}$ and the per cent increase in yield over control was recorded to be 59.70 and 62.84 per cent in 2022 and 2023, respectively. The pooled data of both the years (2022 and 2023) indicated that the mean yield in treated and untreated plots were 342.12 and 212.15 q ha$^{-1}$, respectively. The increase in mean yield in treated plots over untreated plots was 129.96 q ha$^{-1}$ and per cent increase in yield over untreated plots was 61.27 per cent. If the losses due to insect pests of brinjal could be avoided by pest control measures, the production can be appreciably increased. In *Kharif*, 2022 and 2023; the per cent avoidable losses recorded were 37.38 and 38.59 in treated and untreated plots, respectively. The pooled data of two consecutive years showed 37.99 per cent avoidable losses. The crop loss due to shoot and fruit borer are in agreement with that of Kumar and Singh (2012) reported the apparent losses caused by shoot and fruit borer on the fruits of brinjal were 19.4 to 20.2 per cent, whereas total losses were up to the tone of 35.2 to 36.4 per cent, out of which avoidable losses were 34.0 to 36.1 per cent. The results are also in agreement with those of Kumar *et al.* (2014) reported the apparent losses caused by brinjal shoot and fruit borer on fruits were 18.70 to 20.07 per cent, whereas total losses were up to the tune of 34.36 to 36.53 per cent, out of which avoidable losses were 33.60 to 36.19 per cent. Similarly, Varma *et al.* (2009) was also reported 3.76 to 45.45 per cent fruit damaged and 3.00 to 67.71 per cent weight loss by *L. orbonalis* in brinjal crop. Kumari (2018) found that fruit yield obtained from both the treatments was significantly differed and the per cent avoidable loss was 47.50 per cent are also support the present investigation. These results are also in conformity with the findings of Singh *et al.* (2006); Meena *et al.* (2012); Yadav and Kumawat (2013); Nayak *et al.* (2022). The varied damage caused by insect pests of brinjal was due to the varied biotic and abiotic factors of various localities.

**Table 1: Estimation the crop losses due to insect pests of brinjal in *Kharif*, 2022 and 2023 (Pooled).**

| Treatment | Yield (q/ha) | | | Increase in yield over untreated plots (%) | | | Avoidable loss (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2022 | 2023 | Pooled | 2022 | 2023 | Pooled | 2022 | 2023 | Pooled |
| Yield in treated plots (Malathion 50 EC @ 0.05 % alternately with acephate 75 SP @ 0.05 %) | 340.77* | 343.46* | 342.12* | 59.70 | 62.84 | 61.27 | 37.38 | 38.59 | 37.99 |
| Yield in untreated control plots (q/ha) | 213.38 | 210.92 | 213.50 | | | | | | |
| Increase in yield (q/ha) | 127.38 | 132.54 | 128.62 | | | | | | |
| t-cal. | 25.42 | 21.71 | | | | | | | |

(T-table = 2.18, df- 12),* Significant at 5 per cent level

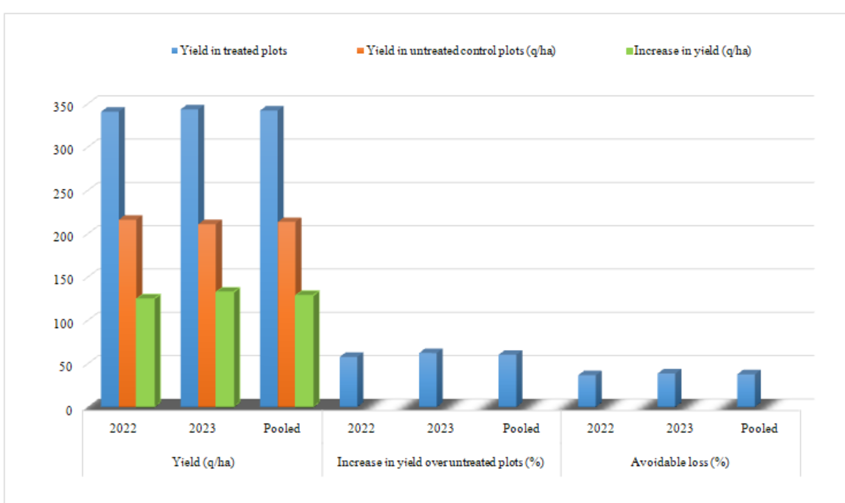


**Fig. 1.** Estimation the crop losses due to insect pests of brinjal in *Kharif*, 2022 and 2023 (Pooled).

## CONCLUSIONS

The study demonstrated a significant increase in fruit yield in treated plots compared to untreated plots in *Kharif,* 2022 and 2023. The mean fruit yields in treated plots were substantially higher with increases of 127.38 and 132.54 q $ha^{-1}$, translating to a 59.70% and 62.84% increase over untreated plots in 2022 and 2023, respectively. The pooled data from both years showed a mean yield increase of 129.96 q $ha^{-1}$, equivalent to a 61.27% increase. Additionally, the percentage of avoidable losses due to insect pests was 37.38% and 38.59% for the two years, with a pooled average of 37.99%. This highlights the effectiveness of pest control measures in significantly boosting brinjal production.

## FUTURE SCOPE

Study the impact of climate change on pest dynamics and develop adaptive pest management strategies to ensure sustainable brinjal production under changing environmental conditions. Develop and test new brinjal varieties that are resistant to insect pests, reducing the need for chemical treatments and promoting sustainable agriculture practices. Promote the integration of cultural, biological, and chemical control measures to develop a comprehensive pest management strategy that minimizes environmental impact.

**Author contributions.** Review & editing of manuscript (BLJ, AH& LSS); Allocation of treatment (BLJ & AH); Conceived and designed the analysis (BLJ &LSS); Collected the data (LSS& MSM); Contributed data or analysis tools (LSS& MSM); Performed the analysis (LSS &MSM); Wrote the paper (LSS).

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**Conflict of Interest.** None.

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