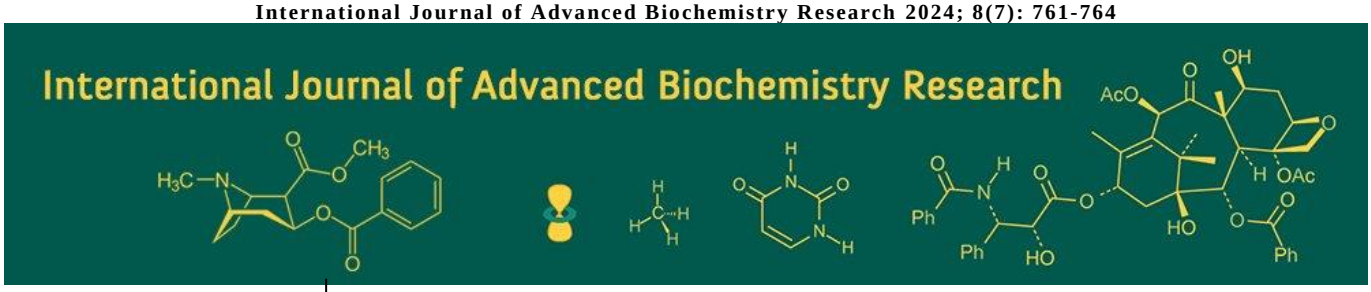

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Management of brinjal Shoot and Fruit borer [(*Leucinodes orbonalis* (Guenee)] in Prayagraj (UP.)

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Abstract
The Investigation on "Management of brinjal Shoot and Fruit borer [(*Leucinodes orbonalis* (Guenee)] in Prayagraj (UP.)". on brinjal during *Rabi*, 2023-24 at the experimental research plot of Department of Entomology, Central Research Farm (CRF), Sam Higginbottom University of Agriculture, Technology and Science, Prayagraj, Uttar Pradesh. The result showed that the treatments maximum benefit cost ratio with Emamectin benzoate 5 SG (1:8.9) Followed by Indoxacarb 14.5% SC (1:6.8), Spinosad 45% SC (1:5.4), *Metarhizium anisopliae* $1x10^8$ spores /ml (1:5.3), *Beauveria bassiana* 1 $x10^{12}$ Spores/ml (1:5.0), *Bacillus thuringiensis* ($1x10^8$ CFU/ml) (1:4.7), NSKE 5% (1:4.6) and control (1:1.3).

Keywords: Emamectin benzoate, *Leucinodes orbonalis*, cost benefit ratio, chemical

1. Introduction
Brinjal or eggplant (*Solanum melongena* Linn.) is worldwide known as aubergine or guinea squash which is most popular and Principle vegetable crop hence regarded as "King of vegetables belonging to the family '*Solanaceae*' is one of the common and popular vegetables grown throughout the world. Brinjal is a versatile and economically important vegetable among small-scale farmers and low-income consumers of the entire universe Naik and Kumar (2021) [8].

Brinjal, eggplant, or Aubergine, boasts a rich history of cultivation spanning over 4000 years in the region. It finds its predominant niche in warmer hemispheres, with a notable prevalence in the culinary traditions of the Mediterranean and Middle Eastern regions. This versatile plant species serves a myriad of purposes. Thanks to its remarkable nutritive profile, encompassing vital minerals like iron, phosphorous, calcium, as well as vitamins A, B, and C, the unripe fruits take center stage as a culinary vegetable in the region. Additionally, they play a pivotal role in the production of pickles and serve as a valuable remedy for individuals grappling with liver maladies. Within the realm of traditional Ayurvedic medicine, it garners recognition for its efficacy in managing diabetes. Moreover, its properties extend to acting as an appetizer, aphrodisiac, cardiotonic, laxative, and as a potent anti-inflammatory agent, as highlighted by Kalawate and Dethe (2014) [5] In every 100 grams of edible brinjal, the elemental composition stands as follows: moisture content at 92.7 g, protein at 1.4 g, fat at 0.3 g, minerals at 0.3 g, Fiber at 1.3 g, carbohydrates at 4.0 g, calcium at 10 mg, magnesium at 16 mg, phosphorous at 47 mg, iron at 0.9 mg, sodium at 3.0 mg, potassium at 200.00 mg, copper at 0.17 mg, sulphur at 44 mg, chlorine at 52 mg, vitamin A at 124 IU, thiamine at 0.04 mg, riboflavin at 0.11 mg, nicotinic acid at 0.09 mg, and vitamin C at 12 mg Raj and Kumar (2021) [8].

Annual production of eggplants in China is ranked No.1, the country accounts for 64.41% of total world eggplant production, cultivated over 781,695 hectares, producing 454,852 hg/ha. Followed by India which accounts for 22.97% of total world eggplant production cultivated over 727,000 hectares with a yield of 174,415 hg/ha and Egypt which accounts for 2.14% of total world eggplant production, cultivated over 43,818 hectares with a yield of 269,350 hg/ha (FAO 2019).

Brinjal shoot and fruit borer, BFSB, *(Leucinodes orbonalis* Guenee), (Lepidoptera Pyralidae) is the most serious chewing pest of brinjal crop and it damages the fruits up to 50- 70%. It damages shoot and fruit of brinjal plant in almost all stages of growth. Serious damage is caused by the larval stage of this pest.

It is an internal borer which damages the tender shoots and fruits. Adult moth having dirty whitish wings and speckled markings lays eggs on young leaves/ flowers/ calyx of the fruits. After hatching the larvae starts boring into the petiole/ midrib of the leaves/ growing shoots/ flower buds/ fruits and closes the bore hole with frays. After entering, it will feed inside the midribs/ flower/ ovary of flower and the pulp of fruit. The damaged shoots and the flowers droop down and the damaged fruits get rotten from inside. Brinjal larvae bore the plant shoot and fruits which directly affect growth, yield and fruit quality of crop and thus make it unfit for feeding purpose.

2. Materials and Methods

The experiment was conducted during *Rabi* season 2023-24 at a Central Research Farm of Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, India in a Randomized Block Design (RBD) with seven treatment and three replication three times using variety Arka Keshaw seeds in plot size of 2m X 1m at a spacing of 60 cm x 45 cm with a recommended package of practices excluding plant protection. The soil of the experimental site was well drained and medium high. The treatments were Emamectin benzoate 5 SG Followed by Indoxacarb 14.5% SC, Spinosad 45% SC, *Metarhizium anisopliae* $1x10^8$ spores /ml, *Beauveria bassiana* $1x10^{12}$ Spores/ml, *Bacillus thuringiensis* ($1x10^8$ CFU/ml), NSKE 5% and one control plot (water spray) were used in this study. The insecticides were sprayed twice, first just after the appearance of pest on shoot and the second spray was given after 20 days of first spray. For evaluating the effectiveness of insecticides against shoot and fruit borer, damaged shoots were counted in each plot after 3rd, 7th and 14 days after each spray and the percent shoot infestation was computed on the basis of number of infested shoots out of total number of shoots per plot in each observation. Percent fruit infestation was worked out on the basis of number of infested fruits out of total number of fruits. Gross returns were calculated by multiplying total yield with the market price of the produce. Cost of cultivation and cost of treatments were deducted from the gross returns, to find out returns and cost benefit of ratio.

On Shoot -Number Basis: The total number of shoots and number of shoots infested of five selected plants from each treatment, replication was recorded.

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

(Yadav *et al*.,2014) [11]

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

(Yadav *et al*., 2014) [11]

Cost benefit ratio of treatments

Gross returns were calculated by multiplying total yield with market price of the produce. Cost of cultivation and cost of treatments were deducted from the gross returns, to find out returns and cost benefit of ratio by following formula.

$$\text{BCR} = \frac{\text{Net returns}}{\text{Total cost}}$$

3. Results and Discussion

Per cent mean infestation (3rd, 7th, 14th) day after first spray: The data on the per cent infestation of shoot borer on 3rd, 7th, 14th day after spray revealed that all the treatments were significantly superior over control. Among all the treatments lowest per cent infestation of shoot and fruit borer was recorded in Emamectin benzoate 5 SG (11.51) Followed by Indoxacarb 14.5% SC (13.08), Spinosad 45% SC (14.04), *Metarhizium anisopliae* $1x10^8$spores /ml (14.94), *Beauveria bassiana* 1 x10 ^{12} Spores/ml (15.84), *Bacillus thuringiensis* ($1x10^8$ CFU/ml) (17.07), NSKE 5% (20.80) and control (29.39).

Per cent infestation 3rd, 7th, 14th day after second spray

The data on the per cent infestation of fruit borer on 3rd, 7th, 14th day after spray revealed that all the treatments were significantly superior over control. Among all the treatments lowest percent infestation of shoot and fruit borer was recorded in Emamectin benzoate 5 SG (8.28) Followed by Indoxacarb 14.5%SC (9.89), Spinosad 45% SC (10.80), *Metarhizium anisopliae* $1x10^8$spores /ml (11.83), *Beauveria bassiana* 1 x10 ^{12} Spores/ml (13.19), *Bacillus thuringiensis* ($1x10^8$CFU/ml) (14.29), NSKE 5% (18.18) and control (33.48).

Table 1: Bio-efficacy of chemical insecticides against *Leucinodes orbonalis* on shoots of brinjal (first spray)

S. No.	Treatment	1day before spray	Per cent shoot infestation (first spray)			Mean shoot infestation (%)
			3rd	7th	14th	
1.	NSKE 5 %	32.03	23.73	18.47	20.22	20.81
2.	*Bacillus thuringiensis* ($1x10^8$ CFU/ml)	27.56	20.18	15.07	15.98	17.08
3.	*Beauveria bassiana* (1 x10 ^{12} Spores/ml)	27.38	19.52	13.22	14.78	15.84
4.	*Metarhizium anisopliae* (1x10 spores /ml)	21.26	18.54	12.20	14.09	14.94
5.	Spinosad 45% SC	24.85	17.63	11.28	13.23	14.05
6.	Indoxacarb 14.5 % SC	22.11	16.19	10.65	12.42	13.08
7.	Emamectin benzoate 5 SG	27.12	14.03	9.70	10.81	11.57
8.	Control	24.34	25.51	27.42	35.26	29.40
	F- test	NS	S	S	S	S
	SE(d)	-	0.90	0.67	0.88	0.38
	CD at5%	-	2.43	1.13	1.90	4.33

Table 2: Bio-efficacy of chemical insecticides against *Leucinodes orbonalis* on fruits of brinjal (Second spray)

S. No.	Treatment	1 day before spray	Per cent shoot infestation (first spray)			Mean shoot infestation (%)
			3rd	7th	14th	
1.	NSKE 5 %	21.72	18.67	17.61	18.28	18.19
2.	*Bacillus thuringiensis* (1x10^{8} CFU/ml)	17.96	14.49	13.02	15.36	14.29
3.	*Beauveria bassiana* (1 x10 ^{12} Spores/ml)	15.39	14.19	11.84	13.55	13.19
4.	*Metarhizium anisopliae* (1x10^{8} spores /ml)	16.40	12.27	10.24	13.00	11.84
5.	Spinosad 45% SC	19.60	11.25	9.15	12.01	10.80
6.	Indoxacarb 14.5 % SC	16.43	10.79	8.83	10.07	9.89
7.	Emamectin benzoate 5 SG	15.95	9.48	6.82	8.56	8.40
8.	Control (untreated)	27.59	34.29	32.60	33.57	33.49
	F- test	NS	S	S	S	S
	SE(d)	--	0.90	0.67	0.88	0.38
	CD at5%	--	2.36	1.60	4.58	0.87

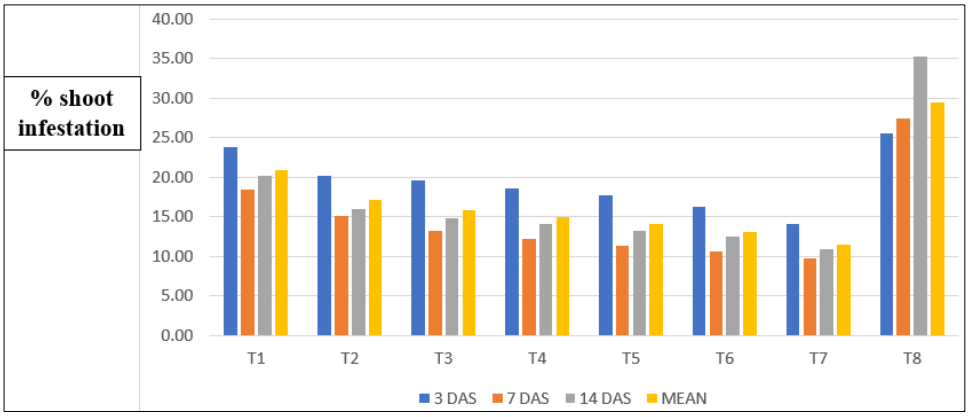

Fig 1: Bio-efficacy of chemical insecticides against *Leucinodes orbonalis* on shoots of brinjal (first spray)

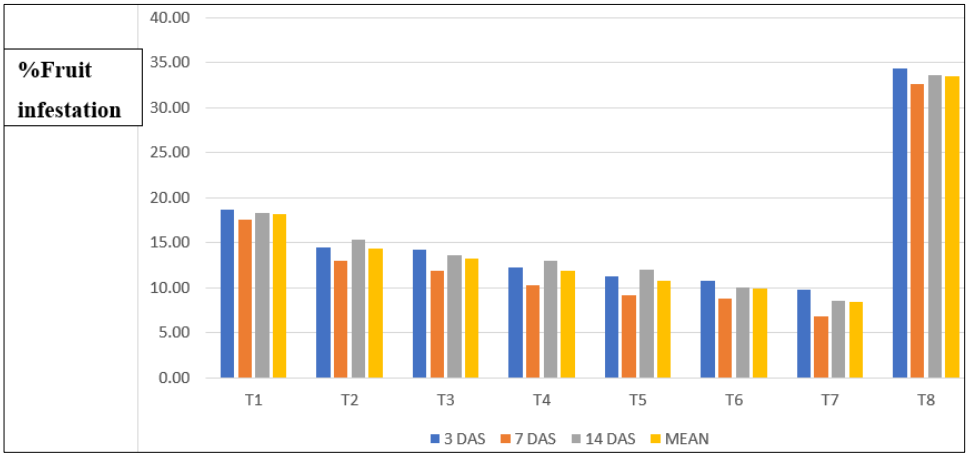

Fig 2: Bio-efficacy of chemical insecticides against *Leucinodes orbonalis* on fruits of brinjal (Second spray)

4. Conclusion

The data on the percent infestation of shoot and fruit borer after first and second spray revealed that all the chemical treatments were significantly superior over control. Among all the treatments lowest percent infestation of shoot and fruit borer was recorded in Emamectin benzoate 5 SG, on shoot infestation (11.57%) and fruit infestation (8.40%) with highest yield 220.65q/ha and cost benefit ratio recorded 1:5.3.

5. References

1. Abirami SK, Nayak M, Tomar DS. Efficacy of botanicals and biopesticide against shoot and fruit borer in brinjal. Annals of Plant and Soil Research. 2023;25(1):84-92.
2. Amin R, Razzab AM, Akter T, Yesmin M. Evaluation of some botanical and chemical insecticides for eco-friendly management of brinjal shoot and fruit borer (*Leucinodes orbonalis*). International Journal of Sustainable Agricultural Technology. 2014;10(11):15-21.
3. Awal A, Rahman MM, Alam MZ, Khan MMH. Management of brinjal shoot and fruit borer, *Leucinodes orbonalis* (Lepidoptera: Crambidae) using some selected insecticides in field condition, Bangladesh. Jahangirnagar University Journal of Biological Sciences. 2017;6(1):35-43.
4. Chandan MK, Awasthi AK, Tomar RKS, Kerketta A, Chandravanshi D, Ray A. Field efficacy of different newer insecticides against shoot and fruit borer (*Leucinodes orbonalis*) on brinjal (*Solanum melongena*). Journal of Entomology and Zoology Studies. 2019;7(1):1167-1169.

5. Dethe DB, Korat DM, Dabhi MR. Evaluation of botanicals for their bio-efficacy against insect pests of brinjal in Karnataka. Journal of Agricultural Sciences. 2014;27(2):145-147.
6. Farman A, Khan I, Ullah Z, Asad A, Rahman A. ARPN Study on the population trend of brinjal fruit borer (*Leucinodes orbonalis* Guenee) (Lepidoptera: Pyralidae) and its susceptibility to different insecticides. Journal of Agricultural and Biological Science. 2016;11(7):45-54.
7. Halder J, Khushwaha D, Singh A, Tiwari SK, Rai AB, Singh B. Whether *Leucinodes orbonalis* Guenee is becoming a serious problem to brinjal seedlings in nursery. Pest Management in Horticultural Ecosystems. 2015; 21(2):231-232.
8. Jeevitha P, Sreekumar KM, Ramesha B, Varma CY, Binitha NK. Bio-efficacy of Millettia pinnata oil soap in the suppression of brinjal fruit and shoot borer (*Leucinodes orbonalis* Guenee). Entomology. 2021;46(1):41-46.
9. Kalawate A, Dethe MD. Bio-efficacy study of biorational insecticide on brinjal. Journal of Biopesticides. 2012;5(1):75-80.
10. Kameshwaran C, Kumar K. Efficacy of newer insecticides against the brinjal (*Solanum melongena* L.) shoot and fruit borer, *Leucinodes orbonalis* (Guen.) in Karaikal district, UT of Puducherry. Asian Journal of Bio Science. 2015;10(2):119-128.
11. Kaur P, Yadav GS, Wargantiwar R, Prasad SB. Population dynamics of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenée (Lepidoptera: Crambidae) under agroclimatic conditions of Hisar, Haryana. Indian Journal of Environmental Sciences. 2014;8(1-2):1-5.
12. Kolhe PS, Kumar A, Tayde AR. Field efficacy of certain chemicals and neem products against shoot and fruit borer (*Leucinodes orbonalis* Guenee) on brinjal (*Solanum melongena* L.) in Trans Yamuna region of Allahabad. International Journal of Current Microbiology and Applied Sciences. 2017;6(9):1320-1327.
13. Kumar S, Singh D. Seasonal incidence and economic losses of brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee). Agricultural Science Digest. 2013;33(2):98-103.
14. Kumar S, Prasad RP, Hussain MS, Singh A. Management of brinjal shoot and fruit borer through farmer's participatory approach. The Pharma Innovation Journal. 2022;11(7):651-653.
15. Latif MA, Rahman MM, Alam MZ, Hossain MM, Solaiman AR. Threshold-based spraying of flubendiamide for the management of brinjal shoot and fruit borer (*Leucinodes orbonalis*) (Lepidoptera: Pyralidae). Journal of Entomological Society of Iran. 2009, 29(1).