Research Paper :

Chemical control of chiku moth (*Nephopteryx eugraphella* R.) in North Gujarat conditions

A.R. HAJARE, J.I. PATEL, P.E. MORE AND S.B. DIGHULE

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See end of the article for authors' affiliations

Correspondence to :
J.I. PATEL
Department of Entomology, All India Coordinated Research Project, Dry Farming Research Station (Arid), S.D.A.U., S.K. NAGAR (GUJARAT) INDIA

SUMMARY

The field studies on chemical control of chiku moth (*Nephopteryx eugraphella* R.) under north Gujarat conditions showed that out of 10 treatments, all were significantly superior over control of 1st, 3rd, 7th and 15th days of spraying. While treatment with Profenophos + cypermethrin 0.044 per cent was most effective against chiku moth (*Nephopteryx eugraphella* R.) on the basis of per cent shoot damage. Looking to the economics of the treatments profenophos + cypermethrin 0.044 per cent (NICBR 1:22.97) was found best followed by chlorpyriphos + cypermetrin 0.05 per cent (NICBR 1:20.96) and D.D.V.P. 0.03 per cent (NICBR 1:19.93)

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Sapota [*Manilkara achras* (Mill.) Farsberg, syn. *Achras zapota* Linn.] is an important tropical fruit tree, which is generally planted in Gujarat and Maharashtra states. The area under sapota is increasing year after year. About 25 insect pests attack sapota tree (Butani, 1975). Among these, chiku moth (*Nephopteryx eugraphella* R.) is the more destructive pest of sapota in India .It is direct as well as indirect pest of sapota. Larvae feed on leaves, floral buds and small fruits of sapota and also the larvae join the leaves with silken threads and feed on the leaf tissues and remain hidden within the loose tunnel made up of excretal pellets (Sandhu *et al.*, 1974 and Butani, 1975). The pest is active throughout the year. Chemical control of this pest has been studied earlier by Sandhu *et al.* (1974), Sandhu and Sran (1982), Jhala *et al.* (1986), Patel (1996), Patange *et al.* (1997), Deshmukh, (2001) and Patel (2001).

However, considering the importance of *Nephopteryx eugraphella* R. the present investigation was undertaken in order to know the effectiveness of certain chemicals to control the chiku moth (*Nephopteryx eugraphella* R.) under north Gujarat conditions.

MATERIALS AND METHODS

The experiment was carried out at Horticultural Instructional Farm, C.P. College of Agriculture, S.D.A.U., Sardarkrushinagar (Gujarat). Thirty sapota plant of variety Kalipatti were selected for experiment with 10m x10m spacing. Randomized Block Design was used for experiment with three replications and ten treatments (one tree kept as treatment unit) *i.e.* T_1- Neem oil (0.5%), T_2- D.D.V.P. (0.03%), T_3- Profenophos (0.075%), T_4- Profenophos + cypermethrin (0.044%), T_5- Chlorpyriphos (0.05%), T_6- Endosulfan (0.07%), T_7- Chlorpyriphos + cypermethrin (0.055%), T_8- Azadiractin (0.0003%), T_9- *Bacillus thuringiensis*(1kg/ha), T_{10}- control. Only one spray was given, the treatments were evaluated based on per cent shoot (leaf-clusters) infected per twig per plant, selected randomly and per cent shoot damage were recorded, prior to treatment and 1st ,3rd ,7th and 15th days after treatment. The incremental cost benefit ratio (ICBR) was worked out on the basis of cost of various treatments including

prevailing labour charges and market price of sapota fruits.

RESULTS AND DISCUSSION

The data on per cent shoot infestation among various treatments are presented in Table 1. The data on per cent shoot damage before spray revealed that all the treatments were non-significant.

The per cent shoot damage recorded after first day of the treatment indicated that all the treatments were significantly superior over control in per cent shoot infestation except treatment neem oil 0.5 per cent (34.52 % shoot damage). The treatment chloropyriphos + cypermethrin 0.05 per cent was found significantly superior.(14.80% shoot damage). However, it was at par with profenofos + cypermethrin 0.044 per cent (16.18 % shoot damage), *Bacillus thuringiensis* (1 kg/ha) (16.49 % shoot damage), D.D.V.P. 0.03 per cent (17.29 % shoot damage), Endosulfan 0.07 per cent (17.99 % shoot damage) and chloropyriphos 0.05 per cent (18.29 % shoot damage), respectively.

After 3rd, 7th and 15th day of the treatment, all the treatments were found significantly effective over control. Among different treatments after 3rd of spray, treatment with Profenofos + cypermethrin 0.044 per cent (2.73 % shoot damage) found significantly superior and was at par with chloropyriphos + cypermethrin 0.05 per cent (4.74 % shoot damage) and *Bacillus thuringiensis* (1 kg/ha) (5.21 % shoot damage) followed by D.D.V.P. 0.03 per cent (5.54 % shoot damage), chloropyriphos 0.05 per cent (5.66 % shoot damage), endosulfan 0.07 per cent (6.41 % shoot damage).

Seven days after spray, treatment with profenofos + cypermethrin 0.044 per cent (1.02 % shoot damage) was significantly superior in reducing shoot damage and was at par with chloropyriphos + cypermethrin 0.05 per cent (1.03 % shoot damage), *Bacillus thuringiensis* (1kg/ha) (1.06 % shoot damage), D.D.V.P. 0.03 per cent (1.33 % shoot damage), profenophos 0.075 per cent (1.68 % shoot damage) and chloropyriphos 0.05 per cent (1.73 % shoot damage).

Fifteen days after spray treatment with , profenofos + cypermethrin 0.044 per cent (1.04 % shoot damage) and *Bacillus thuringiensis* (1 kg/ha) (2.12 % shoot damage) were significantly superior in reducing the shoot damage and was at par with each other followed by chloropyriphos + cypermethrin 0.05 per cent (2.39 % shoot damage), D.D.V.P. 0.03 per cent (3.05 % shoot damage), chloropyriphos 0.05 per cent (3.37 % shoot damage), endosulfan 0.07 per cent (4.34 % shoot damage), profenophos 0.075 per cent (4.36 % shoot damage), azadirachtin 0.0003 per cent (6.03 % shoot damage) and neem oil 0.5 per cent (7.14 % shoot damage). The highest shoot damage was recorded in control (14.15 % shoot damage).

Thus, on the basis of shoot damage per twig, it was found that profenofos + cypermethrin 0.044 per cent was the most superior treatment followed by chloropyriphos + cypermethrin 0.05 per cent and *Bacillus thuringiensis* (1 kg/ha).

As indicative from the review of available literature, the synthetic pyrethroids were found more effective than

Table 1 : Effect of different treatments against infestation of chiku moth (*N. eugraphella* R.) on shoots

Sr. No.	Treatments	Conc. (%)	Per cent shoots infestation				
			Before spray	1 DAS	3 DAS	7 DAS	15 DAS
1.	Neem oil	0.5	42.67	34.52	13.72	4.29	7.14
2.	D.D.V.P.	0.03	36.12	17.29	5.54	1.33	3.05
3.	Profenofos	0.075	38.49	20.32	6.43	1.68	4.36
4.	Profenofos + Cypermethrin	0.044	38.41	16.18	2.73	1.02	1.04
5.	Chloropyriphos	0.05	38.41	18.29	5.66	1.73	3.37
6.	Endosulfan	0.07	38.83	17. 99	6.41	2.10	4.34
7.	Chloropyriphos + Cypermethrin	0.05	39.81	14.80	4.74	1.03	2.39
8.	Azadirachtin	0.0003	42.08	22.00	12.15	2.17	6.03
9.	*Bacillus thuringiensis*	1 kg/ha	32.29	16.49	5.21	1.06	2.12
10.	Control	-	37.82	35.37	28.55	16.85	14.15
	S.E.		1.49	1.20	0.89	0.32	0.39
	C.D. (P=0.05)		N.S.	3.58	2.66	0.95	1.15
	C.V.%		6.60	9.87	17.00	16.62	14.01

DAS - Days after spray NS=Non-significant

Table 2 : Economics of different insecticides against chiku moth (*N. eugraphella* R.) on sapota

Sr. No.	Treatments	Conc. (%)	Quantity of insecticide (lit/ha) or (kg/ha)	Cost of insecticide (Rs/ha)	Total cost of protection* (Rs./ha)	Yield (kg/ha)	Gross realization (Rs./ha)	Net realization over control (Rs./ha)	Net gain (Rs./ha)	Net ICBR
1.	Neem oil	0.5	5 lit	1000	1450	8800	44000	4000	2550	1:1.76
2.	D.D.V.P.	0.03	0.39 lit	195	645	10700	53500	13500	12855	1:19.93
3.	Profenofos	0.075	1.50 lit	900	1350	10200	51000	11000	9650	1:7.15
4.	Profenofos + Cypermethrin	0.044	1.00 lit	593	1043	13000	65000	25000	23957	1:22.97
5.	Chloropyriphos	0.05	2.50 lit	1050	1500	10100	50500	10500	9000	1:6.00
6.	Endosulfan	0.07	2.00 lit	588	1038	9500	47500	7500	6462	1:6.22
7.	Chloropyriphos + Cypermethrin	0.05	1.00 lit	620	1070	12700	63500	23500	22430	1:20.96
8.	Azadirachtin	0.0003	2.00 lit	560	1010	8900	44500	4500	3490	1:3.46
9.	*Bacillus thuringiensis*	1 kg/ha	1.00 lit	1015	1465	12600	63000	23000	21535	1:14.70
10.	Control	-	-	-	-	8000	40000	-	-	-

* Labour charges @ Rs. 4.50/tree

Market price of sapota fruit Rs. 5.00/kg

Neem oil @ Rs.200 /lit

DDVP 76 EC @ Rs.500 /lit

Profenofos 50 EC @ Rs.600 /lit

Polytrin C 44 EC @ Rs.593 /lit

Chloropyriphos 20 TC @ Rs.420 /lit

Endosulfan 35 EC @ Rs.294 /lit

Nurelle D 50 EC @ Rs.620 /lit

Azadirachtin 0.15 EC @ Rs.280 /lit

Bacillus thuringiensis WP @ Rs.1595 /kg

conventional insecticides against sapota bud boring pest as reported by Jhala *et al.* (1986), Anonymous (1985), Jhala *et al.* (1993), Anonymous (1995). Similarly, Deshmukh (2001) reported that Polytrin C 0.044 per cent, Lamda-cyhalotrin 0.005 per cent, methomyl 0.1 per cent and Nurelle D 0.055 per cent found most effective against bud boring insects. The present finding was tallied with above reports.

Economics :

ICBR of the different treatments tested against chiku moth (*N. eugraphella* R.) was worked out and presented in Table 2. Data revealed that highest incremental cost benefit ratio (ICBR) was recorded in the treatment of Profenophos + cypermethrin 0.044 per cent(1:22.97) was found best followed by Chlorpyriphos + cypermetrin 0.05 per cent (1:20.96) and D.D.V.P. 0.03 per cent (1:19.93).

Deshmukh (2001) reported the maximum ICBR (1 : 18.44) of Lamda - cyhalothrin 0.005 per cent followed by Polytrin- C (1 : 17.37) and Nurelle D 0.055 per cent (1 : 17.30). The present findings was talied with above reports.

Authors' affiliations:

A.R. HAJARE, P.E. MORE AND S.B. DIGHULE, Oilseed Research Station (MPKV) JALGAON (M.S.) INDIA

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