

LABORATORY TESTS WITH DDT AND DEUTERO-DDT AGAINST MOSQUITOES

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Deutero-DDT, in which the hydrogen atom on the tertiary carbon atom of DDT has been replaced by deuterium, has received considerable study during recent years. Pillai *et al.* (1963) found it to be highly toxic to larvae of 11 DDT-resistant *Aedes aegypti* strains. Brown (1964) suggests the substitution of deutero-DDT against *Ae. aegypti* in situations where resistance to DDT has developed. Zwick (1964) found a higher tolerance to deutero-DDT in Caribbean strains of *Ae. aegypti* than did Pillai *et al.* (1963). This note presents results comparing DDT and deutero-DDT against larvae of four species

and as residues against resistant *Ae. aegypti* adults.

Larval susceptibility studies (Table 1) were performed following the World Health Organization standard procedure (Anon. 1960). All strains tested except one were resistant to either DDT or diel-drin or both. Results are given in Table 1.

Increased kills with deutero-DDT in comparison to DDT were obtained against specimens of all strains except susceptible *A. quadrimaculatus*. The greatest difference was obtained with DDT-resistant *Ae. aegypti*, but the concentration required

TABLE 1.—Comparison of DDT and deutero-DDT against late 3rd-early 4th instar larvae of four mosquito species.

Species resistant to		Percent mortality in 24 hours at ppm					
		2.5	0.5	0.1	0.02	0.004	0.0008
<i>A. quadrimaculatus</i> (diel-drin)	DDT	..	..	100	100	69	..
	deutero-DDT	..	..	100	100	100	25
<i>A. quadrimaculatus</i> (DDT-diel-drin)	DDT	97	91	84	54	27	..
	deutero-DDT	100	100	99	85	47	..
<i>A. quadrimaculatus</i> (susceptible)	DDT	..	..	..	100	96	73
	deutero-DDT	..	..	..	100	99	72
<i>A. albimanus</i> (diel-drin)	DDT	..	..	100	100	43	..
	deutero-DDT	..	..	100	100	92	8
<i>C. p. quinquefasciatus</i> (DDT-diel-drin)	DDT	..	100	89	28
	deutero-DDT	..	100	100	99	9	..
<i>Ae. aegypti</i> (DDT)	DDT	16	11	1
	deutero-DDT	99	74	36

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for 95 percent mortality (2.5 p.p.m.) was significantly higher than the concentration of DDT required for the same mortality of susceptible *Ae. aegypti* (0.1 p.p.m., Flynn *et al.*, 1964). Similarly, the LC₉₅ of deutero-DDT against chlorinated hydrocarbon-resistant *A. quadrimaculatus* (0.1 p.p.m.) is markedly higher than the

TABLE 2.—Residual activity of DDT and deuterio-DDT against late 3rd-early 4th instar *Ae. aegypti* larvae.

Conc. (ppm)	No. weeks of 95 percent or higher kills in 24 hours					
	DDT-resistant		Dieldrin-resistant		Susceptible	
	DDT	Deutero-DDT	DDT	Deutero-DDT	DDT	Deutero-DDT
2.5	0	4	3	>10	>10	>10
1.0	0	<3	3	>10	4	>10
0.5	0	<3	<3	4	3	>10
0.25	..	0	..	3	..	4
0.1	0	0	0	<3	<3	<3

value obtained for DDT against a susceptible strain (0.004 p.p.m.), Mortalities with DDT and its deuterated analogue against susceptible *A. quadrimaculatus* were similar.

Residual larvicide evaluations (Table 2) of these compounds were performed against three strains of *Ae. aegypti* following the method described by Jakob (1965). Residual effectiveness of deutero-DDT persisted for >10 weeks at 0.5 and 1.0 p.p.m. against the susceptible and dieldrin-resistant strains, respectively. However, the maximum concentration of deutero-DDT tested (2.5 p.p.m.) was satisfactory for only 4 weeks against a DDT-resistant strain.

Residual panel studies with deposits from emulsifiable formulations on plywood were conducted against DDT- and dieldrin-resistant adults of *Ae. aegypti* by the technique previously described (Jakob and Schoof, 1963). Exposures were for 1 hour; effectiveness was based on female mortalities at 24 hours. With a dieldrin-resistant strain, DDT at 200 mg./sq. ft. gave satisfactory mortalities (*i.e.* 70 percent or above) for 5 weeks, while exposure to the same dosage of deutero-DDT gave effective kills for 20 weeks, except at week 15. However, during the 20-week period the kills were above 90 percent only through week 13. With DDT-resistant specimens neither compound at 200 mg./sq. ft. was effective at week 1.

The data presented indicate that while DDT-resistant larvae showed an increased response to deutero-DDT, the concentra-

tions required for effective larval mortality (*i.e.* 95 percent) were much higher than corresponding levels with DDT against susceptible specimens. In residual panel tests against DDT-resistant *Ae. aegypti* deutero-DDT was ineffective, but it was significantly better than DDT against a dieldrin-resistant strain. The data indicate little potential for deutero-DDT in situations where *A. quadrimaculatus* or *Ae. aegypti* are resistant to DDT. Such potential is further lessened by the development of new toxicants that are highly effective against resistant strains.

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