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CHEMICAL CONTROL OF THE RED SPIDER MITE, TETRANYCHUS TELARIUS L. (TETRANYCHIDAE)

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Tetranychus telarius is a polyphagous pest affecting crops like tapioca, brinjal, castor, bhindi, cowpea and cotton in Kerala. The present contribution reports laboratory and field evaluation of 11 newer pesticides against *T. telarius* on tapioca.

Materials and Methods

The pesticides used in various experiments were prepared by diluting commercial formulations with water. Laboratory evaluation was done by bioassay. Mites required for this experiment were collected from a heavily infested field in the College Farm. Small pieces of leaf bearing 25 adult mites each (other stages were removed with a camel hair brush) were placed in petridishes of 10 cm. diameter. The leaf surface bearing the mites was sprayed with 1 ml. of spray fluid under Potter's tower, at a mercury pressure 24 cm, column. Each chemical was applied in 5 doses and each dose was sprayed in 3 dishes. The sprayed leaves were dried under an electric fan for 5 minutes and then transferred to moist cotton swab taken in petridishes. The dishes were then covered with lids and kept under $30 \pm 1^{\circ}$ G Mortality was recorded at the end of 24 hrs. after spraying. The per cent mortality in different treatments was corrected by using Abbot's formula and the data were subjected to probit analysis.

For the assessment of persistent toxicity, various pesticides were sprayed at field doses (vide Table 2) on tapioca plants in the field. Leaves were collected at intervals of 1, 5, 10, 15 and 20 days after spraying. Each leaf was placed on a cotton swab in a petridish as in the previous experiment and 10 numbers of field collected full grown mites were liberated on it. Three replications were made for each treatment, Mortality counts were taken at the end of 24 hrs after liberation and the persistent toxicity was calculated by a method elaborated by Pradhan (1967).

For assessing the field performance of various pesticides, each toxicant was sprayed on an infested tapioca plant. In each plant five infested leaves were labelled and the number of mites on them was counted prior to spraying, 1, 5, 10, 15 and 30 days after spraying.

Relative t[illegible]xicity of s[illegible] pesticid[illegible] to th[illegible] adul[illegible] of *Tetr[illegible]nychus tela[illegible]*

	Pesticide	Heterogeneity		Regression equation	X =	LC_{50}	Fiducial limits	Relative toxicity
1.	[illegible]	χ^2 = 2.74	Y	= 1.55[illegible]X + [illegible]5	log (conc × 10	0.000741	[illegible]	5 [illegible]
2.	[illegible]thion	[illegible] 7.50	Y	= [illegible]X + [illegible]21	log (conc × 10	0.0007[illegible]	[illegible]	4.7[illegible]55
3.	[illegible]	χ^2 = 1.[illegible]8	Y	= 2.[illegible]6X + [illegible]	log (conc × [illegible]	0.000[illegible]	[illegible]	[illegible]
4.	[illegible]phen[illegible]	χ^2 (2[illegible]	Y	= 2.981X + 17.5	log (conc × 10	0.00[illegible]	[illegible]	[illegible]
5.	[illegible]ate	χ^2 (3[illegible] = 1.0[illegible]	Y	= [illegible]X + [illegible]	log (conc × 10	0.00[illegible]	[illegible]	1.[illegible]
[illegible]	Parathion	χ^2 = [illegible]64	Y	= 2.[illegible]X + [illegible]	log (conc × 10	0.0[illegible]	[illegible]	1[illegible]
7.	[illegible]	χ^2 = 0.17	Y	= [illegible]X + [illegible]	log (conc × 10	0.00[illegible]	[illegible]	0.77
8.	[illegible]	χ^2 (3[illegible] = [illegible].05	Y	= 2.[illegible]X + 2.[illegible]	log (conc × 10	0.010	[illegible]	0
[illegible]	Di[illegible]	χ^2 = [illegible].43	[illegible]	= 4.[illegible]X + [illegible]1	log (conc × 10	0.0[illegible]	[illegible]	0
[illegible]	[illegible]ate	[illegible] 0.7[illegible]	Y	= 0.[illegible]X + 1[illegible]	log (conc × 10	0.015	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	Y	= [illegible]X + 2[illegible]4	log (conc × 10	0.03[illegible]	[illegible]	[illegible]

Table 2

Corrected percentage [illegible] a ity or r<d sp[illegible] mi e, *Tetran[illegible]* [illegible] s exposed to apioca leaves sprayed wi[illegible] ticides and co ected at [illegible] ious inte[illegible] a[illegible] spraying

Sl. No.	Pesticide	Conc. %	Period after spraying (days)			15	20	P	T	PT	ORE
1	Dicofol (Kelthane)	[illegible] 10	[illegible]	[illegible]	[illegible]	N 1	N	10	[illegible]5 5	[illegible]55 0	7
2	Carbophenothion (Trithion)	[illegible] 10	90 [illegible]	[illegible]0 [illegible]	[illegible]0 [illegible]	20 0	N	13	75 0	[illegible]25 [illegible]	[illegible]
3	Parathion	0 0	70 [illegible]	100 0	7[illegible]	20[illegible]	N	5	[illegible]	[illegible]	[illegible]
4	Elsan	0 05	4[illegible]	20 0	[illegible]	Nil	N	0	[illegible]4 4	244 0	[illegible]
5	Chinomethionate (MorestanJ	[illegible] 10	2[illegible]	20 0	1[illegible]	[illegible]	N	[illegible]	[illegible]	[illegible]	[illegible]
6	Thiometion (Ekatin)	0 10	[illegible]	4[illegible]	2[illegible]	6 6	N	15	38 [illegible]	574 5	[illegible]
7.	Dimethoate (Rogor)	0 [illegible]5	[illegible]	[illegible]	[illegible]	10 0	N	15	41.[illegible]	[illegible]24[illegible]	4
8	Phosphamidon (Dimecron)	[illegible] 05	[illegible]	4[illegible]	[illegible]	[illegible]	N	15	2[illegible]	[illegible]24.[illegible]	[illegible]
9	Monocrotophos	0 0[illegible]	[illegible]	[illegible]	[illegible]	Nil	N	10	7[illegible]	7[illegible]	[illegible]
10	Formothion (Anthio)	[illegible] 10	[illegible]	600	60 0	[illegible]	N	15	4[illegible]	[illegible]	5
11	Fenitrothion (Sumithion)	0 1[illegible]	2[illegible]	Ni	[illegible]	Ni	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

P — Period; T = A[illegible] res dual toxic ty; [illegible] Index of persistent toxicity ORE = Order of relative efficacy ba[illegible] [illegible] T [illegible]al [illegible]

Results and discussion

The results on the bioassay of the pesticides are presented in Table 1 and it will be seen that the relative toxicity was in the following order: monocrotophos > formothion > thiometon > carbophenothion > dimethoate parathion > phosphamidon > elsan > dicofol > chinomethionate > fenitr thion. Of these chemicals monocrotophos, earbophenothion, dicof and fenitrothion were tested against *T. telarius* on castor (Sidhu *et al.*, 1970) and the relative tosicity reported were in the same descending order as seen in the case of tapioca mite. But values of LC_{50} for mites collected from tapioca were much lower than the values reported for castor mite. This difference is due to the effect of nutrition on the susceptibility of the mites to various toxicants.

The persistent toxicity of various chemicals as seen in Table 2 was in the following descending order earbophenothion > parathion > monocrotophos > dimethoate > formothion > thiometon > dicofol > phosphamidon > elsan > chinomethionate > fenitrothion.

Table 3

Colonisation of *T telarius on* plants treated under field conditions.

Pesticide	Concentration	Population with reference to pretreatment counts [percentage]				
		1 day	5 days	10 days	15 days	30 days
Diocofol	0.10	Nil	3.00	11.00	13.00	39.40
Carbophenothion	0.10	Nil	Nil	Nil	Nil	8.30
Parathion	0.04	Nil	2.67	68.00	33.34	13.34
Elsan	0.05	3.20	15.90	12.70	17.50	28.60
Chinomethionate	0.10	9.40	11.00	6.25	7.90	17.20
Thiometon	0.10	Nil	Nil	1.27	0.70	1.90
Dimethoate	0.05	Nil	Nil	6.07	4.60	3.10
Phosphamidon	0.05	66.00	7.57	5.70	7.57	13.20
Monocrotophos	0.03	Nil	Nil	2.23	Nil	
Formothion	0.10	Nil	Nil	Nil	Nil	Nil
Fenitrothion	0.10	8.00	8.00	8.00	10.30	6.90
Control	—	100.00	37.30	37.30	20.00	76.50

The results of spraying the infested plants in field are presented in Table 3. A drastic reduction in the population is seen in all treatments 1 day after spraying. There were no survivals on plants treated with monocrotophos, formothion, thiometon, carbophenothion, dimethoate and parathion. This agrees with their higher relative toxicity in bioassay; the LC_{50} values of former five insecticides were 5.019, 4.755, 3.830, 3.086 and 1.386 times higher than parathion. Though dicofol was only 0.242 times toxic than parathion in bioassay it gave 100 per cent reduction in pest population in field trial. The persistent toxicity of the above chemicals as revealed from the PT index was also high. Though the PT index for parathion was second in relative ranking the recolonisation in plants sprayed with this insecticide was high. This might be due to the prolonged adverse effect of this toxicant on the natural enemies of the pest. It may be concluded that carbophenothion, monocrotophos, dimethoate and formothion can effectively control *T. telarius* on tapioca. Basu and Paramanik (1968) and Sidhu *et al.* (1970) found carbophenothion as very effective against *T. telarius* on brinjal and castor respectively. In the case of dicofol though the initial control was good, the recolonisation of mites in the treated plants was higher. The relative toxicity and persistent toxicity of phosphamidon, elsan, chinomethionate and fenitrothion were low and their performance in the field trial also was comparatively poorer.

Summary

Eleven newer pesticides were evaluated in the laboratory for their toxicity to adults of red spider mite *Tetranychus telarius* on tapioca. Their performance in field was also assessed. Carbophenothion, monocrotophos, dimethoate and formothion were very effective against the pest while dicofol, elsan, chinomethionate, thiometon, phosphamidon, and fenitrothion were ineffective under laboratory and field conditions, Parathion was not good in controlling the pest in field though in laboratory evalution it ranked high.

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