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# Efficacy of selected insecticides against brinjal shoot and fruit borer, *Leucinodes orbonalis* (Guenee)

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**Abstract**
A field investigation was carried out during *Kharif* season of 2021 at Crop Research Farm, Department of Entomology "Sam Higginbottom university of Agriculture, Technology and Sciences" Prayagraj, Uttar Pradesh. The experiment was laid in Randomized block design with seven treatments replicated thrice along with a control plot to check the Efficacy of selected insecticides against brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee). In the series of shoot infestation, the efficacy of treatments on first spray showed that chlorantraniliprole (7.87%) to be the most effective among the selected insecticides followed by flubendiamide (9.03%) and emamectin benzoate (11.84%). Treatments Spinosad (12.83%) and cypermethrin (15.00%) was found to be average. While lambda cyhalothrin (16.35%) and Azadirachtin (20.69%) was found to be less effective in controlling the infestation of *Leucinodes orbonalis* (Guenee). In the series of the fruit infestation, the efficacy of treatments on second spray showed that Chlorantraniliprole (8.30%) found to be most effective, followed by Flubendiamide (9.69%) and Emamectin benzoate (11.90%). Treatments Spinosad (13.91%) and Cypermethrin (16.55%) was found to be average. While Lambda cyhalothrin (18.25%) and Azadirachtin (20.64%) was found to be less effective in controlling the infestation of *Leucinodes orbonalis* (Guenee) but comparatively superior over the control.

**Keywords:** Brinjal, efficacy, insecticides, *Leucinodes orbonalis* shoot and fruit borer

## Introduction
*Solanum melongena* (L.), popularly known as eggplant (Brinjal), is a member of the Solanceae family. It is considered a native to India and grown all over the world extensively in India, Bangladesh, Pakistan, China, and Philippines. It is popular in Central and South America, East Asia, and parts of Africa. India leads the world in terms of output and productivity, after China. The total area under brinjal cultivation in India is 7.11 million hectares, among the Indian states Rajasthan has a land area of 55.39 thousand hectares and produced 23.21 million tonnes of produce per year.

Brinjal is abundant in minerals (calcium, magnesium, phosphorus, sodium, potassium, chlorine, and iron etc.), vitamins, and it also has therapeutic value. The pest infestation in brinjal is known to be from germination until harvest, the brinjal crop is attacked by a variety of insect pests like shoot and fruit borer, *Leucinodes orbonalis* (L.) Guen., jassid, Amrasca,\Aphid, *Biguttula biguttula* (Ishida), *Aphis gossypii* Glover, *Urentius echinus* Distant, *Epilachna vigintioctopunctata* Fab, and stem borer, *Euzophera perticella L. orbonalis*, among which shoot and fruit borer cause major constraints in brinjal production as these remain active throughout the year. This pest has been well documented in all areas where brinjal is grown, including Germany, Burma, the United States, Sri Lanka, and India. The shoot and fruit borer, which can cause yield losses of up to 90%, is now regarded as the most serious pest of brinjal crop. The pest's caterpillar attacks the terminal shoot first and bores inside as a result the shoots drop and wilt. It also bores into the young fruits by making holes and feeding them from inside. Such fruits are partially inappropriate for human consumption and they lose their market value.

It is critical to manage the pest population at the appropriate time in order to prevent pest infestation and provide a quality harvest. Keeping these considerations in mind an investigation was carried out in order to improve pest management strategies of shoot and fruit borer in brinjal. A novel safer insecticidal approach against *L. orbonalis* was made in the current study in which a test was carried out to assess the efficacy of some newer, safer drugs molecules that are insecticidal against *L. orbonalis*.

## Materials and Methods

**Table 1:** Details of the experiment

| Crop and variety | Banaras Purple Long |
|---|---|
| Design | Randomized Block Design |
| Replication | Three |
| Treatments | Eight |
| Spacing | 60x45 cm |

**Table 2:** Details of insecticides used in experiment

| S. No. | Treatments | Chemicals name and formulation | Group | Waiting period (DAYS) | Reference |
|---|---|---|---|---|---|
| 1 | $T_0$ | Untreated | - | - | - |
| 2 | T1 | Emamectin benzoate 5 SG@0.5g/lit | Avermectins | 03 | Nawale Jayant Shyamrao *et al.,* (2018) [7] |
| 3 | $T_2$ | Chlorantraniliprole 18.5SC @0.4ml/lit | Anthranilic diamide | 02 | Niranjana R F *et al.*,(2017) [8] |
| 4 | $T_3$ | Cypermethrin 25EC @2ml/lit | Synthetic pyrethroid | 01 | Anwar *et al.*,(2015) [1] |
| 5 | $T_4$ | Spinosad 45%SC @ 0.20 to 0.30ml/lit | Spinosyns | 03 | B K Singh *et al.*,(2021) |
| 6 | $T_5$ | ƛ−cyhalothrin 05.00%EC@1ml/lit | Pyrethroids | 04 | Vinayaka KS *et al.*,(2019) |
| 7 | $T_6$ | Flubendiamide 20WG @0.75g/lit | Diamide | 05 | Shridara *et al.*,(2019) |
| 8 | $T_7$ | Azadirachtin 0.03%EC@5ml/lit | Botanical | 07 | Tripura *et al.*,(2017) |

*Waiting period according to the recommendation of Gov. of India, Ministry of Agriculture-Major use of pesticide. Registered under the Insecticide Act, 1968. As on 7.11.2009

The present investigation was undertaken to evaluate the efficacy of selected insecticides against brinjal shoot and fruit borer at the Crop Research Farm of Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh during Kharif season 2021.

### Data collection

Data pertaining to this field experiment was collected from five randomly selected plants from each plot. Periodic observations were recorded at 3rd, 7th, 14th days after spray through the cropping season.

### On Shoot

### Number Basis

At each picking the total number of shoots and number of shoots infested of five selected plants from each treatment replication wise will be recorded.

$$\% \text{ Shoot infestation} = \frac{\text{No. of shoot infeted}}{\text{Total no. of shoots}} \text{ x } 100$$

### On Fruit

### Number Basis

At each picking the total number of fruits and number of fruits infested of five selected plants from each treatment replication wise will be recorded.

$$\text{Fruit infestation (Number Basis)} = \frac{\text{No. of fruits infested}}{\text{Total no. of fruits}} \text{ x } 100$$

ANOVA was made by F variance and the pair comarisions were performed by Ducan's Multiple Range Test (Gomez and Gomez 1984).

## Results and Discussion

### Efficacy of selected insecticides against brinjal shoot and fruit borer *Leucinodes orbanalis* (Gueene)

- **First Spray-Percent shoot infestation**

The data on the mean (3rd, 7th, 14th DAS) Percent infestation of shoot borer on first spray revealed that all the chemical treatments are superior over the control. Among all the treatments lowest percent of shoot infestation was recorded in chlorantraniliprole (7.87%), Followed by flubendiamide (9.03%) and emamectin benzoate (11.84%). Treatment spinosad (12.83%) and cypermethrin (15.00%) was found to be average. The lambda cyhalothrin (16.35%) and Azadirachtin (20.69%) found to be less effective in controlling the infestation of *Leucinodes orbonalis* Guenee.

**Table 3:** To evaluate the efficacy of selected insecticides against brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee) (First Spray): (% shoot infestation)

| Treatments | | Percent shoot infestation of *Leucinodes Orbonalis* | | | | |
|---|---|---|---|---|---|---|
| | | One day before spray | After spray | | | |
| | | | 3rd Day | 7th Day | 14th Day | Mean |
| T0 | Untreated | 22.803 | 24.91 | 26.96 | 32.77 | 28.21 |
| T1 | Emamectin benzoate 5SG | 19.627 | 12.34 | 10.40 | 12.78 | 11.84 |
| T2 | Chlorantraniliprole 18.5SC | 21.27 | 8.00 | 6.72 | 8.90 | 7.87 |
| T3 | Cypermethrin 25 EC | 20.67 | 15.89 | 12.81 | 16.30 | 15.00 |
| T4 | Spinosad 45% SC | 27.38 | 13.47 | 10.77 | 14.25 | 12.83 |
| T5 | Lambda cyhalothrin05.00%EC | 22.43 | 16.92 | 14.29 | 17.86 | 16.35 |
| T6 | Flubendiamide 20WG | 20.37 | 9.07 | 7.98 | 10.06 | 9.03 |
| T7 | Azadirachtin 0.03% EC | 25.92 | 21.75 | 18.00 | 22.30 | 20.69 |
| Overall Mean | | 22.55 | 15.29 | 13.49 | 16.90 | 15.22 |
| F- test | | NS | S | S | S | S |
| S. Ed. (±) | | 6.11 | 0.881 | 0.780 | 1.02 | 1.11 |
| C. D. (P = 0.05) | | NS | 1.883 | 1.673 | 2.200 | 2.41 |

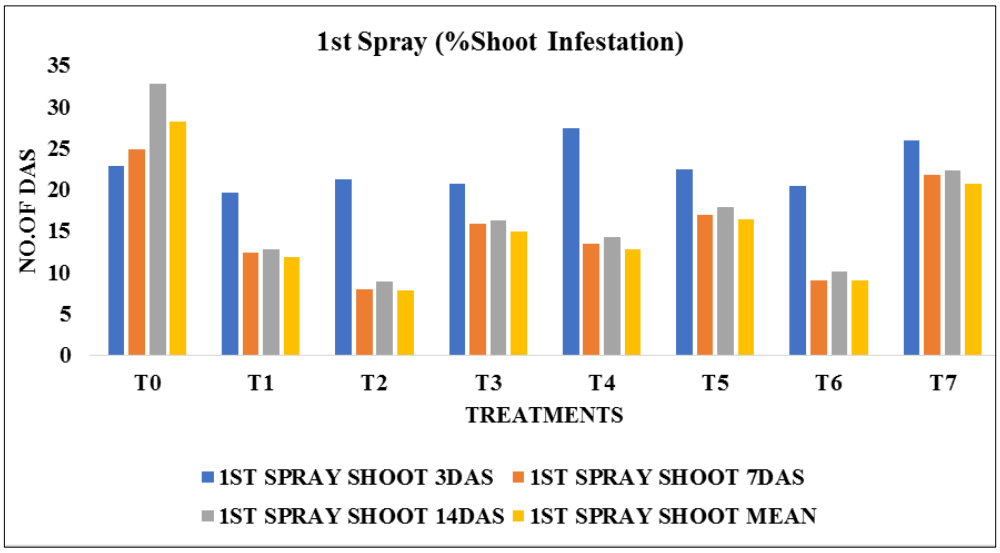


**Fig 1:** Graphical representation of Efficacy of selected insecticides against brinjal shoot and fruit borer *Leucinodes orbonalis* (Guenee) (First Spray) (% shoot infestation)

- **Second spray -per cent fruit infestation**

The data on the mean (3rd, 7th, 14th DAS) Percent infestation of fruit borer on second spray revealed that all the chemical treatments are superior over control. Among all the treatments, the lowest fruit infestation was recorded in Chlorantraniliprole (8.30%) Followed by Flubendiamide (9.69%) and Emamectin benzoate (11.90%). Treatments Spinosad (13.91%) and Cypermethrin (16.55%) was found to be average. The Lambda cyhalothrin (18.25%) and Azadirachtin (20.64%) found to be less effective in controlling the infestation of *Leucinodes orbonalis* (Guenee).

**Table 4:** To evaluate the efficacy of selected insecticides against brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee) (Second Spray): (% fruit infestation).

| Treatments | | Percent shoot infestation of *Leucinodes orbonalis* | | | | |
|---|---|---|---|---|---|---|
| | | One day before spray | After spray | | | |
| | | | 3rd Day | 7th Day | 14th Day | Mean |
| T0 | Untreated | 22.163 | 25.21 | 28.100 | 33.88 | 29.06 |
| T1 | Emamectin benzoate 5SG | 23.69 | 12.06 | 11.183 | 12.45 | 11.90 |
| T2 | Chlorantraniliprole 18.5SC | 27.72 | 7.91 | 7.06 | 9.95 | 8.30 |
| T3 | Cypermethrin 25 EC | 25.77 | 16.903 | 14.66 | 18.11 | 16.55 |
| T4 | Spinosad 45% SC | 19.69 | 14.077 | 13.34 | 14.38 | 13.93 |
| T5 | Lambda cyhalothrin05.00%EC | 26.71 | 18.46 | 16.67 | 19.62 | 18.25 |
| T6 | Flubendiamide 20WG | 23.88 | 10.30 | 8.26 | 10.53 | 9.69 |
| T7 | Azadirachtin 0.03% EC | 25.90 | 20.84 | 19.52 | 21.55 | 20.63 |
| Overall Mean | | 24.44 | 15.71 | 14.84 | 17.55 | 16.03 |
| F- test | | NS | S | S | S | S |
| S. Ed. (±) | | 4.947 | 0.836 | 0.726 | 0.854 | 1.19 |
| C. D. (P = 0.05) | | NS | 1.78 | 1.55 | 1.828 | 2.58 |

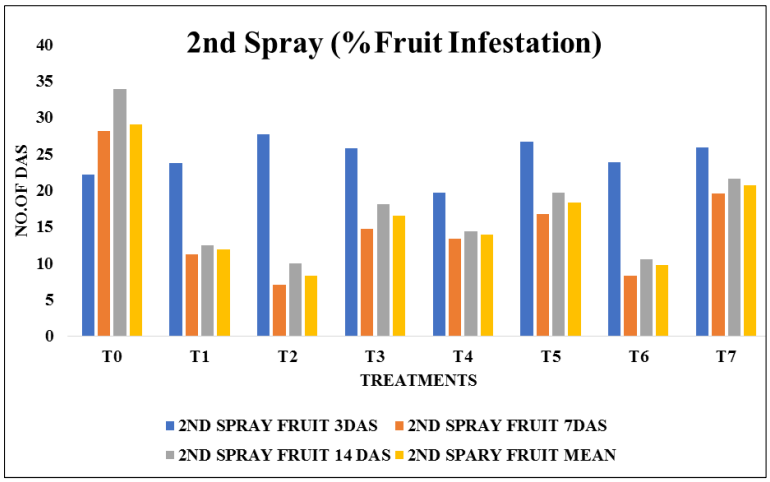


**Fig 2:** Graphical representation of Efficacy of selected insecticides against brinjal shoot and fruit borer *Leucinodes orbonalis* (Guenee) (First Spray) (% fruit infestation)

## Conclusion

From the analysis of present findings on efficacy of selected insecticides on brinjal shoot and fruit borer, the treatments Chlorantraniliprole was found most effective against brinjal shoot and fruit borer followed by flubendiamide, emamectin benzoate and resulted higher yield. While Spinosad and cypermethrin ranked middle in order of their efficacy, then lambda cyhalothrin and Azadirachtin found to be least effective in managing *Leucinodes orbonalis.*

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