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Efficacy of some eco-friendly insecticides against Brinjal shoot and fruit borer under the climatic condition of Rewa district, Madhya Pradesh.

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ABSTRACT
Field experiment were carried out during Kharif & Rabi, 2016-17 to evaluate the effficay of Profenophos @ 800 ml/ha, Fenpyroximate @ 500 ml/ha, Fenpropathrin @ 250 ml/ha, NSKE @ 2500 ml/ha, Emamectin benzoate @ 250 g/ha and Chlorantraniliprole @ 18.5 ml/ha against the Leucinodes orbonalis (Guenn.). Chlorantraniliprole @ 18.5 ml/ha was found significantly most effective against Brinjal shoot and fruit borer (BSFB) followed by Emamectin benzoate @ 250 g/ha whereas, NSKE @ 2500 ml/ha was found least effective.
Key words: *Brinjal, Brinjal shoot and fruit borer (BSFB), Chlorantraniliprole, Emamectin benzoate, NSKE*

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INTRODUCTION

Brinjal (*Solanum melongena* L; family- Solanaceae), commonly known as egg plant, is cultivated throughout the year in the country [9].

Brinjal cultivation in the nation is done in about 680 thousand hectare area with an annual production of 12,706 thousand tonnes and productivity of 18.7 tonnes per hectare. In Madhya Pradesh, it is cultivated in 46.12 thousand hectare area with a productivity of 25.02 tonnes per hectare [1].

Although, productivity of the brinjal in the state is higher than national productivity but quality production of the crop is a matter of concern as it is severaly affected by various insect pest and diseases throughout the year. Among the insect pest jassid (*Amrasca biguttula biguttula* (Ishida), aphid (*Aphis gossypii* (Glover), whitefly (*Bemisia tabaci* (Gennadius), hadda beetle (*Epilachna vigintioctopunctata*), mealybug (*Coccidohystrix insolita* (Green), lace bug (*Urentius sentis* Distant) and shoot and fruit borer (*Leucinodes orbonalis* (Guenee) have been reported to cause considerable yield loss to the crop [4].

No doubt among the insect pests brinjal shoot and fruit borer alone causes more than 90% loss to the crop either quantitative or qualitative [6]. The pest when infested the young plant, the damage is seen in the growing shoots of the plants as drooping down of the shoots [2] and the infested plant at this stage shows retarded development. But, at flowering and fruiting stage of the crop, damage is done by the larvae of the pest by boring and feeding inside the fruit and detiorating them to the extent of unfit for human consumption and marketing. The damage may reach to the extent of 100 percent [5].

MATERIAL AND METHODS

A field experiment was conducted at Entomology Instructional Farm, JNKVV, college of Agriculture Rewa (M.P.) during *Kharif & Rabi* 2016-17 on Brinjal variety Pusa Kranti. The experiment was laid out in Randomized Block Design with seven treatments including control having three replications. The treatments were Profenophos @ 800 ml/ha, Fenpyroximate @ 500 ml/ha, Fenpropathrin @ 250 ml/ha, NSKE @ 2500 ml/ha, Emamectin benzoate @ 250 g/ha and Chlorantraniliprole @ 18.5 ml/ha along with control. All agronomic practices followed as per recommendations. First spraying was done at incidence and second spraying was done 20 days after 1st spray. Observation recorded one day before of the treatments application, and there after 3, 7 and 10 days of the treatments. At flowering and fruiting stage the observation recorded on total number of fruits and total number of damaged fruits at each picking of the fruit. The percentage of infestation were calculated by the following formula :

$$\text{Damaged Shoot percentage} = \frac{\text{Number of damaged Shoots}}{\text{Total number of Shoots}} \times 100$$

$$\text{Damaged Fruit percentage} = \frac{\text{Number of damaged Fruits}}{\text{Total number of Fruits}} \times 100$$

RESULTS AND DISCUSSION

Efficacy of six insecticides namely i.e. Profenophos @ 800 ml/ha, Fenpyroximate @ 500 ml/ha, Fenpropathrin @ 250 ml/ha, NSKE 5% @ 2500 ml/ha, Emamectin benzoate @ 250 g/ha and Chlorantraniliprole @ 162 ml/ha were evaluated against Brinjal shoot and fruit borer {Table 1 & 2, Fig. 1 (a.) & (b.)} after three day, 7 & 10 day of the insecticide spray. All insecticide were found effective against the pest but variation in the degree of control was observed among them. The post treatment effect indicate that three day after the treatment a significant reduction in the infestation of insect was noted in the insecticide treated plot than control. The average infestation percent of insects varied from 3.93 to 4.80% in insecticide treated plot as against 7.55% of untreated control. A significance influence of the insecticide was further seen after 7th day of the treatment with an infestation ranging from 2 to 3.3%. However, the infestation in untreated plots were found 7.86%. Among the tested insecticides, Chlorantraniliprole @ 162 ml/ha was found superior over the rest of the insecticides with a percent reduction of 74.55% in insect infestation after 7th day which was followed by Emamectin benzoate @ 250 g/ha with a reduction of insects infestation of 72.90%. After 10th day of insecticide treatment a slight increase in the pest infestation were seen in all treatment plots including untreated control.

After second spray of insecticide, no doubt, further reduction in Brinjal shoot and fruit borer infestation was observed in various treatments {Table 1 & 2, Fig. 2 (a.) & (b.)} with a record of 2.93 to 3.90% in comparison to untreated control (10.81%), three day after the second spray. A significance influence of the insecticide was further seen after 7th day of the treatment. At this stage the infestation varied between 2.17 to 3.40%. However, the infestation in untreated control were found 11.62%. Among the tested insecticides, Chlorantraniliprole @ 162 ml/ha was found superior over the rest of the insecticides with a percent reduction of 83.00% in insect's infestation level after 7 days, followed by Emamectin benzoate @ 250 g/ha with a reduction of 81.52%. All insecticide were found effective and significantly superior over control after ten day of the second treatments.

Superiority Chlorantraniliprole @ 162 ml/ha against brinjal shoot and fruit borer have also reported by Kushwaha and Painkra [8] and Dattatray *et al* [3]. However, Kaur *et al* [7] reported *Leucinodes orbonalis* (Guenee) to Emamectin benzoate higher toxic than Chlorantaniliprole against brinjal shoot and fruit borer.

CONCLUSION

As regard to the efficacy of insecticides namely i.e. Profenophos @ 800 ml/ha, Fenpyroximate @ 500 ml/ha, Fenpropathrin @ 250 ml/ha, NSKE 5% @ 2500 ml/ha, Emamectin benzoate @ 250 g/ha and Chlorantraniliprole @ 162 ml/ha against Brinjal shoot and fruit borer, after 7 day of the insecticide spray had shown the maximum reduction of pest to the extent of 74.55 & 81.32 percent after 1st and 2nd spray of insecticides respectively by the Chlorantraniliprole @ 162 ml/ha followed by Emamectin

benzoate @ 250 g/ha. NSKE, through was effective but the extent of control was not significant than untreated control.

Table 1: Efficacy of different insecticides against Brinjal shoot and fruit borer, first and second spray in brinjal, during *Kharif* & *Rabi* 2016-17

Treatment	Name of Treatments with Trade Name	Doses		Before spray	% infestation of Brinjal shoot and fruit borer (BSFB)					
					After spray			Second spray		
		g a.i./ha	Formulation g or ml/ha		3 DAT	7 DAT	10 DAT	3 DAT	7 DAT	10 DAT
T_1	Profenophos 50% EC (Curacron)	400	800	6.74 (15.05)	4.27 (11.92)	2.23 (8.59)	2.57 (9.21)	3.33 (10.51)	2.67 (9.39)	2.83 (9.69)
T_2	Fenpyroximate 5% EC (Pyromite)	25	500	7.61 (16.00)	4.40 (12.10)	2.70 (9.45)	2.93 (9.86)	3.57 (10.88)	3.00 (9.97)	3.17 (10.25)
T_3	Fenpropathrin 30 EC (Meothrin)	75	250	7.40 (15.78)	4.67 (12.47)	2.93 (9.86)	3.00 (9.97)	3.73 (11.14)	3.13 (10.19)	3.30 (10.46)
T_4	NSKE 5%	-	2500	6.76 (15.07)	4.80 (12.65)	3.33 (10.51)	3.50 (10.78)	3.90 (11.38)	3.40 (10.62)	3.57 (10.88)
T_5	Emamectin benzoate 5% SG (Proclaim)	12.5	250	7.80 (16.21)	4.00 (11.43)	2.13 (8.39)	2.47 (9.03)	2.97 (9.91)	2.47 (9.03)	2.63 (9.33)
T_6	Chlorantraniliprole 18.5% SC (Coragen)	30	162	6.91 (15.24)	3.93 (15.94)	2.00 (8.13)	2.27 (8.65)	2.93 (9.86)	2.17 (8.46)	2.33 (8.78)
T_7	Untreated control	-	-	6.94 (15.27)	7.55 (15.94)	7.86 (16.28)	8.88 (17.33)	10.81 (19.19)	11.62 (19.92)	12.01 (20.27)
	SEm±			2.009	0.907	0.444	0.448	1.454	2.281	1.324
	CD at 5%			**NS**	2.221	1.087	1.097	3.559	5.583	3.240

( ) Figures in parentheses are angular transformed values, BSFB = Brinjal shoot & fruit borer, DAT = Day after transplanting

Table 2: Percentage reduction infestation level due to different insecticide spray against (BSFB) after 1st & 2nd spray

treatment	Name of Treatments with Trade Name	Doses		Percentage reduction in infestation level of BSFB			
				First spray		Second spray	
		a.i./ha	Formulation g or ml/ha	7DAT	10DAT	7DAT	10DAT
T_1	Profenophos 50% EC (Curacron)	400	800	71.62	71.05	80.02	77.53
T_2	Fenpyroximate 5% EC (Pyromite)	25	500	65.64	67.00	77.56	75.91
T_3	Fenpropathrin 30 EC (Meothrin)	75	250	62.72	66.21	76.58	74.83
T_4	NSKE 5%	-	2500	57.63	60.58	74.56	73.68
T_5	Emamectin benzoate 5% SG (Proclaim)	12.5	250	72.90	72.18	81.52	79.95
T_6	Chlorantraniliprole 18.5% SC (Coragen)	30	162	74.55	74.43	83.00	80.22
T_7	Untreated control	-		-	-		

BSFB = Brinjal shoot & fruit borer, DAT = Day after transplanting

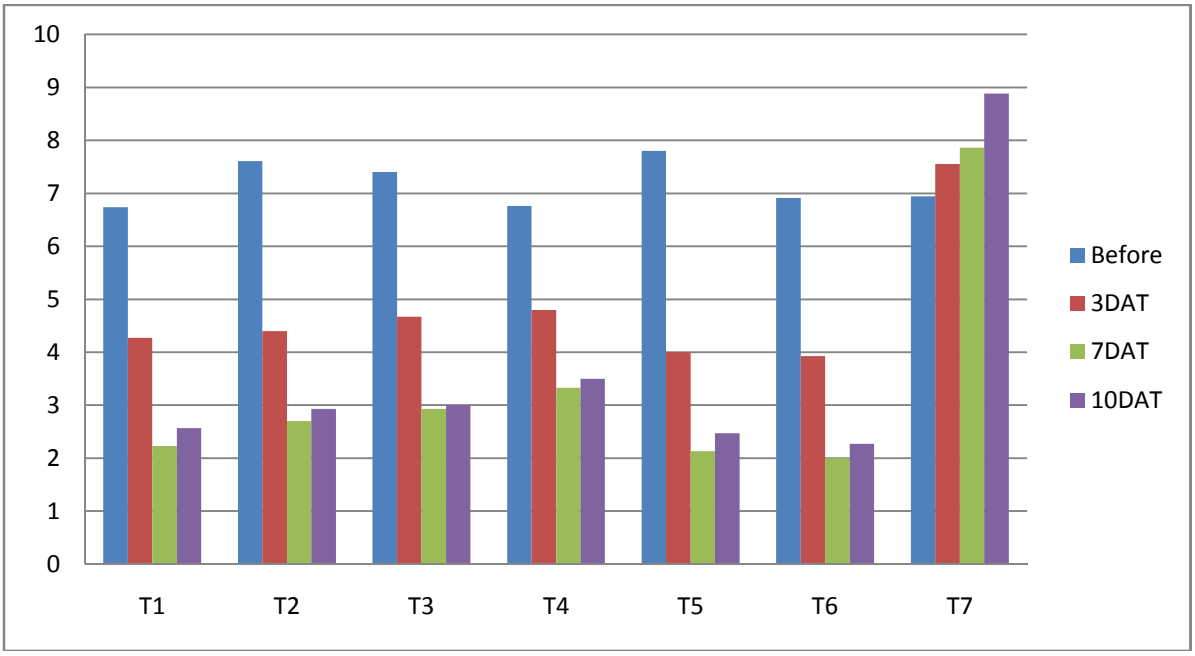

Fig.1 (a.): Efficacy of different insecticides against Brinjal shoot and fruit borer, *Kharif* & *Rabi* 2016-17, After 1st spray

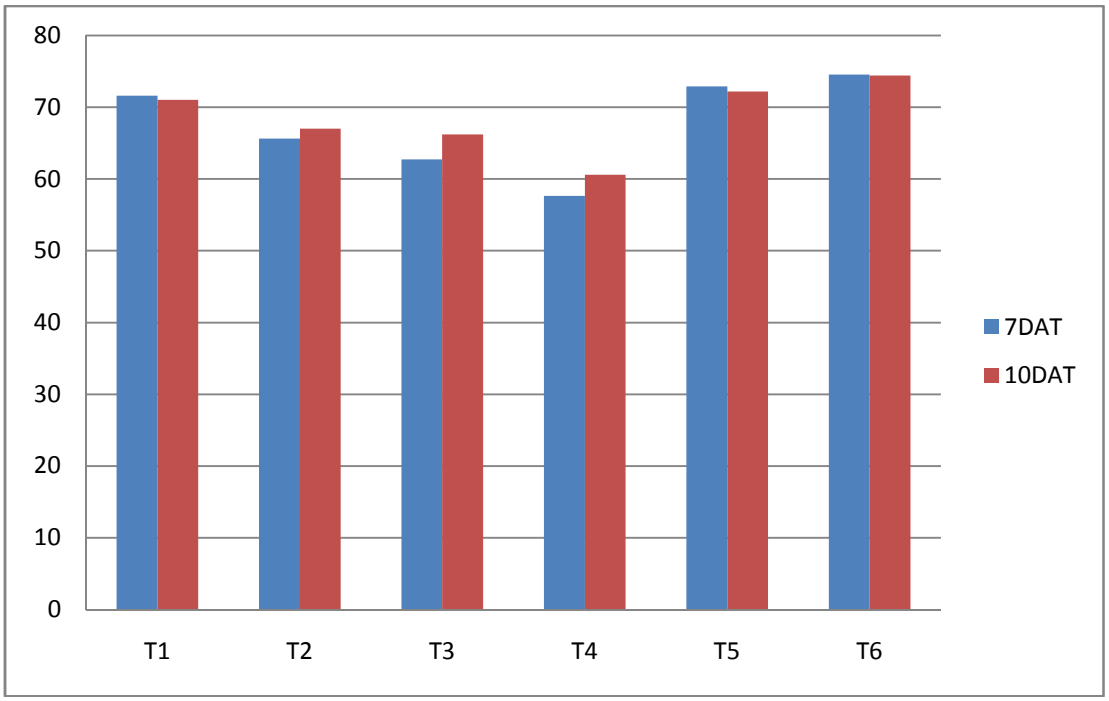

Fig.1(b.): Percentage reduction in infestation level due different insecticide spray against (BSFB) after 1st spray

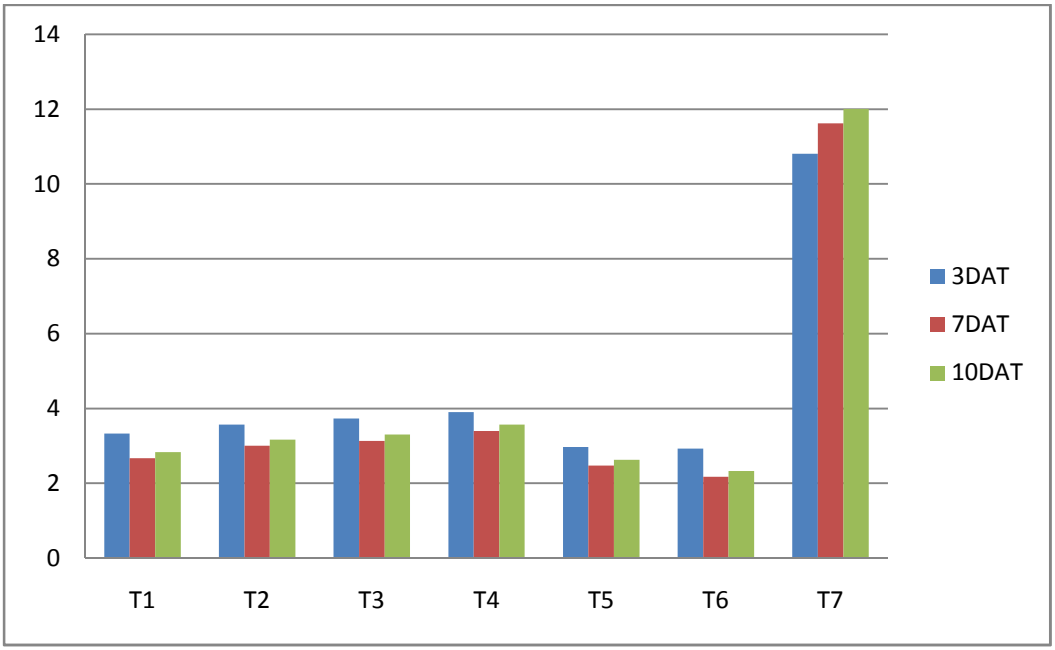

Fig. 2(a.): Efficacy of different insecticides against Brinjal shoot and fruit borer, *Kharif & Rabi* 2016-17, After 2nd spray

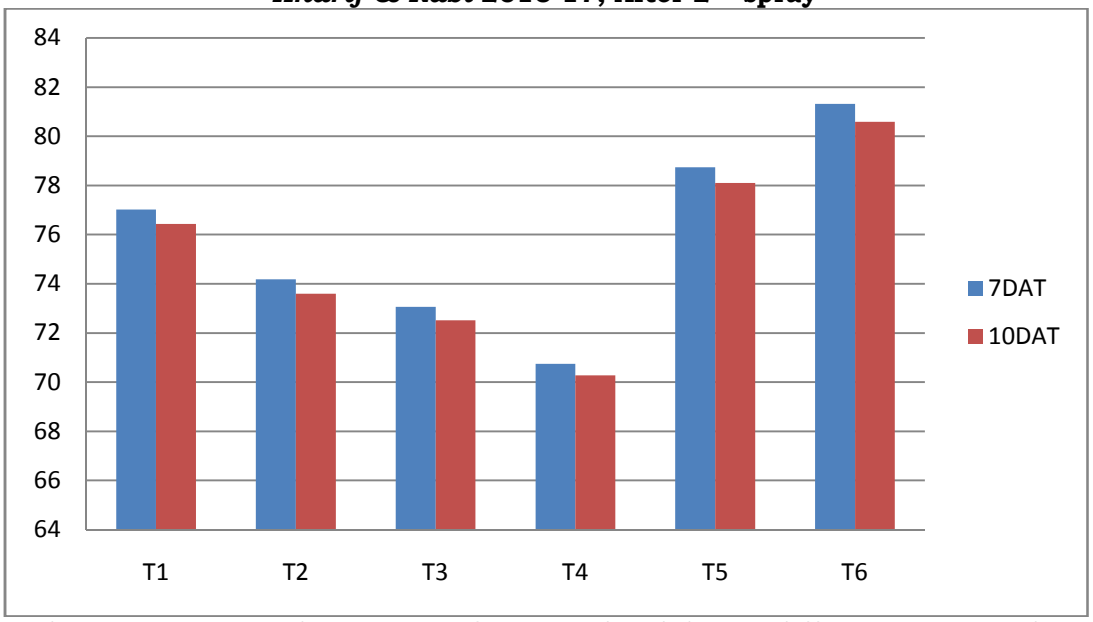

Fig. 2(b.): Percentage reduction in infestation level due to different insecticide spray against (BSFB) after 2nd spray

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