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COMPARATIVE EFFICACY OF DIFFERENT FORMULATIONS OF ETHYL PARATHION

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The insecticidal performance of a chemical preparation depends as much on its formulation as on the quantity of active ingredient. Hence pesticide formulations will have to be evaluated for their chemical composition and biological performance. Six different formulations of ethyl parathion which are widely marketed in Kerala, have been evaluated for their biological efficacy and the results are presented in this paper.

Materials and methods

The different formulations of ethyl parathion used were Folidol E 605 (supplied by Bayer India Pvt. Ltd.. Bombay), Ekatox (supplied by Sandoz India Ltd., Bombay), Parathion compound (supplied by FACT, Alwaye) Paranock (supplied by Keen Pesticides Pvt. Ltd., Cochin) Paranox (supplied by Premier Pesticides Pvt. Ltd., Cochin) and Technical parathion (supplied by Bharath Pulverising Mills Pvt. Ltd., Bombay), The required doses of the insecticides were prepared by diluting the above formulations with water. Technical parathion was formulated as emulsion using benzene as solvent and Triton x 100 as emulsifier- In the final spray solution the levels of solvent and the emulsifier were maintained at 5% and 0 625% respectively.

The contact toxicity of the various formulations were compared with technical material in the laboratory, adopting standard bioassay techniques, using *Haltica cyanea* (gregarious blue beetle of paddy) *Spodoptera mauritia* (Rice swarming caterpillar) and *Aphis craccivora* (pea aphid) as test insects

The adults of *H. cyanea* were collected from field and maintained on one month old potted plants for 24 hours. Fifteen insects were transferred to a petridish of 10 cm diameter and this was covered with a wire guaze of 5 mesh/cm. The insects in the petridish was then directly sprayed under a potters spraying tower with 1 ml of the emulsion at 24 cm. , pressure. Three such lots were sprayed with each concentration of the insecticide and six concentrations were tried for each insecticide. Three sprayed with water alone and three lots treated with benzene and emulsifier in water served as control. The sprayed dishes containing the insects were dried for five minutes under an electric fan. Insects in each dish were then transferred to separate hurricane chimney and they were fed with untreated food material. The two sides of the chimney were closed with muslin cloth and kept under 30 ı PC. Mortality counts were taken 24 hrs after treatment. The moribund insects were treated as dead. The percentage mortality was corrected by using Abbott's formula and the data were subjected to probit analysis. The relative toxicity was calculated by taking the LC 50 of technical parathion as unity.

Spodoptera mauritia was reared in the laboratory on paddy seedlings at a constant temperature of 30 ± PC. The third instar larvae of uniform size, measuring about 1.5 cm in length, were used for the experiment. Ten caterpillars taken in a petridish were directly sprayed with 1 ml of the emulsion for one replication of each treatment. The rest of the experiment and assessment of results were the same as in the above case.

Dry-film method was adopted for assessing the contact toxicity to pea-aphids, one ml each of the insecticide emulsion was sprayed in petri dishes and the sprayed dishes were dried under an electric fan for five minutes. 15 full grown apterous aphids were introduced in each dish and at the end of 1 hr they were transferred to fresh pea leaves, taken in a specimen tube (3" x 1"), which were closed with muslin cloth held in position by rubber band. The rest of the methods and assessment of results were as in previous experiments.

The persistent toxicity of the various formulations on paddy and cowpea were assessed using the first instar caterpillars of *S. mauritia* and full grown apterous forms of *A. craccivora* respectively as test insects. The plants were raised in V flower pots and 0.04 percent emulsion of each formulation was uniformly sprayed on plants in three pots using a pneumatic hand sprayer. The sprayed plants were exposed to sun but were protected from rains.

Five treated paddy seedlings collected at random from each replication were planted in a specimen tube and the leaf portion of the plants was enclosed in small muslin cloth bag, supported inside by a loop of iron wire. Ten 48 hr old, caterpillars of S. *mauritia* were introduced into each cage and the upper end of it was tied up with a piece of twine. Mortality counts were taken at the end of 24 hrs. This was repeated at various intervals (vide Table 2).

In the case of cowpea three sprayed leaves collected from treated plants in each replication were placed in a petridish (10 cm dia) into which ten apterous adult aphids, collected from field, were introduced. The dish was then coverd with muslin cloth held in position with rubber band. Mortality counts were taken at 24 hrs after the release of the insects. Similar sets maintained on untreated material served as control

Table 2. Persistent toxicity of different formulations of ethyl parathion to adults of *Aphis c* [illegible] and larvae of *Spodoptera* [illegible]

A. *Aphis craccivora*

Pesticides	Corrected percentage mortality at various intervals after spraying (in days)									P	T	PT	Relative persistent toxicity
	4	5	6	7	8	11	12	14	18				
Technical parathion	[illegible]	73 18	7.14	0.00	8.33	0 00	0.00	0.00	0.00	8	25.73	205.84	1.00
Folidol	100 .00	88.88	73 33	39.28	29.16	27.53	16 66	22.22	0.00	14	49.63	694 82	3 375
Ekatox	[illegible] 00	100.00	42.85	23.[illegible]3	[illegible]	13.05	16.66	16.66	0.00	14	41.46	580.44	2.819
Parathion compound	100 00	[illegible].00	39 23	36 66	[illegible]	16.66	27.77	22 22	0.00	14	45.95	643.30	[illegible]
Paranox	100 .00	19[illegible].92	73 33	17.86	[illegible]	5.79	11.11	[illegible]	0.00	12	48.19	578.28	[illegible]
Bladan [illegible]	80.00	62.95	3[illegible]	0.00	[illegible]	0.00	[illegible]	[illegible]	0.00	8	35.88	287.04	[illegible]

B. *Spodoptera* [illegible]

Pesticides	4	5	6	7	8	11	12	14	18	P	T	PT	Relative persistent toxicity
Technical parathion	88.88	[illegible]	50.00	30.00	[illegible]	[illegible]0.52	[illegible]26	[illegible]	0.00	13	44.[illegible]9	530 97	[illegible]
Folidol	100.00	100.00	100 00	90.00	80.[illegible]	[illegible]3.15	4[illegible] 36	[illegible]	0.00	14	76.[illegible]2	1072 68	1.85
Ekatox	100.00	100.00	100.00	85.00	[illegible]	6.65	3[illegible].58	[illegible]	0.00	14	68.33	949 42	1.651
Parathion compound	100 00	100.00	95.60	80.00	[illegible]	11.58	4 36	[illegible]	0.00	14	64.88	901 32	[illegible]
Paranox	100.00	100 00	100 00	50 00	[illegible]	5.78	2[illegible].05	[illegible]	0.00	13	58.13	764.79	1.3[illegible]6
Bladan [illegible]ck	100.00	100.00	95.00	75 00	3[illegible] 50	41.05	2.[illegible]51	[illegible]	0.00	13	67.[illegible]5	872 95	[illegible]

1	2	3	4	5	6	7	8
4. Parathion compound	50.10	$\chi^2(3) = 0.34$	$y = 3.247x + 3.059$ *		0.003961	0.002955 0.005309	0.505
5. Paranox	50.05	$\chi^2(3) = 0.64$	$y = 2.219x + 3.465$		0.004920	0.003844 0.006298	0.407
6. Paranock	51.60	$\chi^2(3) = 4.97$	$y = 1.8011x + 3.076$		0.011700	0.00877 0.01560	0.171
C. *Aphis craccivora*							
1. Technical parathion	100	$\chi^2(3) = 0.000025$	$y = 5.65x + 0\ 66$		0.005868	0 004435 0.007764	1.000
2. Folidol	49.90	$\chi^2(3) = 0.02949$	$y = 3.40x + 1.95$		0.007903	0 005554 0.009763	0.742
3. Ekatox	49.89	$\chi^2(3) = 00018$	$y = 6.04x - 0.82$	,,	0.009170	0.008401 0.010300	0.649
4. Parathion Compound	50.10	$\chi^2(3) = 0.8730$	$y = 5.65x - 0.23$		0.008405	0.006853 0.010300	0.698
5. Paranox	50.05	$\chi^2(3) = 0.0798$	$y = 8.45x - 3.38$		0.009792	0.008758 0.010950	0.599
6. Paranock	51.60	$\chi^2(3) = 1.0433$	$y = 4.65x - 0.56$		0.015680	0.011760 0 020880	0.374

y = Probit kill LC 50 = Concentration calculated to give 50% mortality. * The data were not significantly heterogenus (excepting in the case of folidol and paranock against *H. Cyanea*) at p = 0.05

Table I. Relative contact toxicity of different formulations of ethyl parathion to

A. Haltica cyanea

Sl. No	Pesticides	Percentage of ethyl parathion	Heterogenity*	Regression equation	X	LC 50	Fiducial limits	Relative toxicity
	1	2	3	4	5	6	7	8
1.	Technical parathion	100	$\chi^2(3) = 2.81$	$y = 3.015x + 4.055$	x = log conc. x10[2]	0.02056	0.01736 0.02435	1.0000
2.	Folidol	49.90	$\chi^2(3) = 9.50$	$y = 3.504x + 3.181$		0.03240	0.02198 0.05998	0.6345
3.	Ekatox	49.89	$\chi^2(3) = 0.15$	$y = 9\ 158x - 2\ 061$		0.05020	0.04938 0-07055	0.4097
4.	Parathion compound	50.10	$\chi^2(3) = 1.72$	$y = 5.887x + 0.268$		0.07848	0.07066 0.08718	0.2620
5.	Paranox	50.05	$\chi^2(3) = 0.71$	$y = 3.878x + 1.494$		0.07746	0.06904 009315	0.2655
6.	Paranock	51.60	$\chi^2(3) = 12.73$	$y = 23.915x - 16.811$		0.08168	0.07800 0.08221	0.2518
B.	*Spodoptera* mount/a							
1.	Technical parathion	100	$\chi^2(3) = 0.15$	$y = 2.788x + 4.164$	x = log conc. x10[3]	0.002004	0.001590 0.002526	1.0000
2.	Folidol	49.90	$\chi^2(3) = 0\ 004$	$y = 1.411x + 4.479$		0.002340	0.001490 0.003670	0.856
3.	Ekatox	49.89	$\chi^2(3) = 0.826$	$y = 1.886x + 3.507$		0.005711	0.002498 0.013240	0.351

in both the experiments. From the mortality data persistent toxicity was calculated adopting the method elaborated by Pradhan (1967).

Results and discussion

The results are presented in Tables 1 and 2. The contact toxicity of the different commercial formulations were inferior to the emulsion prepared from technical meterial whereas the persistent toxicity was higher in the case of commercial formulations. It is the effect of adjurants like spreaders and stickers usually added in commercial preparations. Folidol was found to have the maximum contact toxicity among the different commercial formulations tried in various experiments. Ekatox was the next best against *H. cyanea* whereas its toxicity to S. *mauritia* and A. *craccivora* was less than that of parathion compound. In the case of *H. cyanea the* performance of parathion compound was very low and was on par with those of paranock and paranox. Paranox was better than ekatox against S. mauritia and it was as toxic as parathion compound and ekatox against A, *craccivora.* Paranock had very low toxicity against all the insects tested. Regarding persistent toxicity also foliclol was found to be the best in both the experiments. The persistent toxicity of other insecticides on paddy against *S. mauritia,* was in the descending order ekatox> parathion compound > paranock> paranox. On pea the persistent toxicity was in the descending order parathion compound > ekatox > paranox > paranock. There is considerable variation in biological efficacy and it is not according to the variation in the precentage of active ingredient in the formulations as evident from table 1.

Summary

Five different commercial formulations of ethyl parathion were evaluated for their biological efficacy against *11 cyanea S. mauritia* and A. *craccivora.* Folidol was found to be the best among the various formulations Paranock had a very low contact toxicity to all the insects tested. Its persistent toxicity on pea was also least when tested with A. *craccivora.* But its persistent toxicity on paddy as assessed with S. *mauritia* was higher than that of paranox but lower than other formulations. Ekatox, parathion compound and paranox were varying in the order of contact and persistent toxicity.

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REFERENCE

Pradhan, S. (1967) Strategy of integrated pest control. *Indian j. Ent. 29,* 105-122.

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