INSECTICIDAL TESTS AGAINST *MANSONIA PERTURBANS* (WALKER) [1]

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The mosquito, *Mansonia perturbans* (Walker) is sufficiently abundant during certain years and in certain areas to be considered an important pest. Through the efforts of the Metropolitan Mosquito Control District it has been possible to obtain sufficient larval collections of this mosquito for comparative insecticide studies. The results reported appear to be the first toxicity determinations for this species.

METHODS. Field collections were made during September and early October, 1966 and 1967 in six counties in the St. Paul-Minneapolis, Minnesota area. The larval collections were brought into the laboratory promptly and tested against the insecticides on the day of collection or one day after. Testing procedures used were those of the World Health Organization with minor modifications (Anonymous, 1960). These included conducting the test in 100 ml. of distilled water instead of 250 ml. water. Twenty larvae were generally used in triplicate for each dose of insecticide. DDT was applied from an ethanol solution and the other insecticides from solutions in acetone. Tests were conducted at 25° C. Insecticides compared were DDT, carbaryl, Abate, malathion and Dursban, the latter compound included only in the 1967 tests.

Probit analysis was based upon the statistical treatment of Finney (1962, 1966). The data were programmed following the methods of Daum and Killcreas (1966) and analyzed by electronic computer.

RESULTS. Regression lines shown in fig. 1 represent combined data from several tests for 1967. Both LC50 and LC90 values show Abate to be the most toxic (LC50=2.63 ppb.); next in order of effectiveness was Dursban, DDT, malathion and carbaryl. Comparative values for the 2 years presented in Table 1 show the same toxicity relationship between compounds. Abate was significantly more toxic than Dursban with both insecticides being several times more toxic than DDT at LC50 and LC90 levels. DDT was at least 4 and 8 times as toxic as malathion and carbaryl, respectively at LC50 values. The mosquito, *Mansonia perturbans,* appeared to be more susceptible in 1967 than in 1966 based upon results with Abate, DDT, and malathion. The responses to DDT resulted in a regression line with a somewhat flatter slope than the other compounds.

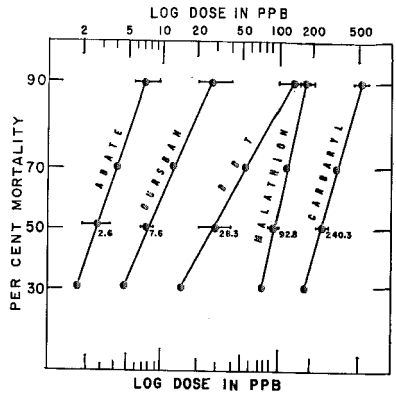

FIG. 1.—Comparative toxicity results of five insecticides tested against 4th instar field collected larvae of *Mansonia perturbans* (Walker) during 1967. Per cent mortality determined at 24 hours is plotted on a probit scale.

DISCUSSION. The insecticide, Abate, was extremely toxic to *Mansonia perturbans* larvae, but Dursban was also high

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TABLE 1.—Comparative dosage-response values for five insecticides used against field-collected fourth instar *Mansonia perturbans* during 1966 and 1967 seasons. All larvae were collected between September 2 and October 3. All values in parts per billion. Each test involved a minimum of 240 larvae.

Insecticide	No. tests	Year	LC50 and confidence limits	LC90 and confidence limits	Regression slope
Abate	3	'67	2.6 (1.9–3.3)	7.0 (5.7–9.5)	3.010
Abate	4	'66	5.8 (5.2–6.5)	11.6 (10.1–14.4)	4.264
Dursban	7	'67	7.6 (6.6–8.7)	26.8 (20.4–41.4)	2.350
DDT	3	'67	28.3 (21.7–35.7)	135.7 (98.6–215.0)	1.881
DDT	4	'66	57.6 (48.3–68.6)	207.9 (154.6–330.6)	2.300
Malathion	2	'67	92.8 (87.1–98.9)	170.1 (154.2–187.6)	4.87
Malathion	3	'66	139.5 (129.9–149.9)	332.8 (273.4–405.2)	3.394
Carbaryl	2	'67	240.0 (216.1–266.5)	539.0 (478.9–606.7)	3.647
Carbaryl	5	'66	211.2 (183.4–243.1)	688.8 (543.7–872.6)	2.496

in toxicity. Although there was considerable variation in response to a given insecticide, differences between the five insecticides were highly significant. Variations could be attributed to environmental differences since each lot of larvae came from a distinct breeding site.

In general, *Mansonia perturbans* appears to be somewhat more resistant to the tested insecticides when compared with other species of mosquitoes. The LC50 values for four prominent species are compared in Table 2. In general, *Mansonia perturbans* has a much higher naturally occurring resistance to insecticides than *Aedes aegypti* and *Anopheles quadrimaculatus,* and is somewhat more resistant than *Culex pipiens quinquefasciatus.* The magnitude of difference is greater with DDT which had an LC50 of 7.3 for

TABLE 2.—A comparison of dosage-response values (LC50's) for larvae of three prominent mosquito species with *Mansonia perturbans.* Values given in parts per billion of active ingredient. Tests were principally with fourth instar larvae.

Species	DDT	Malathion	Abate	Dursban	Reference
Aedes aegypti	7.3	47.5	1.3	....	Pass & Knapp, 1966
Anopheles quadrimaculatus	4.0	....	....	....	Jones *et al.*, 1946
	...	500.0 (LD95)	4.0 (LD95)	4.0 (LD95)	Scharf, 1966
	2.0 to 2.5	....	....	....	Deonier *et al.*, 1946; Metcalf, 1955
Culex pipiens quinquefasciatus	64	49	0.54	0.135	Steelman, Gussie & Craven, 1967
	35	68	1.4	....	Mulla, 1964
	..	80	1.0	3.0	Mulla, Metcalf & Geib, 1966
Mansonia perturbans					
1966	57.6	139.5	5.8	....	Present paper
1967	28.3	92.8	2.6	7.6	

Aedes aegypti and 28.3 and 57.6 for *Mansonia perturbans*.

SUMMARY. Standard laboratory tests (WHO method) were used to determine the responses of field-collected larvae of *Mansonia perturbans* to five insecticides. The LC50 values for the 1967 collections were 2.6 ppb. for Abate, 7.6 ppb. for Dursban, 28.3 ppb. for DDT, 92.8 ppb. for malathion, and 240 ppb. for carbaryl. LC50 and LC90 values are also presented for 1966, Dursban excepted. In general, *Mansonia perturbans* is more difficult to kill with these insecticides than larvae of *Aedes aegypti, Anopheles quadrimaculatus* and *Culex pipiens quinquefasciatus*.

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