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Effect of Systemic Insecticides on Thrips and Mites and its Relation to Leaf Curl Disease of Chilli

J. R. Patel, R. C. Patel and P. R. Amin

Department of Entomology, B. A. College of Agriculture, GAU, Anand Campus, Anand.

Chilli (*Capsicum annum* L.) is one of the important cash crops of Gujarat. Its cultivation is however reducing due to increased incidence of leaf curl and infestations of thrips and mites. Rangarajan *et al.* (1973), Butani (1976) and Mote (1976) have reported effective insecticides and acaricides for the control of thrips and mites. However, no attention has been given to study the relation between the control of these two important pests and the incidence of leaf curl disease. An experiment was conducted in 1976-77 with five different insecticides (mentioned in Table 1) to control thrips and mites and also to record their effects on the incidence of leaf curl.

Thirty-day old seedlings of S-G-5 Chilli Variety were transplanted at 60 cm x 60 cm in August. The area was then divided in various plots of 6.0 m x 3.6 m and insecticidal treatments were randomised and replicated 4 times in randomised block design. Emulsion spray treatments were given every 15 days beginning from 30 days after transplanting for 3 rounds, whereas, granular insecticidal tratments were given only once after 15 days from transplanting. The populations of thrip and mite were recorded by counting number of immature thrips and mites on three leaves at different heights of each of the 5 plants selected at random from each of the plots. The population counts were taken fortnightly including one preapplication count. Leaf curl incidence was recorded by counting the number of plants showing leaf curl symptoms out of 4 x 32 plants in each treatment. The leaf curl infected plants in all 4 plots were totalled and are presented in Table 2 as per cent of leaf curl infected plants. Yield data of chilli fruits were recorded at each picking and total yield of 5 pickings is presented in Table-3.

RESULTS AND DISCUSSION

The results presented in Table 1 show that all the treatments viz. dimethoate, methyl-demeton, monocrotophos, phorate and aldicarb were significantly superior to control in checking the thrip infestation until 2nd week of November. However, the differences among them were not significant. In aldicarb and phorate treatments which were applied 2 weeks earlier than others, the thrip incidence was checked until 6 weeks (i.e. until 2nd week of October) after their application and then the population began to increase to strike the peak during the 4th week of November. However, the thrip population was lowest (35.36) in aldicarb treatment in comparison with other treatments. The thrip population in control

TABLE 1

Thrip and mite population on chilli during different periods.

Treatments	Average number of Thrips and Mites on 5 x 3 leaves in different treatments during											
	September				October				November			
	2nd week		4th week		2nd week£		4th week		2nd week		4th week	
	Thrip	Mite	Thrip	Mite	Thrip	Mite	Thrip	Mite	Thrip	Mite	Thrip	Mite
Dimethoate 0.03% emulsion spray	1.10* (0.21)**	1.20* (0.44)**	1.0 (0)	2.38 (4.66)	1.28 (0.65)	4.61 (20.32)	1.20 (0.45)	6.12 (36.45)	2.93 (7.58)	9.76 (94.65)	7.21 (50.98)	2.07 (3.28)
Methyl-demeton 0.025% emulsion spray	1.28 (0.64)	1.61 (1.59)	1.0 (0)	4.98 (23.8)	1.0 (0)	5.66 (31.11)	1.0 (0)	6.46 (40.73)	2.57 (5.60)	11.72 (136.35)	8.84 (77.14)	2.95 (7.70)
Monocrotophos 0.04% emulsion spray	1.0 (0)	1.61 (1.59)	1.0 (0)	3.02 (8.12)	1.30 (0.71)	6.52 (41.54)	1.20 (0.45)	6.98 (47.72)	2.29 (4.24)	10.47 (107.37)	8.54 (71.93)	3.25 (9.56)
Phorate 10G @2.8 kg a.i./ha	1.0 (0)	2.70 (6.29)	1.0 (0)	1.51 (1.28)	1.0 (0)	6.43 (40.37)	1.28 (0.65)	5.30 (27.09)	2.07 (3.28)	9.20 (83.64)	8.01 (63.16)	5.61 (30.47)
Aldicarb 10 G @2.8 kg a.i./ha	1.0 (0)	1.60 (1.56)	1.0 (0)	1.0 (0)	1.0 (0)	3.20 (9.28)	1.74 (2.03)	5.93 (34.16)	2.11 (3.45)	10.50 (109.25)	6.03 (35.36)	3.65 (12.32)
Control (Water spray)	1.0 (0)	1.35 (0.82)	1.18 (0.39)	3.04 (8.24)	2.94 (7.64)	5.87 (33.46)	4.37 (18.1)	4.33 (17.75)	7.46 (54.65)	5.39 (28.05)	5.86 (33.33)	1.66 (1.76)
S.Em.±	0.07	0.41	0.07	0.62	0.25	1.18	0.25	0.97	0.43	1.02	1.03	3.83
C.D. at 5%	n.s.	n.s.	n.s.	1.86	0.75	n.s.	0.76	n.s.	1.31	3.08	n.s.	n.s.
C.V. %	13.34	49.80	14.40	46.82	35.37	43.86	28.02	33.15	26.87	21.56	27.84	239.75

*Value after $\sqrt{X+1}$ transformation.

£Last spray

**Figures in parenthesis are retransformed means.

TABLE 2

Effect of different insecticides on the leaf curl (L.C.) incidence and yield of chilli fruit during different periods.

Treatments	*Per cent leaf curl infected plants and yield of chilli fruit in different treatments during*					
	October 2nd week		*October 4th week*		*December 2nd week*	
	% L. C.	*AV. Yield in kg/plot*	% L.C.	*AV. Yield in kg/plot*	% L.C.	*AV. Yield in kg/plot*
Dimethoate 0.03% emulsion spray	39.99* (41.30)**	0.250	50.80 (60.00)	0.356	77.32 (95.2)	0.867
Methyl-demeton 0.025% emulsion spray	26.39 (19.70)	0.335	52.89 (63.6)	0.440	70.58 (88.9)	0.933
Monocrotophos 0.04% emulsion spray	22.38 (14.5)	0.155	41.67 (44.2)	0.267	82.47 (98.3)	0.763
Phorate 10G @ 2.8 kg a.i./ha	18.18 (9.7)	0.342	26.98 (20.6)	0.512	64.09 (80.9)	1.685
Aldicarb 10G @ 2.8 kg a.i./ha	6.97 (1.4)	0.481	18.98 (10.6)	1.618	49.14 (57.2)	2.215
Control (Water spray)	39.19 (39.9)	0.128	63.40 (80.0)	0.227	86.02 (99.52)	0.200
S. Em. ±	7.24	0.065	6.10	0.124	7.53	0.297
C.D. at 5%	21.84	0.196	18.38	0.373	22.70	0.897
C.V. %	56.80	46.23	28.74	43.68	21.04	53.58

* Arcsin transformed values.

** Figures in parenthesis are retransformed means.

during the 4th week of November was lower than the preceding observation probably due to activity of natural enemies. Aldicarb and phorate were effective in checking the thrip population until 10 weeks after application whereas, dimethoate, methyl-demeton and monocrotophos were effective until 4 weeks after their application.

The mites (Table 1) could not be checked successfully by the insecticides except for aldicarb which was effective until 30 days after its application. The decline in population of mites in all the plots in the 4th week of November was probably due to the effect of the natural enemies.

The data in Table 2 show the correlationship between leaf curl incidence and yield of green chilli fruits at each picking. The results show that aldicarb treatment permitted minimum leaf curl incidence and maximum yield at each picking.

The leaf curl incidence during the 2nd and 4th weeks of October and 2nd week of December was 1.4, 10.6 and

TABLE 3

Economics and ICBR of various insecticides used for the control of leaf curl disease of chilli.

Treatments	*Quantity of insecticide formulation required per ha.*	*Price Rs./kg. or 1*	*Cost Rs./ha*	*Labour Rs./ha*	*Total cost Rs./ha*	*Yield kg./ha*	*Gross income Rs./ha @Rs. 0.74/kg*	*Net Profit Rs./ha*	*Profit over control Rs.*	*I.C.B.R.*
Dimethoate 0.03%	1.05 l*	61.00	64.05	18	82.05	1529	1146.75	1064.70	583.95	1:7.11
Methyl-demeton 0.025%	1.05 l*	75.00	78.75	18	96.75	1617	1212.75	1116.00	635.25	1:6.56
Monocrotophos 0.04%	1.05 l*	164.00	172.20	18	190.20	1162	871.50	681.30	200.55	1:1.05
Phorate 10G @28 kg/ha	28 kg	21.00	588.00	16	604.00	2756	2067.00	1463.00	982.25	1:1.62
Aldicarb 10G @28 kg/ha	28 kg	30.00	840.00	16	856.00	5656	4242.00	3386.00	2905.25	1:3.39
Control	—	—	—	—	—	641	480.75	480.75	—	—
S.Em.±						324.7				
C.D. at 5%						978.8				
C.V. %						29.17				

*For three sprays.

57.2 per cent in aldicarb treatment which was minimum as against the maximum incidence of 39.9, 80.0 and 99.52 per cent in control respectively. Likewise the average yield during October 2nd and 4th weeks and December 2nd week was 0.481, 1.618 and 2.215 kg per plot in aldicarb treatment which is the highest as against the minium yield of 0.128, 0.227 and 0.200 kg per plot in control respectively. Both the granular insecticides were superior to other E.C. formulations in checking the leaf curl incidence as well as increasing fruit yield.

The yield data (Table 3) show that aldicarb treated plants yielded maximum fruits (5,656 kg/ha) followed by phorate (2,756 kg/ha). There was no significant difference in the yields from other treatments and that from control. However, the ICBR values for these two treatments were lower than that for dimethoate and methyl-demeton due to high cost of the granular insecticides. Hence, considering the total yield obtained per hectare, it is desirable to recommend a single round of aldicarb 10% granules applied around each plant after 15 days from transplanting.

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