

## LABORATORY EVALUATION OF CERTAIN LARVICIDES AGAINST *CULEX QUINQUEFASCIATUS* IN PUERTO RICO\*

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**INTRODUCTION.** The effectiveness of insecticides against mosquito larvae varies greatly. Apparently both the environment and the strain of mosquito play roles in this variation. Consequently from time to time it is well to re-evaluate some of the standard insecticides and to test new ones on these larvae. This present study was on a recently established laboratory colony of *Culex quinquefasciatus* collected as larvae from near the International Airport, Isla Verde, Puerto Rico.

Since all the testing of insecticides was done on the fourth instar larvae of the  $F_2$  generation of *C. quinquefasciatus*, it was necessary to establish a laboratory colony. This colony was maintained by keeping adults in cages of 12 x 18 x 12 inches. The adult females were fed two to three times a week on chickens which were three to eight weeks old. Egg masses were laid in finger bowls containing distilled water which were provided in the cages. These eggs were transferred to individual finger bowls within 12 hours after being laid. The larvae which developed in these bowls were fed on whole guinea pig food pellets. After the larvae had reached sufficient size, approximately 5 days old, groups of 100 were transferred to new finger bowls and food was provided. Fresh water and food were given them daily. The largest and most active 4th stage larvae were selected for all the tests.

Commercial insecticides were used in the determination of their efficacy against this Puerto Rican strain of *C. quinque-*

*fasciatus*. However, when feasible these insecticides were compared with technical or pure grade of insecticide. This was accomplished by using the WHO test kit. This kit includes standard solutions in ethyl alcohol to which distilled water was added to give the desired concentrations.

The concentrations used in this experiment were 0.02, 0.01, 0.50, 1.00, 2.50, and 12.5 p.p.m. These concentrations were prepared by a method used by Fox (1961). The insecticides included in this study were DDT, Dieldrin, chlordane, malathion, lindane, Bayer 29493, Bayer 39007, Hercules 7522, and Hercules 8717.

**METHODS.** The experiments were completed between August and December, 1961 at temperatures varying from 27° to 29.5° C. Twenty larvae placed in a solution of 200 ml. distilled water and concentrate of insecticide contained in disposable paper cups were used in each test. Controls of twenty larvae in 200 ml. of distilled water without the addition of insecticide were used in each series of tests. Ordinarily, two replicates were run; however, when an inconsistency of results occurred more tests were run. When this happened, only the two lowest percentages of mortality were considered. In calculating percentage of mortality, the writer included only the dead larvae and not the moribund ones. Although records of moribund larvae were kept, the difficulty in separating the forms made their use inadvisable.

**RESULTS AND CONCLUSIONS.** Table 1 presents the average of the two lowest percentages of dead larvae after 24 hours exposure to the insecticides in the concentrations of 0.02, 0.10, 0.50, 1.00, 2.50, and 12.5 p.p.m. From these results it appears that Bayer 29493, Bayer 39007, and Hercules 7522 produced 100 percent mortality

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TABLE 1.—Percentage mortality of fourth instar larvae of *Culex quinquefasciatus* after 24 hours exposure to insecticides (average of 2 replicates, dead only).

Insecticide	Concentrations in parts per million					
	0.02	0.100	0.50	1.00	2.50	12.5
DDT	2	0	0	5	45	87
Dieldrin	0	13	87	88	97	100
Diazinon	2	77	95	100	100	100
Bayer 29493	0	72	100	100	100	100
Bayer 39007	30	75	100	100	100	100
Hercules 8717	0	0	2	20	87	100
Hercules 7522	0	85	100	100	100	100
Lindane	0	20	25	100	100	100
Malathion	0	83	97	100	100	100
Chlordane	80	65	70	45	87	100

at 0.50 p.p.m. One hundred percent mortality occurred at 1.00 p.p.m. for diazinon, lindane, and malathion and at 12.5 p.p.m. for Dieldrin, Hercules 8717 and chlordane. DDT did not reach 100 percent kill even when 12.5 p.p.m. were used. Erratic results were obtained with chlordane, which gave a lower mortality at 1.00 p.p.m. than at 0.02, 0.10 or 0.50 p.p.m.

A number of insecticides were also tested on the fourth instar larvae of a colony of *Culex quinquefasciatus* which had been established in the laboratory seven months prior to these experiments. Malathion at 0.10 p.p.m., Bayer 39007 at 0.50 p.p.m. and Dieldrin at 1.00 p.p.m. gave 100 percent kill. Again DDT did not produce 100 percent mortality even at 12.5 p.p.m. The other insecticides were not tested.

It is evident that these Isla Verde specimens of *C. quinquefasciatus* show resist-

ance to DDT, Dieldrin and chlordane. In addition the general effectiveness of Diazinon, DDT, malathion, Hercules 7522 and Hercules 8717 was lower than Mulla et al. (1962) observed in their work in California. In comparing the results in this paper with those of Fox (1961) on *Aedes aegypti* from the same general area, it appears that *C. quinquefasciatus* had a greater resistance to DDT and a lower one to Diazinon, malathion, and lindane.

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#### Literature Cited

- FOX, IRVING. 1961. Resistance of *Aedes aegypti* to certain chlorinated hydrocarbon and organophosphorus insecticides in Puerto Rico. Bull. W.H.O. 24:489-494.
- MULLA, M. S., METCALF, R. J., and ISAAC, L. W. 1962. Some new and highly effective mosquito larvicides. Mosquito News 22(3):231-238.