Research Paper :

Chemical Control of *Earias vittella* (Fabricius) on Okra

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SUMMARY

Among the different insecticides tested against *Earias vittella* (Fabricius) on okra, profenophos + cypermethrin 0.044%, chlorpyriphos + cypermethrin 0.055%, cypermethrin 0.006% and profenophos 0.05%, were found to be the most effective in reducing the fruit infestation *i.e.* 6.47 to 10.52%. The highest yield of healthy fruits was recorded in the treatment of profenophos + cypermethrin 0.044% (2366.6 kg/ha) followed by chlorpyriphos + cypermethrin 0.055% (2155.35 kg/ha), cypermethrin 0.006% (2127.06 kg/ha) and profenophos 0.05% (2103.91 kg/ha). The treatments with cypermethrin 0.006% gave the highest NICBR (1: 20.3) followed by profenophos + cypermethrin (1: 11.9), chlorpyriphos (1: 10.4), chlorpyriphos + cypermethrin (1: 10.2) and profenophos (1: 8.7).

Key words : Insecticides, *E. vittella*, Okra, Chemical control

Okra is an important vegetable crop grown all over India and tropical and sub-tropical parts of the world. The crop is vulnerable to attack of many insect pests, among which fruit borer (*Earias vittella* and *E. insulana*) is the most important pest causing direct damage to the marketable fruits. It is alone reported to cause 57.1% fruit infestation and 54.04% yield loss in okra (Chaudhary and Dadheech, 1989). At present, many newer and ready mixed insecticides are available in the market and there is not much precise information available about their efficacy against okra fruit borer. Attempts were therefore made to find out the efficacy of certain new molecules against okra fruit borer under the field conditions.

MATERIALS AND METHODS

An experiment was conducted at the College Farm, College of Agriculture, Junagadh Agricultural University, Junagadh during *kharif* season of 2006 in a Randomized Block Design with three replications with a view to determine the efficacy of twelve different insecticides including the control on okra fruit borer. The okra cv. Gujarat Bhendi-2 was sown in a plot size (gross) 6.00 m x 3.60 m with a spacing 60 cm x 30 cm. Two sprayings of insecticides were carried out with the help of knapsack sprayer, first spraying was given at fruit formation stage and second at 15 days after first spray. The observations on number of healthy and infested okra fruits were recorded from ten randomly selected and tagged plants from the net area of each plot before 24 hours of each spraying. Subsequently, the observations on infested and healthy okra fruits and yield of healthy okra fruits were also recorded at each picking. On the basis of number of damaged and healthy okra fruits, the percentage infestation was calculated and the data were statistically analyzed. Statistical analysis of data was carried out by the Fisher's analysis of variance techniques as given by Panse and Sukhatme (1985).

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RESULTS AND DISCUSSION

The results obtained from the present investigation in Table 1 and 2.

Furit infectation :

The data on per cent fruit infestation (Table 1) recorded at each fruit picking indicated that all the insecticides were significantly superior over the control for minimizing the fruit infestation due to *E. vittella*. Among the various insecticides tested, the lowest infestation (8.48%) due to fruit borer was recorded in the treatment of profenophos 40 EC + cypermethrin 4 EC at 0.044%. However, it was at par with treatments chlorpyriphos 50 EC + cypermethrin 5 EC at 0.055%, profenophos 0.05% and cypermethrin 0.006% as they registered 9.90, 12.40 and 12.61 per cent fruit infestation, respectively. The next better treatments were methomyl 0.05%, aceptate 0.05% and chlorpyriphos 0.05% which

Table 1: Efficacy of newer and ready mixed insecticides against *E. vittella* on okra

Sr. No.	Treatment	Conc. (%)	Per cent fruit infestation				Yield of healthy okra fruits (kg/ha)	Percentage increase in yield over control
			Before spray	After 1st spray	After 2nd spray	Mean		
1.	Profenophos+ Cypermethrin	0.044 %	31.77* (27.72)	16.93* (8.48)	12.48* (4.67)	14.74* (6.47)	2366.26**	113.46
2.	Chlorpyriphos+ Cypermethrin	0.055 %	29.16 (23.74)	18.34 (9.90)	15.64 (7.27)	17.01 (8.56)	2155.35	94.43
3.	Profenophos	0.05 %	31.22 (26.86)	20.62 (12.4)	17.22 (8.76)	18.93 (10.52)	2103.91	89.79
4.	Chlorpyriphos	0.05 %	29.16 (23.74)	24.88 (17.7)	22.51 (14.66)	23.70 (16.16)	1833.85	65.42
5.	Acephate	0.05 %	31.02 (26.55)	24.86 (17.67)	22.90 (15.14)	23.88 (16.39)	1756.69	58.46
6.	Methomyl	0.05 %	30.76 (26.08)	24.85 (17.66)	21.90 (13.91)	23.38 (15.75)	1736.11	56.61
7.	Triazophos+ Deltamethrin	0.036 %	31.63 (27.41)	28.6 (22.91)	26.90 (20.47)	27.75 (21.68)	1640.95	48.02
8.	Cypermethrin	0.006 %	32.03 (28.10)	20.8 (12.61)	16.78 (8.33)	18.80 (10.39)	2127.06	91.87
9.	Azadirachtin	0.003 %	33.67 (30.73)	31.34 (27.05)	30.54 (25.81)	30.94 (26.43)	1548.35	39.67
10.	NSKE	5 %	33.82 (30.97)	33.19 (29.97)	31.82 (27.8)	32.51 (28.88)	1332.30	20.18
11.	*B. t.*	1.5 kg/ha	33.29 (30.11)	31.43 (27.19)	31.05 (26.6)	31.24 (26.90)	1448.05	30.62
12.	Control	-	34.5 (32.06)	41.23 (43.43)	45.60 (51.04)	43.47 (47.33)	1108.54	-
	S.E. ±	-	2.29	1.56	1.38	1.13	17.92	-
	C.D. at (P=0.05)	-	NS	4.56	4.04	3.51	52.57	-
	C.V. %	-	12.47	10.20	9.70	6.25	1.76	-

*Angular transformed values. Figures in parentheses are retransformed values. **Average of three replication

registered 17.66, 17.67 and 17.70 per cent fruit infestation, respectively. The treatment of triazophos 35 EC + deltamethrin 1 EC at 0.036% recorded 22.91 per cent fruit infestation. The remaining treatments *viz*., azadirachtin 0.003%, *Bacillus thuringiensis* var. *kurstaki* 1.5 kg/ha and neem seed kernel extract 5% were found to be least effective against the shoot and fruit borer as they registered 27.05, 27.19 and 29.97 per cent fruit damage, respectively. More or less similar observations were also recorded after second spraying.

Overall mean:

Looking to the overall mean per cent fruit infestation (Table 1) after two sprayings, the treatments of profenophos 40 EC + cypermethrin 4 EC at 0.044% and chlorpyriphos 50 EC + cypermethrin 5 EC at 0.055% exhibited minimum fruit infestation *i.e.* 6.47 and 8.56%, respectively due to the pest and they were statistically at par with each other and can be considered as most effective treatments. Also, the highest fruit infestation was recorded in the treatment of neem seed kernel extract 5% (28.88%).

Yield and economics:

The data (Table 1 and 2) indicated that profenophos 40 EC combined with cypermethrin 4 EC at 0.044%, chlorpyriphos 50 EC combined with cypermethrin 5 EC at 0.055%, cypermethrin 0.006% and profenophos 0.05% were found significantly superior over rest of the treatments and gave the higher yield of okra fruits. Yield of healthy fruits in these treatments was recorded 2366.6, 2155.35, 2127.06, 2103.91 kg/ha, respectively. The insecticidal treatments *viz*., chlorpyriphos 0.05%, acephate 0.05%, methomyl 0.05% and triazophos 35 EC + deltamethrin 1 EC at 0.036% were found effective and next in order as they registered 1833.85, 1756.69, 1736.11 and 1640.95 kg/ha yield of okra fruits, respectively. The remaining treatments *viz.*, azadirachtin 0.003%, *B. t.* @ 1.5 kg/ha and neem seed kernel extract 5% were found the least effective.

Considering the per cent increase in the yield of healthy fruits over control due to the insecticidal

Table 2 : Economics of different insecticidal treatments against *E. vittella* on okra

Sr. No.	Treatments	Qty. of insecticide (kg/l or ml/ ha)	Price of insecticide (Rs./l or kg)	Cost of insecticide (Rs./ha)	Total cost including labour charges (Rs./ha)	Yield of healthy okra fruits (kg/ha)	Realization (Rs./ha)		NICBR
							Gross	Net	
1.	Profenophos + Cypermethrin 0.044%	1.2	540	648	848	2366.26	18930.04	10061.73	1: 11.9
2.	Chlorpyriphos + Cypermethrin 0.055%	1.2	520	624	824	2155.35	17242.80	8374.49	1: 10.2
3.	Profenophos 0.05%	1.2	600	720	920	2103.91	16831.28	7962.96	1: 8.7
4.	Chlorpyriphos 0.05%	1.2	300	360	560	1833.85	14670.78	5802.47	1: 10.4
5.	Acephate 0.05%	1.5	550	825	1025	1756.69	14053.50	5185.19	1: 5.1
6.	Methomyl 0.05%	0.8	1280	1024	1224	1736.11	13888.89	5020.58	1: 4.1
7.	Triazophos + Deltamethrin 0.036%	0.7	700	840	1040	1640.95	13127.57	4259.26	1: 4.1
8.	Cypermethrin 0.006%	0.288	700	202	402	2127.06	17016.46	8148.15	1: 20.3
9.	Azadirachtin 0.003%	3.6	336	1210	1410	1548.35	12386.83	3518.52	1: 2.5
10.	NSKE 5%	5 Kg	250	1250	1450	1332.30	10658.44	1790.12	1: 0.9
11.	*Bt* 1.5 kg/ha	1.5 Kg	1170	1755	1955	1448.05	11584.36	2716.05	1: 1.9
12.	Control	-	-	-	-	1108.54	8868.31	-	-

The labour charge has been calculated @ Rs. 100/ha/spray Price of okra fruits has been calculated @ Rs. 8/Kg.

treatments, profenophos 40 EC combined with cypermethrin 4 EC at 0.044%, chlorpyriphos 50 EC combined with cypermethrin 5 EC at 0.055%, cypermethrin 0.006% and profenophos 0.05% gave 113.46, 94.43, 91.87 and 89.79 per cent increase in yield over control, respectively.

It can be seen from the data (Table 2) that the highest Net Incremental Cost Benefit Ratio (1: 20.3) was obtained in the treatment of cypermethrin 0.006% followed by profenophos 40 EC combined with cypermethrin 4 EC at 0.044% (1: 11.9), chlorpyriphos at 0.05% (1: 10.4), chlorpyriphos 50 EC combined with cypermethrin 5 EC at 0.05% (1: 10.2) and profenophos at 0.05% (1: 8.7), acephate at 0.05 % (1: 5.1), methomyl at 0.05% (1: 4.1), triazophos 35 EC + deltamethrin 1 EC at 0.036% (1: 4.1), azadirachtin at 0.003% (1: 2.5), *B. t.* at 1.5 kg/ha (1: 1.9) and neem seed kernel extract at 5 kg/ha (1: 0.9).

These results are in close agreement with the works of Dubey and Ganguli (1998), Rai and Satpathy (1999), Das *et al*. (2001), Singh and Jayswal (2001), Misra *et al.* (2002) and Bagade *et al*. (2005). Thus, the treatment of cypermethrin 0.006% was found effective and economic against the pest on okra.

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