



EFFICACY OF BIOPESTICIDES AND CHLORANTRANILIPROLE AGAINST TOMATO FRUIT BORER *HELICOVERPA ARMIGERA* (HUBNER)

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ABSTRACT

Field trial was conducted at the Central Research Farm, during rabi, 2022-2023. The experiment was laid out in RBD (randomized block design). Eight treatments were evaluated against *Helicoverpa armigera* (Hubner). Insecticides with treatment T₁ chlorantraniliprole 18.5%SC (1:10.) was the best. This was chlorantraniliprole 18.5%SC, ½ dose chlorantraniliprole + nisco sixer plus 2ml/l (*O. sanctum* 13% + *A. nardus* 4%), spinosad 45%SC, nisco sixer plus 2ml/l (*O. sanctum* 13% + *A. nardus* 4%) recorded the least fruit infestation. The highest yield was noticed in chlorantraniliprole 18.5%SC (240.5 q/ ha), followed by ½ dose chlorantraniliprole + nisco sixer plus 2ml/l (*O. sanctum* 13% + *A. nardus* 4%).

Key words: Chlorantraniliprole, cost benefit ratio, *Helicoverpa armigera*, incidence, spinosad, tomato, treatments, spinosad, NSKE, azadirachtin, nisco sixer plus, Ocimum, fruit infestation

Tomato (*Lycopersicon esculentum* Mill.) is an important vegetable ranks second among vegetables in area and production and occupies an area of 1.20 million ha. with a production of 19.4 mt with yield of 16.1 mt hectare. Among the various insect pests, tomato fruit borer *Helicoverpa armigera* is highly destructive causing serious damage. It has been found to cause a yield loss of 35 to 37.79% (Biswas et al., 2019). This study evaluates some biopesticides alongwith insecticides against the pest.

MATERIALS AND METHODS

The experiment was conducted under field conditions at the Central Research Farm, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh during rabi 2022-2023. Randomized block design with three replications was followed with plots 2× 1 m size maintaining 30 cm borders as a bunds and treatments was assigned randomly. The observations on infestation of *H. armigera* was recorded visually from five randomly selected tagged plants. The insecticides were sprayed at recommended doses when infestation reached ETL threshold. On seventh and fourteenth days after spraying observations were made on the number of fruits. Descriptive statistics was calculated using MS-EXCEL. ICAR WASP Statistics software was used.

RESULTS AND DISCUSSION

The insecticides viz., T₁ chlorantraniliprole

18.5%SC, T₂ ½ dose chlorantraniliprole + nisco sixer plus, T₃ Spinosad 45%SC, T₄ nisco sixer plus 2ml/l, T₅ neem seed kernal extract, T₆ azadirachtin 5%, T₇ *Beauvaria bassiana* were evaluated against tomato fruit borer *H. armigera*. The spray was carried out during peak period of fruit borer and the data was recorded one day before treatment (DBT) and then on 7th and 14th day after treatment (DAT). The data on the efficacy of the treatments given in Table 1 revealed significant reduction in incidence after 7 and 14 days after treatment (DAT). Among all the treatments minimum percent infestation of fruit borer was recorded in T₁ chlorantraniliprole 18.5SC (8.57%) as compared to T₀ – untreated control (21.87%) similar to the findings reported by Jamir et al. (2022), Patil et al. (2018). Among all the treatments lowest number of fruit borer was recorded in chlorantraniliprole 18.5%SC. Second most effective treatment was recorded in T₂ ½ dose chlorantraniliprole + nisco sixer plus 2ml/l (9.604%) these results were similar to the findings reported by Lalhluzuala and Kumar (2022). Third effective treatment was recorded in T₃ Spinosad 45%SC (10.66%), which are similar with Harshita et al. (2018). Fourth effective treatment was recorded in T₄ nisco sixer plus 2ml/l (11.35%) these findings agree with those of Tejeswari et al., and Kumar (2021).

Higher yield (240.5 q/ ha) and higher cost: benefit ratio (1:10.4) was obtained from chlorantraniliprole 18.5%SC treated plots and lowest (110 q/ ha) in untreated control plot. These findings agree with

Table 1. Infestation of *H. armigera* in tomato

Sl. No.	Treatments	Fruit infestation (5 plants) in %										Mean	Yield (q/ha)	C:B ratio
		First spray					Second spray							
		DBS	7DAS	14DAS	Mean	DBS	7DAS	14DAS	Mean					
T1	Chlorantraniliprole 18.5%SC 1ml/ℓ	21.67	8.44	10.59	9.515	11.85	6.64	8.62	7.63	8.57	240.5	1:10.4		
T2	½ Dose chlorantraniliprole + Nisco sixer plus 2 ml/ℓ + 2 ml/ℓ	19.48	9.06	11.37	10.216	13.43	8.9	9.08	8.99	9.60	232.5	1:10.0		
T3	Spinosad 45%SC 0.4 ml/ℓ	18.69	10.25	12.05	11.15	14.43	9.63	10.0	9.81	10.66	200	1:8.7		
T4	Nisco sixer plus 2 ml/ℓ	18.91	11.23	13.07	12.15	14.87	10.52	10.59	10.56	11.35	187.5	1:8.1		
T5	Neem seed kernel extract 5% 50 ml/ℓ	18.31	15.00	13.86	14.43	15.32	11.29	11.60	11.44	12.93	160	1:6.9		
T6	Azadirachtin 5% 5ml/ℓ	18.02	16.31	15.31	15.81	16.86	12.80	12.50	12.65	14.23	150.5	1:6.5		
T7	<i>Beauveria bassiana</i> 2 g/ℓ	20.36	17.66	16.17	16.92	17.51	14.39	13.46	13.92	15.42	135.5	1:5.8		
T0	Control	21.53	23.19	25.33	24.26	23.14	18.86	19.49	19.17	21.87	110.5	1:4.9		
	F-test	NS	S	S	S	S	S	S	S	S	-	-		
	S. Ed. (±)	1.38	0.35	0.32	0.85	0.39	0.31	0.15	0.42	0.58	-	-		
	C.D. (p=0.05)		1.047	0.995	2.842	1.175	0.941	0.463	1.396	1.954	-	-		

DBS - Day Before Spray; DAS- Day After Spray; NS-Non significant; S- Significant

those of Jamir et al. (2022) who reported that the chlorantraniliprole 18.5%SC is the best and most economical treatment recorded yield (222.54q/ ha) and cost benefit ratio (1:9.14). Next highest yield and benefit cost ratio was recorded in T₂ -½ dose chlorantraniliprole + nisco sixer plus 2ml/ℓ (232.5 q/ ha and 1:10.0) similar findings made by Lalhluzuala and Kumar (2022). Bandhavi and Kumar (2019) who reported that the T₃ spinosad 45%SC is the best and most economical treatment which is similar to yield (200 q/ha) and cost benefit ratio (1:8.7). The results concluded that among all the treatments in chlorantraniliprole % SC with minimum mean 8.57% and maximum yield of 240.5q/ ha proved to be the best treatment which is followed by ½ chlorantraniliprole + nisco Sixer Plus 2ml/ℓ mean of 9.6% and yield with 232.5 q/ hac, and at last untreated control with mean of 21.87% and yield is 110.5q/ ha in managing *H. armigera* reduction. Recommended dose of chemicals may be useful in devising proper strategy against fruit borer of tomato.

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AUTHOR CONTRIBUTION STATEMENT

This work was carried out equally by both authors.

CONFLICT OF INTEREST

No conflict of interest.

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