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Efficacy of selected chemicals and botanicals against shoot and fruit borer [(*Leucinodes orbonalis*) (Gueenee)] on brinjal (*Solanum melongena* L.)

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Abstract
The field investigation was carried out at Central Research Farm (CRF), Department of Entomology, Sam Higginbottom University of Agriculture, Technology and Sciences. Prayagraj, Uttar Pradesh during *Rabi* season 2023-24. The experiment was laid in Randomized Block Design with eight treatments replicated thrice viz, treatment with doses. The result after two sprays reveled that the lowest percent shoot and fruits, infestation after first and second spray was recorded in treatment Chlorantraniliprole 18.5% SC (9.94%), Spinosade 45% SC (10.51%), Indoxacarb 14.5% SC (10.82%), Emamectin Benzoate 5% SG (11.43%), Flubendamaide 480% SC (11.88%), *Beauveria bassiana* 1.15% WP (12.57%), Neem oil 2% (13.12%), Control Plot (15.95%). The crop yield ranged between 221 q/ha to 90.50 q/ha in the treatments and BCR ranged between 1:9.9 to 1:4.6. The plot treated with chlorantraniprole 18.5 SC showed highest yield and BCR of 221 q/ha and 1:9.9 and found to be most effective treatment next to which Spinosad 45 SC (195.13 q/ha, 1:9.3) Indoxacarb 14.5SC (185.87 q/ha, 1:9.0), Emamectin Benzoate (178.95 q/ha,1:8.5), Flubendiamide 480 SC (170.43 q/ha,1:8.0), *Beauveria bassiana* 1.15% WP (165 q/ha,1:7.9). Neem oil @ 2% (150.69 q/ha 1:7.2) as compared to untreated control plot (90.50 q/ha, 1:4.6).

Keywords: Botanicals, benefit cost ratio, brinjal, chemicals, *Leucinodes orbonalis*, yield

Introduction
Brinjal (*Solanum melongena* Linnaeus) belongs to the family Solanaceae. Eggplant is referred as the - King of vegetables‖ originated from India and now grown as a vegetable throughout the tropical, sub-tropical and warm temperate areas of the world. It is a most important vegetable in the Indian Subcontinent that accounts for almost 50% of the world's area under its cultivation. However, in India, the area is estimated as 7.5% of the total area of vegetables with 8% of the total production of vegetables (Roy *et al.*, 2016) [10].

Nutritional value per 100 g of brinjal contains carbohydrates (5.88 g), protein (0.98 g), total fat (0.18 g), dietary fiber (3.0 g), folates (22 mcg), niacin (0.649 mg), riboflavin (0.037 mg),thiamin (0.039 mg), vitamin C (2.2 mg), vitamin A (23 IU), vitamin A, (1 µgvRAE),vitamin E (0.30 mg), vitamin K (53 mcg), vitamin sodium (2 mg), potassium (229 mg), calcium (9 mg), iron (0.23 mg), magnesium (14 mg), phosphorus (24 mg), zinc (0.16 mg), and lutein andzeaxanthin (516 mg). It has been reported as Ayurvedic medicine for curing the diabetes. In addition, it is used as a good appetizer, good aphrodisiac, cardio tonic, laxative and reliever of inflammation.

Brinjal is subjected to attack by number of insect pest right from nursery stage. till harvesting. Among the insect pests infesting brinjal, the major ones are shoot and fruit borer, *Leucinodes orbonalis*, whitefly, and *Bemicia tabaci*, leafhopper, *Amrasca biguttula* (Ishida), and non-insect pest, red spider mite, *Tetranychus macfurlanei*. Aphids and whiteflies both have piercing, sucking mouthparts used to suck the sap out of eggplant leaves and stems. Both pests are primarily found on the undersides of the leaves. As they feed, they secrete a sticky waste known as honeydew. These, *L. orbonalis* is considered the main constraint as it damages the crop throughout the year. This pest is reported from all, brinjal growing areas of the world including Germany, Burma, USA, Sri Lanka and India. It is known to damage shoot and fruit of brinjal in all stages of its growth.

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The yield loss due to the pest is to the extent of 70-92 percent. The infested fruits become unfit for consumption due to loss of quality and hence, lose their market value. (Kalawate and Dethe, 2012) [2].
It was reported that the borer infestation was 78.66% on top shoots in vegetative phase and then shifted to flowers and fruits with infestation reaching 66.66% in fruiting phase (Yadav *et al.*, 2015) [17].

Materials and Methods

The field investigation was conducted at the experimental research plot of Department of Entomology, Central Research Farm, Sam Higginbottom University of Agriculture Technology And Science, Prayagraj, during Kharif season 2023 in a Randomized Block Design (RBD) with eight treatment viz which were replicated time using variety, Sangam F1 hybrid seeds in plot size of 2m X Im at a spacing of 60 cm x 45 cm with a recommended package of practices excluding plant protection. The spraying was done after the population reached its ETL.
The population of brinjal shoot and fruit borer was recorded one day before spraying and on 3rd, 7th day and 14th day after treatment application. The populations of brinjal shoot and fruit borer was recorded on 5 randomly selected plants from each plot and then it was converted into percent of infestation by following formulas,

On Shoot

Number Basis: The total number of shoots and number of shoots infested of five selected plants from each treatment replication wise were recorded.

$$\% \text{ Shoot infestation} = \frac{\text{No. of shoot infested}}{\text{Total no. of shoot}} \times 100$$

(Yadav *et al*., 2015) [17]

On Fruit

Number Basis: At each picking the total number of fruit and number of fruits infestation five selected plants from each treatment replication wise was recorded.

$$\text{Fruit infestation } \% = \frac{\text{No. of Fruit infested}}{\text{Total no. of shoot}} \times 100$$

(Lavanya and Kumar, 2022) [3]

Based on the yield data, the gross returns and net returns were calculated for each treatment. Gross returns were calculated by multiplying total yield with the market price of the produce. The ratio of gross return and cost of cultivation was worked for each treatment and was used as Cost: benefit ratio (BCR) to compare the performance of different treatments. Cost Benefit ratio was calculated by using the following equation.

$$\text{C: B Ratio} = \frac{\text{Gross Returns}}{\text{Total Cost}}$$

Where,
C:B Ratio = Cost benefit Ratio
(Reddy and Yadav, 2023) [9]

Results and Discussion

The data on the percent infestation of shoot and fruit borer on brinjal shoot after first spray (3rd, 7th and 14th DAS) revealed that all the treatments were significantly superior over control. Among all the treatments lowest percent shoot infestation was recorded in T_1 Spinosad 45% SC (9.92%), which was lower than the check treatment i.e, T_2 Chlorantraniliprole 18.5% SC (9.28%), followed by T_4 indoxacarb 14.5% SC (10.43%), T_3 Emamection benzoate 5% SG (10.93%), T_5 flubendiamide 480% SC (11.53%), T_7 *Beauveria bassiana* 1.15%WP (11.87%), T_6 Neem oil 2% (12.52%), Control plot T_8 (14.14%). (Table 1).
The data on the percent infestation of shoot and fruit borer on brinjal fruit after second spray (3rd, 7th and 14th DAS) revealed that all the chemical treatments were significantly superior over control. Among all the treatments lowest percent shoot, infestation was recorded in T_1Spinosad 15% SC (10.51%), which was lower than the check treatment T_2, Chlorantraniliprole 18.5% SC (9.94%), followed by T_4 indoxacarb 14.5% SC (10.82%), T_3 Emamection benzoate 5% SG (11.43%) T_5 flubendiamide 480% SC (11.88%), T_7 Beauveria bassiana 1.15%WP (12.57%), T_6 Neem oil 2% (13.12%), Control plot T_8 (15.95%). (Table 1).
The results are in support with Sankar and Kumar (2022) [11]. Who reported that the treatment Chlorantraniliprole 18.5% SC was superior in reducing the population of shoot and fruit borer which is check treatment. Next most effective treatment was T_1 Spinosad 45% SC which was similar with the findinss of results. Next effective Treatment was recorded in T_4 indoxacarb 14.5% SC which is similar to Saimandir and Gopal (2009) [12].
The yields and C:B ratio among all the treatment were significant as highe compared to control plot. The highest yield & C:B ratio was obtaind in T_2 Chlorantraniliprole 18.5% SC (221 q/ha), followed by T_1 Spinosad 45% SC (195.13 q/ha), T_4 indoxacarb1 4.5% SC (185.87 q/ha), T_3 Emamection benzoate 5% SG (178.95 q/ha) T_5 flubendiamide 480% SC (170.43 q/ha), T_7 Beauveria bassiana 1.15%WP (165 q/ha), T_6 Neem oil 2% (150.69 q/ha) and Control plot T_8 (90.50 q/ha).

Table 1: Treatment Doses Average number of Larvae

Treatment Doses			Average number of Larvae									Yield q/ha	B:C
			First spray					Second spray					
			1 DBS	3 DBS	7 DBS	14 DBS	Mean	3 DBS	7 DBS	14 DBS	Mean		
T_1	Spinosad 45% SC	0.5 ml/lit	13.58	10.14^{cd}	9.16^{de}	10.46^{cd}	9.92	10.10^{cd}	7.99^{de}	13.44^{c}	10.51	195.13	1:9:3
T_2	Chlorantraniliprole 18.5% SC	0.4 ml/lit	14.43	9.93^{d}	8.30^{e}	9.63^{d}	9.28	9.74^{d}	7.24^{e}	12.86^{c}	9.94	221	1:9:9
T_3	Emamection benzoate5% SG	0.4 ml/lit	14.76	11.44^{bcd}	10.18^{bcde}	11.19^{bcd}	10.93	11.26^{bcd}	9.16^{cd}	13.88^{bc}	11.43	178.95	1:8:5
T_4	Indoxacarb 14.5% SC	0.5 ml/lit	15.25	10.70^{cd}	9.72^{cde}	10.89^{bcd}	10.43	10.61^{cd}	8.27^{de}	13.58^{c}	10.82	185.87	1:9:0
T_5	Flubendiamide 480% SC	1 ml/lit	15.03	11.90^{abcd}	10.80^{bcd}	11.98^{bc}	11.53	11.82^{bcd}	9.72^{c}	14.11^{bc}	11.88	170.43	1:8:0
T_6	Neem oil 2%	2 ml/lit	16.77	12.81^{ab}	11.91^{b}	12.86^{ab}	12.52	12.86^{ab}	11.28^{b}	16.08^{a}	13.12	150.69	1:7:2
T_7	*Beauveria bassiana* 1.15%WP	2.5 gm/lit	14.78	12.13^{abc}	11.32^{bc}	12.16^{bc}	11.87	12.03^{bc}	10.15^{bc}	15.25a	12.57	165	1:7:9
T_8	Control	-	13.44	13.88^{a}	14.11^{a}	14.43^{a}	14.14	15.02^{a}	16.08^{a}	16.77	15.95	90.50	1:4:6
	Overall Mean	-	14.75	11.61	10.68	11.7	11.33	11.68	9.93	14.49	12.02		
	F- test	-	NS	S	S	S	S	S	S	S	S		
	S. Ed. (±)	-	1.36	1.33	1.29	0.86	0.95	1.22	1.00	1.10	1.01		
	C.D. (P=0.05)	-	-	482.03	1.90	2.11	0	2.24	1.41	1.57	1.50		

Conclusion

The study demonstrated that all treatments were significantly more effective than the control in reducing shoot and fruit borer infestation on brinjal. The lowest shoot infestation after the first spray was recorded for T_1 Spinosad 45% SC (9.92%) and T_2 Chlorantraniliprole 18.5% SC (9.28%). After the second spray, T_1 Spinosad 15% SC (10.51%) and T_2 Chlorantraniliprole 18.5% SC (9.94%) showed the lowest infestation rates. Yield and cost-benefit analysis indicated that T_2 Chlorantraniliprole had the highest yield (221 q/ha) and C ratio, followed by T1 Spinosad. These results support earlier findings and highlight the effectiveness of these treatments in managing borer infestation and enhancing yield.

References

1. Devi LL, Ghule TM, Chatterjee ML, Senapati AK. Effectiveness of biorational insecticides for the management of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee and on yield. Ecol Environ Conserv. 2015;21(2):783-788.
2. Kalawate A, Dethe MD. Bioefficacy study of biorational insecticide on brinjal. J Biopesticides. 2012;5(1):75.
3. Lavanya V, Kumar A. Efficacy of certain chemicals against gram pod borer [*Helicoverpa armigera* (Hubner)] on chickpea (*Cicer arietinum* L.). Pharma Innovation J. 2022;11(3):1293-1297.
4. Machhindra PN, Yadav U, Nana PH, Ananda NS, Sakharam CA. Efficacy of selected chemicals and biopesticides, against shoot and fruit borer [*Leucinodes orbonalis* (Guenee)] on Brinjal. Int J Plant Pathol Microbiol. 2022;3:09-12.
5. Mahla MK, Kamar A, Lekha AV, Singh V. Bio-eficacy of carbosulfan 25 BC against fruit and shoot borer of brinjal and their natural enemies. J Entomol Zool Stud. 2017;5(5):260-264.
6. Mahajan SS, Kumar A, Warghat NA, Kolhe PS, Jagarlamudi SMR. Comparative efficacy of latest chemical insecticides and bio-pesticides against (*Leucinodes orbonalis* Guenee.) on brinjal at Trans Yamuna Region of Prayagraj (UP). Int J Curr Microbiol Appl Sci. 2020;9(7):3414-3429.
7. Naik SG, Kumar A. Field efficacy and economies of certain chemicals and biopesticides against brinjal shoot and fruit borer [*Leucinodes orbonalis* (Guenee)). Pharma Innovation J. 2023;12(6):2937-2940.
8. Pooja GS, Kumar A. Field efficacy and economics of different insecticides against brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee). Pharma Innovation J. 2022;11(7):4545-4548.
9. Reddy AC, Yadav U. Effect of Selected Bio-pesticides and Chemicals against Brinjal Shoot and Fruit Borer, *Leucinodes orbonalis* (Guenee.) in Trans Yamuna Region of Prayagraj, India. Int J Environ Clim Change. 2023;13(9):1613-1617.
10. Roy G, Gazmer R, Sarkar S, Laskar N, Das G, Samanta A. Comparative bioefficacy of different insecticides against fruit and shoot borer (*Leucinodes orbonalis* Guenee) of Brinjal and their effect on natural enemies. Int J Green Pharm. 2016;10(4):257-260.
11. Sankar AS, Kumar A. Evaluation of certain insecticides to control shoot and fruit borer, *Leucinodes orbonalis* Guenee on brinjal (*Solanum melongena* L). Pharma Innovation J. 2022;11(9):2183-2186.
12. Saimandir J, Gopal M, Walia S. Risk assessment of thiacloprid and its chemical decontamination on eggplant, *Solanum melongena* L. Pest Manag Sci formerly Pestic Sci. 2009;65(2):210-215.
13. Sowmya E, Pradeep S, Manjunatha DK, Ravulapenta S, Chethan KS. Bioefficacy of Insecticides against *Leucinodes orbonalis* on Traditional Cultivars of Brinjal. Environ Ecol. 2015;33(4):1596-1598.
14. Sowmya KH, Rajnikant TA. Field Efficacy of Different against Brinjal Shoot and Fruit Borer, *Leucinodes orbonalis* (Cracters). Int J Plant Soil Sci. 2013;35(18):418-422.
15. Tripura A, Chatterjee ML, Pande R, Patra S. Biorational management of brinjal shoot and fruit borer *Leucinodes orbonalis* (Guenes) in mid hills of Meghalaya. J Entomol Zool Stud. 2017;5(4):41-45.
16. Vyas P, Tayde AR. Evaluation of chemical insecticides and biopesticides in management of shoot and fruit borer *Leucinodes orbonalis* (Guence) in brinjal *Solanum melongena* (L.). Pharma Innovation J. 2022;11(10):898-901.
17. Yadav R, Lyall H, Kumar S, Sanp RK. Efficacy of certain botanical insecticides against shoot and fruit borer, (*Leucinodes orbonalis* Guence) on brinjal (*Solanum melongena* L.). Bioscan. 2015;10(2):987-990.