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BIOEFFICACY OF SOME INSECTICIDES AGAINST SHOOT AND FRUIT BORER *LEUCINODES ORBONALIS* G. ON BRINJAL

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ABSTRACT

The experiment was conducted during *kharif* 2009 to evaluate the bioefficacy of malathion 50 EC, beta-cyfluthrin 9% + imidacloprid 21% 300 OD, acephate 75 SP, beta-cyfluthrin 2.5 SC, imidacloprid 200 SL, lambda-cyhalothrin 5% + thiamethoxam 5 WG, quinalphos 25 EC, triazophos 40 EC and endosulfan against shoot and fruit borer (*Leucinodes orbonalis* G.) on brinjal. The insecticides beta-cyfluthrin 9% + imidacloprid 21% 300 OD and beta-cyfluthrin were found very effective in reducing per cent damage fruits at 7, 14 and 21 days after spraying, malathion 50 EC and acephate 75 SP were both moderately effective and imidacloprid 200 SL was found least effective.

INTRODUCTION

The shoot and fruit borer of brinjal, *Leucinodes orbonalis* G. is a widely distributed insect pest. It is estimated to cause about 71% losses in marketable yield of brinjal due to attack of shoot and fruit borer. (Pareek and Bhargava, 2003). Similarly, Ghose *et al*. (2002) observed fruit damage to the extent of 73% due to attack of shoot and fruit borer. Insecticides have been used widely to control the pests on vegetables because of their easy adoptability, effectiveness and immediate control.

The indiscriminate and irrational use of insecticides at high doses has resulted in resurgence and resistance in insect pests and ultimately residues in food commodities. It is therefore, necessary to use some insecticide molecule with high toxicity to insect pests even at lower doses that should also be safer to the natural enemies present in agroecosystem and also to the consumer. Hence an investigation to determine the comparative efficacy of some insecticides was carried out.

MATERIAL AND METHOD

Field experiment was conducted during *kharif* 2008 at Rajasthan College of Agriculture, Udaipur on brinjal variety BR-112. The crop was sown on 2nd May 2008 in seedbed and seedling was transplanted on 10th June 2008 in plots of 2.5 m x 2.5 m (6.25 sq. m) with 60 cm row to row and 45 cm plant to plant spacing. All other horticultural practices were followed to raise the crop. The were ten treatments *viz*; malathion (500 g a.i./ha), beta-cyfluthrin + imidacloprid (15.75 + 36.5 g a.i/ha), acephate (750 g a.i./ ha), beta-cyfluthrin (18 g a.i./ha), imidacloprid (42 g a.i./ ha), lambda-cyhalothrin + thiamethoxam (15.62 + 31.25 g a.i./ha), quinalphos (500 g a.i./ha), triazophos (400 g a.i./ ha), endosulfan (437.5 g a.i./ha) and untreated control. The experiment was replicated thrice in a Randomized Block Design. The first insecticidal application was initiated at 40 days after transplanting and the second insecticidal spray at 25 days after first spray.

The observation on the per cent damage caused by shoot and fruit borer (*L. orbonalis*) was recorded on five plants selected randomly in each treatment by counting the number of damaged and healthy fruits and weighing them separately at each picking (7, 14 , and 21 days after each spraying).

The per cent damage was worked out by following formula given as under :

$$\text{Damage per cent} = \frac{Tc - Hc}{Tc} \times 100$$

(Number basis)

Tc = Total number of brinjal fruits

Hc = Total number of healthy brinjal fruits

$$\text{Damage per cent} \quad \frac{Tw - Hw}{Tw} \times 100$$

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(Weight basis)

TW = Total weight of brinjal fruits

HW = Total weight of healthy brinjal fruits.

The values of per cent damage was transformed to respective arc sine data and analysis of variance was calculated for determining critical difference (CD) at 5 per cent level of significance.

RESULTS AND DISCUSSION

The results indicated that all the insecticidal treatments were significantly superior over control at all interval against brinjal shoot and fruit borer both on basis of fruit number and weight. Treatment beta-cyfluthrin + imidacloprid @ 175 ml/ha was most effective against shoot and fruit borer at both sprays at all intervals. The present finding are in conformity to those obtained by Bhargava *et al*. (2003) who found that brinjal shoot and fruit borer infestation were lowest with the application of 20 g a.i./ha imidacloprid combination with 12.50 g a.i./ha bet a cyfluthrin. The next effective treatment against shoot and fruit borer was betacyfluthrin @ 18 g a.i./ha. Sinha and Gopal (2001) also recorded a reduction in damage to 17.24 and 11.32 per cent respectively at normal dose (12.5 g a.i./ ha) and double dose (2.5 g a.i./ha) of beta-cyfluthrin. Lambda-cyhalathrin + thiamethoxam @ (15.625 + 31.25 g a.i./ha) was next in order to efficacy similar results had been reported by Dikshit *et al*. (2001). They reported that lambda-cyhalothrin 35 g a.i./ha spraying at fruiting stage was most effective to control brinjal shoot and fruit borer. The treatment malathion @ 500 g a.i./ha and acephate 750 g a.i./ha were found in middle order of efficacy at both sprays. Similarly Yadav and Sharma (2005) found that malathion 50 EC gave best control of shoot and fruit borer and Gumbek (1986) also reported that acephate 0.01 per cent afforded good protection against borer attack. Endosulfan @ 437.5 g a.i./ha, triazophos @ 400 g a.i./ha and quinalphos @ 500 g a.i./ha were moderately effective

Table 1: Effect of different treatments against shoot and fruit borer on mean per cent infestation of fruits (Data of I and II spray on number basis)

	Treatments	I spray			II spray		
		Per cent damage fruits days after			Per cent damage fruits days after		
		7	14	21	7	14	21
T_1	Untreated control	32.52 (34.77)*	34.15 (35.76)	34.80 (36.15)	33.14 (35.15)	34.20 (35.70)	35.40 (36.51)
T_2	Malathion @ 1000 ml/ha	14.16 (22.10)	15.25 (22.98)	16.18 (23.72)	15.20 (22.94)	16.15 (23.69)	17.30 (24.58)
T_3	Beta-cyfluthrin + imidacloprid @ (175ml/ha)	5.00 (12.90)	6.130 (14.33)	7.10 (15.44)	5.29 (13.27)	6.30 (14.52)	7.45 (15.83)
T_4	Acephate @ 1000 ml/ha	14.20 (22.14)	15.32 (23.04)	16.14 (23.68)	15.30 (23.02)	16.40 (23.88)	17.60 (24.80)
T_5	Beta-cyfluthrin @720 ml/ha	8.34 (16.77)	9.36 (17.81)	10.26 (18.68)	7.33 (15.70)	8.38 (16.82)	9.50 (17.94)
T_6	Imidacloprid @210 ml/ha	19.44 (26.16)	20.55 (26.94)	20.40 (26.85)	20.37 (26.83)	21.4 (27.55)	22.60 (28.38)
T_7	Lambda-cyhalothrin + thiamethoxam @ (312.5 ml/ha + 125 g/ha)	12.11 (20.36)	13.22 (21.32)	14.10 (22.03)	11.69 (19.97)	12.92 (21.07)	13.80 (21.81)
T_8	Quinalphos@ 2000 ml/ha	17.34 (24.61)	18.36 (25.37)	19.70 (25.97)	17.19 (24.49)	18.20 (25.25)	19.30 (26.06)
T_9	Triazophos@ 1000 ml/ha	16.92 (24.29)	17.88 (25.01)	18.90 (25.76)	16.48 (23.95)	17.50 (24.73)	18.60 (25.55)
T_{10}	Endosulfan @ 1250 ml/ha	16.33 (23.83)	17.40 (24.65)	18.20 (25.25)	17.00 (24.35)	18.00 (25.10)	19.00 (25.82)
	SEm ±	0.29	0.38	0.49	0.41	0.37	0.41
	CD at 5%	0.85	2.77	1.45	1.22	1.11	1.21

Data presented are mean of three replication

* Figure in parenthesis arc sine transformation

Table 2: Effect of different treatments against shoot and fruit borer on mean per cent infestation of fruits (Data of I and II spray on weight basis)

	Treatments	I spray			II spray		
		Per cent damage fruits days after			Per cent damage fruits days after		
		7	14	21	7	14	21
T_1	Untreated control	32.40 (34.69)*	34.20 (35.79)	34.70 (36.09)	33.20 (35.18)	34.22 (35.80)	35.60 (36.63)
T_2	Malathion @ 1000 ml/ha	14.20 (22.13)	15.30 (23.03)	16.15 (23.69)	15.22 (22.96)	16.15 (23.69)	17.50 (24.73)
T_3	Beta-cyfluthrin + imidacloprid 300 OD @ (175 ml/ha)	5.12 (12.98)	6.15 (14.35)	7.15 (15.48)	5.30 (13.30)	6.32 (14.55)	7.52 (15.91)
T_4	Acephate @ 1000 ml/ha	14.15 (22.09)	15.40 (23.10)	16.05 (23.62)	15.24 (22.98)	16.43 (23.91)	17.70 (24.88)
T_5	Beta-cyfluthrin@ 720 ml/ha	8.36 (16.80)	9.40 (17.85)	10.30 (18.70)	7.36 (15.73)	8.36 (16.79)	9.65 (18.09)
T_6	Imidacloprid @210 ml/ha	19.50 (26.20)	20.50 (26.92)	20.42 (26.86)	20.40 (26.85)	21.45 (27.59)	22.80 (28.52)
T_7	Lambda-cyhalothrin + thiamethoxam @ (312.5 ml/ha + 125 g/ha)	12.15 (20.40)	13.25 (21.34)	14.12 (22.06)	11.72 (20.02)	12.80 (20.96)	13.70 (21.72)
T_8	Quinalphos@ 2000 ml/ha	17.40 (24.65)	18.30 (25.32)	19.16 (25.95)	17.20 (24.49)	18.50 (25.47)	19.40 (26.13)
T_9	Triazophos@ 1000 ml/ha	16.94 (24.29)	17.90 (25.02)	18.94 (25.79)	16.50 (23.96)	17.60 (24.80)	18.70 (25.62)
T_{10}	Endosulfan@ 1250 ml/ha	16.20 (23.73)	17.52 (24.74)	18.22 (25.27)	17.10 (24.42)	18.10 (25.18)	19.10 (25.91)
	SEm ±	0.51	0.35	0.41	0.34	0.35	0.30
	CD at 5%	1.53	1.03	1.23	1.00	1.04	0.89

Data presented are mean of three replication
* Figure in parenthesis arc sine transformation

against shoot and fruit borer. Imidacloprid @ 42 g a.i./ha was least effective against shoot and fruit borer. However, results find in tune with the finding of Khurana (1998) accordingly to whom, imidacloprid @ 100 and 200 ml/ha could not reduce the incidence of pink boll worm of cotton (*Pectinophora gossypiella*) as compared to monocrotophos, triazophos and endosulfan.

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