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Efficacy of Botanical Pesticides against Shoot and Fruit Borer, *Leucinodes orbonalis* in Brinjal

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The experiment was conducted during summer season of 2003-04 at Vegetable Research Farm of College of Agriculture, JNKVV Jabalpur.The experiment was designed in randomized block design with 7 treatments and 4 replications, to evaluate the performance of some botanical products against the pest complex of brinjal.The treatment include Triazophos 40E.C. 0.04%,Neem oil 1 %,Achook 5 %,NSKE 5%, Karanj oil 1%,Eucalyptus oil 1% and an untreated control.Four spraying of each treatment were conducted starting 30 days after transplanting, at an interval of 15 days. Observation on shoot and fruit damage by Leucinodes orbonalis were recorded and the results were revealed that Triazophos 40E.C. 0.04%,significantely superior over all the botanical treatments did not significantly shoot damage in different treatments & ranged between 3.9 to 10.1%.Highest healthy fruits yield (24.76q/ha) was recorded in the treatment of Triazophos 40E.C. 0.04% followed by the treatment of neem oil 1% (20.54 q/ha healthy fruits), and both the treatments were statistically at par Yields in remaining treatments were at par and ranged between 19.57 and 15.23 q/ha. Lowest yield (10.50 q/ha healthy fruits) was registered in untreated control.Highest cost benefit ratio of 1:6. 31 was treatment of Triazophos 40 EC 0.04% (table 8). Application of neem oil 1% registered the cost benefit ratio of 1:1.79 and found most economical.

Keywords: Botanical pesticides, Leucinodes orbonalis, Triazophos.

Brinjal *(Solanum melongena* Linn.) is an important vegetable crop, in almost all parts of our country. The crop is generally sown twice or thrice in a year, depending upon the irrigation facilities. Many insect pests damage and affect the yield of brinjal crop to a great extent. Singh et al., (1984) have listed about 25 insect pests of brinjal, of which some major insect pests viz; brinjal shoot and fruit borer (*Leucinodes orbonalis* Gu.), Epilachna beetle *(Epilachna vigintioctopunctata* F.), Aphids *(Aphis gossypi* Glower), stem borer (*Euzophera perticella* Rag.) and Jassid *(Amrasca biguttula biguttula)*.

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Shoot and fruit borer is the most serious pest of brinjal. Gangwan and Sachan (1981) reported 26.3 to 22.5 per cent fruit damage due to this pest, which may go as high as 20 to 92 per cent in Kharif season (Singh, 1983). The losses caused by various pests were estimated to be ranging from 28-85% (Ahmed, 1974).

Suitable insecticides used for the control of brinjal pests include parathion. monocrotophos and endosulfan (Krishnaswami, 1954 and Lai, 1973). However these insecticides remain integrate inside the plant body in general and particularly in fruits causing the problem of resistance and resurgence of pests (Mehrotra, 1990). These toxic insecticides pollute environment and also adversely affect the natural enemies of pests.

Several non-chemical means of pest management have been proposed for brinjal and other crops, like the manipulation of cultural practices, nutrient management, use of biological agents, etc.

To reduce pesticide hazards, one of the resorts is the application of insecticides of plant origin which are cheaper, easily available and safer to mankind. Neem plant has proved itself as a wonderful insecticide of plant origin, which is harmless to higher animals including man (Walunj *et* al., 1996). Plant products like Eucalyptus, Calotropis, Pongamia, Annona and Neem have been found effective in controlling for brinjal pests in green house.

MATERIALS AND METHODS

The experiment was conducted to evaluate efficacy of botanical products against the major insect pest complex of brinjal during summer season of 2003-04 at Vegetable Research Farm of College of Agriculture, JNKVV Jabalpur. The brinjal crop (Variety Pusa Purple Round) was raised by transplanting 26 days old seedlings in 4 x 4 meter plots with plant to plant and row to row distances of 45 x 60 cm. The crop was transplanted in the third week of April. Normal horticultural practices were followed to raise the crop. *Experiment was planned with seven treatments with four replications following Randomized Block Design (RBD). Spacing of rows and plants distance was kept 60 x 45 cm.* Four sprayings were done starting from 30 days after transplanting, at an interval of 15 days. The sprayings solution were done @ of 500 liters water/ha using hand compression sprayer. Due care was exercised to eliminate the drift of spray material from one plot to another by using a canvas curtain between the plots. Observations on shoot damage caused by *Leucinodes orbonalis* was

Table 1. Evaluation of different insecticides against shoot damage by *L.orbonalis* in brinjal crop

S. No.	Treatments	Dose	Pre-treatment shoot damage (%)	Shoot damage (%) 10daysafter			
				Ist spray	IInd spray	IIIrd spray	IVth spray
1.	Triazophos 40 EC 0.04%	1 ml/lit.	4.16	4.16	4.76	5.95	7.14
2.	Neem oil 1%	10ml/**lit.**	3.57	4.165	5.35	7.14	8.33
3.	Achook 0.5%	5 ml/lit.	4.76	3.35	5.95	7.14	8.92
4.	N.S.K.E. 3%	50gm/lit	4.16	4.76		7.73	8.33
5.	Karanj oil 1%	10ml/lit.	3.57	4.16	5.35	8.92	9.52
6.	Eucalyptus oil1%	10ml/lit.	3.35	3.95	6.54	8.33	9.52
7.	Untreated control		4.76	6.54	7.73	9.52	10.11
	CD 5%		3.436	3.011	1.666	3.042	3.428
	SEm±		1.635	1.433	0.793	1.447	1.632

*Cumulative per cent shoot damage

Table 2. Per cent fruit damage in brinjal crop under different treatment

S. No.	Treatments	Dose	Fruit damage (%) 10 days after		
			IInd spray	IIIrd spray	IVth spray
1.	Triazophos 40 EC 0.04%	1 ml/lit.	12.45	11.39	9.25
2.	Neem oil 1%	10ml/lit.	15.42	13.46	10.40
3.	Achook 0.5%	5 ml/lit.	13.40	14.35	12.40
4.	N.S.K.E. 3%	50gm/lit	20.34	18.49	17.58
5.	Karanj oil 1%	10ml/lit.	18.48	16.43	12.94
6.	Eucalyptus oil1%	10ml/lit.	21.33	15 3	11.25
7.	Untreated control		32.18	35.25	39.84
	CD 5%		1.2169	0.8270	.4750
	SEm±		3.2775	2.7020	2.0476

*Four replication mean per cent damage

recorded before treatment and 7 days after every spray. Number of damaged shoots among the total plants from each plot were recorded throughout the crop season and the damage was expressed in terms of percent shoot damage. Fruit damage by *L. orbonalis* was recorded in each picking and finally workout fruit damage percentage and healthy fruit yield. Data of shoot damage and fruit damage was analysed using statistical analysis of variance at 5 % level of significance. Suitable transformations were adopted before analysis of variance. Cost of application of various treatments used in the experiment, were calculated in considering the cost of product and labour charges for four sprays. Value of increased production over control was calculated taking the existing market price (Rs. 700/q) of brinjal during the period of picking (Rs. 700/q) and cost benefit ratios were worked out.

RESULTS AND DISCUSSION

Percent Shoot damage by *L. orbonalis*

Performance of different treatments against shoot damage by shoot and fruit borer in brinjal crop is presented in Table 1.

Pre-treatment Shoot damage among different plots ranged between 3.57 and 4.76 per cent. The differences in shoot damage among different plots were non- significant.7 days after first,Second,Third and Fourth spray Shoot damages among different treatments, including untreated control were between, 3.35 and 6.54 per cent and all were at par. Whereas, 7 days after second spray all the treatments, except Eucalyptus oil 1%, recorded significantly lower shoot damage (3.95 to 5.95%) as compared to untreated control (7.73% shoot damage) and were at par while,7 days after third spray Triazophos 40 EC 0.04% had the lowest shoot damage (5.95%) among all the treatments. Shoot damage in remaining treatments ranged between 7.14 and 8.92 per cent which were at par to that of untreated control (9.52%). 7 days after fourth spray shoot damage ranged between 7.14 and 9.52 per cent among different treatments, while in control it was 10.11 per cent and all were at par. The above findings more or less similar to the Gangwan and Sachan (1981), Singh ***et al.*** (2003) and Jat and Pareek (2003).

Pecent Fruit damage by *L. orbonalis*

First picking of 10 days after second spray All the treatments registered significantly lower fruit damage as compared to untreated control (32.18%) (Table 2 and Fig. 2). Triazophos 0.04%, Achook 0.05% and Neem oil 1% treatments recorded lowest incidence (12.45, 13.40, and 15.42 percent fruit damage respectively) and were found to at par. Second picking of 10 days after third spray All the treatments had expressed significantly lower fruit damage as compared to untreated control (35.25 percent). Lowest incidence of fruit borer was observed in the treatments of Triazophos 0.04% and Neem oil 1% treatments which were at par (11.39 and 13.46%). Whereas, efficacy of Achook 0.5% and Eucalyptus oil 1 % were registered 14.35 and 15. 30% fruit damage, respectively. Third picking of 10 days after fourth spray All the treatments recorded significantly lower damage by fruit borer as compared to untreated control (39.84%). Triazophos 0.04%, Neem oil 1% and Eucalyptus oil 1% registered 9.25, 10.40 and 11.25% fruit damage, respectively and were at par.The highest healthy fruits (24.76

Table 3. Economics of control operations by various botanical products

S. No.	Treatments	Yields of healthy fruits (q/ha)	Increased yield over untreated control	Value of increased yield (%)	Cost of treatment /ha (Rs.) (labour + material cost for 4 sprays) (%)	C:B ratio
1.	Triazophos 40 EC 0.04%	24.76	14.26	9982	1580	1:6.31
2.	Neem oil 1%	20.54	10.04	7028	5960	1:1.79
3.	Achook 0.5%	15.23	4.73	3311	4700	1:0.70
4.	N.S.K.E. 3%	17.28	6.78	4746	12560	1:0.37
5.	Karanj oil 1%	17.81	7.31	5117	5360	1:0.95
6.	Eucalyptus oil1%	19.57	9.07	6349	22160	1:0.28
7.	Untreated control	10.50	-	1050	7350	

q/ha) were recorded in the treatment of Triazophos 40 EC (0.04%) followed by the treatment of Neem oil 1% (20.54 q/ha healthy fruits), and both the treatments were statistically at par (table 3). Yields in remaining treatments were at par and ranged between 19.57 and 15.23 q/ha. Lowest yield (10.50 q/ha healthy fruits) was registered in untreated control. The Highest cost benefit ratio of 1:6. 31 was treatment of Triazophos 40 EC 0.04% (table 3). Application of Neem oil 1% registered the cost benefit ratio of 1:1.79. The cost benefit ratio in remaining treatments was below one i.e. the cost of treatment was higher than the benefit and hence those treatments proved uneconomical. The above findings more or less similar to the Ahmed 1974, Gangwan and Sachan (1981), Shrinivasan ***et al.*** (1999), Kumar ***et al.*** (2003), Raja ***et al.*** (2003)

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