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LABORATORY EVALUATION OF INDIGENOUS INSECTICIDES AS COMPARED WITH OTHER INSECTICIDES AGAINST THE LARVAE OF AEDES AEGYPTI (L.)

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Indigenous insecticides in comparison with other pesticides were evaluated in the laboratory against 4th instar larvae of *Aedes aegypti* (L.). Heptachlor was found most effective with LC_{50} 0.0025 ppm and LC_{90} 0.012 ppm. Among the indigenous insecticides Petkolin-S(1-B), Petkolin-S (2-B), Petkolin-S (3-B), Petkolin-A (2-B) and Petkolin-A (3-B) were found more toxic than Toxaphene while LC_{50} values of Petkolin-S (2-B) and (3-B) were approximately comparable with that of B. H. C.

Introduction

The indigenous pesticides, Makrolin[1] and Petkolin[2] proved very promising during laboratory tests against house filies and cockroaches,[3,4] locust[5] and flour beetles.[6] These pesticides also gave encouraging results in the field against various crop pests.[7,8] The present studies deal with the efficacy of Makrolin, Petkolin-A, Petkolin-A(1-,2- and 3-B), Petkolin-S and Petkolin-S (1-,2- and 3-B) in comparison with other insecticides against the larvae of P.C.S.I.R. strain of *Aedes aegypti* (L.)[9]

Material and Method

The insecticide susceptible strains of *Aedes aegypti* (L.) of the same age and fed at the same diet were used. The standard procedure for larvicide testing outlined in WHO larval resistance test kit[10] was followed and the insecticide solutions of different concentrations were prepared in acetone. The insecticides tested were Heptachlor, Aldrin, DDT, Dieldrin, Lindane, Endrin, BHC, Toxaphene, Petkolin-A (B.P. 41–150°C), Petkolin-S, (B.P. 60–150C°), Petkolin-A (1-B), Petkolin-A(2-B), Petkolin-A(3-B), Petkolin-S(1-B), Petkolin-S(2-B), Petkolin-S(3-B) and malarial oil. Petkolin-A or S(1-B), (2-B), (3-B) are the modifications of Petkolin-A and -S in which 1%, 2% and 3% benzene were added, respectively before subjecting petroleum fraction-A and -S to the process of chlorination.

The solutions of technical grade of the insecticides were made in acetone and serial dilutions were prepared to obtain the different dosages. The final dilution was made by adding 1 ml acetone solution of a toxicant to 225 ml distilled water contained in a glass beaker of 250-ml capacity. A batch of 20 larvae was kept in each small beaker containing 25 ml water.

The larvae alongwith 25 ml water were transferred into the beaker containing the toxicant plus 225 ml water and were held in a constant temperature room (78±2°F) for 24 hr. After 24-hr exposure, the observations based on alive, moribund and dead mosquito larvae were taken. Larvae exhibiting abnormal behaviour, i.e. unable to surface or submerge were considered moribund and were included with the dead counts. Each concentration was used in duplicate and each set of experiment was run 10 times. A control and a check, treated only with acetone, were kept with all tests.

The average percent mortality was plotted against log concentrations in parts per million and the LC_{50} and LC_{90} values were determined from the regression curves.

Results and Discussion

The percent mortalities obtained due to different toxic doses of an insecticide were plotted and regression curve was drawn in each case. From these regression lines the LC_{50} and LC_{90} values were calculated for Heptachlor, Aldrin, DDT, Dieldrin, Lindane, Endrin, BHC, Petkolin-S(3-B), Petkolin-S(2-B), Petkolin-S(1-B), Petkolin-A(3-B), Petkolin-A (2-B), Toxaphene, Petkolin-A(1-B), Petkolin-S, Petkolin-A, Makrolin and malarial oil. The results obtained due to the toxic effects of these insecticides are given in Table 1. The regression curves showing mortalities due to different doses of Heptachlor, Aldrin, D.D.T., Dieldrin, Lindane, Endrin and B.H.C. are given in Fig. 1; and mortalities due to Petkolin-S(3-B), Petkolin-S (2-B), Petkolin-S(1-B), Petkolin-A(3-B), Petkolin-A (2-B), Toxaphene, Petkolin-A(1-B), Petkolin-S, Petkolin-A and Makrolin in Fig. 2 and due to malarial oil in Fig. 3.

It is apparent from these data that the relative larvicidal activity of the materials tested varied a great deal. Heptachlor showed the highest larvicidal activity with LC_{50} 0.0025 ppm and

TABLE 1.—TOXICITY OF VARIOUS CHLORINATED INSECTICIDES AGAINST LARVAE OF *Aedes aegypti* (L.) AFTER 24 HR.

S. No.	Insecticides	LC_{50} (ppm)	LC_{90} (ppm)
1.	Heptachlor	0.0025	0.012
2.	Aldrin	0.006	0.07
3.	DDT	0.013	0.043
4.	Dieldrin	0.018	0.07
5.	Lindane	0.084	0.18
6.	Endrin	0.088	0.20
7.	BHC	0.17	0.32
8.	Petkolin-S(3-B)	1.28	2.05
9.	Petkolin-S(2-B)	1.28	2.4
10.	Petkolin-S(1-B)	1.55	2.72
11.	Petkolin-A(3-B)	2.3	4.1
12.	Petkolin-A(2-B)	2.4	5.4
13.	Toxaphene	2.7	6.65
14.	Petkolin-A(1-B)	3.5	5.5
15.	Petkolin-S	4.4	7.5
16.	Petkolin-A	4.4	10.0
17.	Makrolin	5.8	17.4
18.	Malarial oil	134.00	195.00

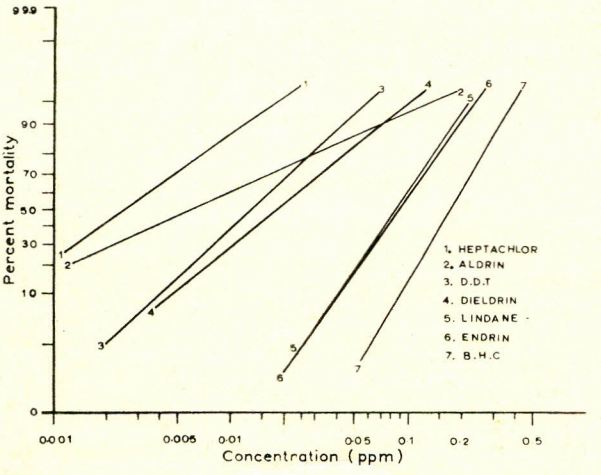

Fig. 1.—Dosage response lines of several insecticides against larvae of *aedes aegypti* (L.).

LC_{90} 0.012 ppm while Toxaphene gave the low larvicidal activity having LC_{50} 2.7 ppm and LC_{90} 6-65 ppm. Malarial oil with LC_{50} 134 ppm and LC_{90} 195 ppm was found to be least toxic towards the larvae. Among the indigenous insecticides Petkolin-S(3-B) was found most effective with LC_{50} 1.2 ppm and LC_{90} 2.05 ppm. Petkolin-S(1-B), Petkolin-S(2-B), Petkolin-S(3-B), Petkolin-A(2-B) and Petkolin-A(3-B) were found more effective than Toxaphene in respect of their LC_{50} as well as LC_{90} while Petkolin-A(1-B) was

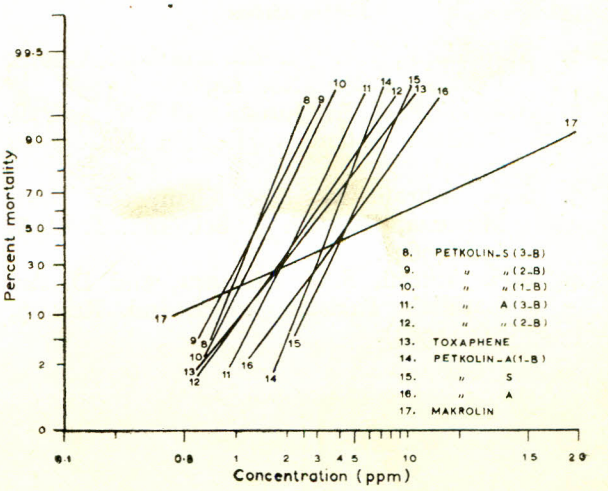

Fig. 2.—Dosage response line of several insecticides against larvae of *aedes aegypti* (L.).

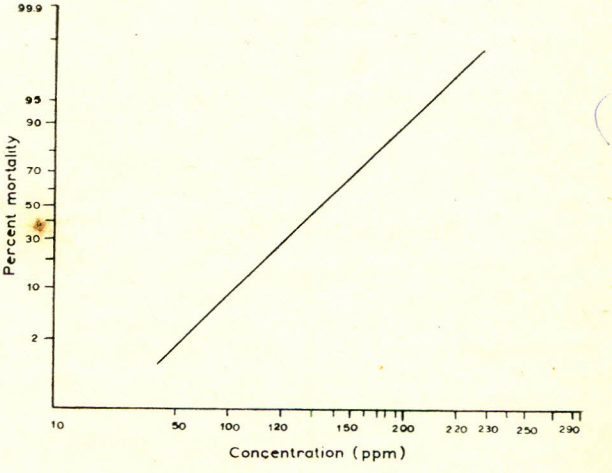

Fig. 3.—Dosage response line of malarial oil against larvae of *aedes aegypti* (L.).

better than Toxaphene in respect of LC_{90} only which is 5.5 ppm for Petkolin-A (1-B) and 6.65 ppm for Toxaphene, (Table 1). The LC_{50} values of Petkolin-S(2-B) and (3-B) were also found approximately comparable with that of B.H.C.

The LC_{50} and LC_{90} values of Makrolin, Petkolin-A, Petkolin-S, Heptachlor, Aldrin and DDT obtained in the present studies were comparable with those reported by Ashrafi, *et al.*[3,4]

From these data it was evident that if 2–3% benzene was added to the petroleum fraction-S and subjected to the process of chlorination to make Petkolin-S(2- or 3-B), then Petkolin will become more toxic than Toxaphene, Petkolin-A, Petkolin-S, Makrolin and malarial oil to mosquito larvae.

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