LABORATORY EVALUATION OF PROMISING INSECTICIDES AGAINST ADULT BLACK SALT-MARSH MOSQUITOES, *AEDES TAENIORHYNCHUS* (WIEDEMANN)

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In Florida, malathion, naled, and fenthion are the only insecticides recommended for control of adult mosquitoes. Malathion has been used quite extensively for the past 8 years, but recent tests (to be reported elsewhere) have shown that malathion resistance is present in adult and larval *Aedes taeniorhynchus* (Wiedemann) in several counties. Obviously there is a continuing need for new and better insecticides to control mosquitoes.

Since 1957 the Gainesville laboratory (formerly located at Orlando, Florida) has conducted a continuing program to evaluate new insecticides as sprays for adults of *A. taeniorhynchus*. The results of previous laboratory tests have been reported by Davis and Gahan (1958; 1961), Davis (1959), and Gahan and Davis (1964). This paper reports the results obtained with 13 new materials.

TESTING TECHNIQUE. Adult female mosquitoes from a colony of *A. taeniorhynchus* reared in the laboratory were exposed to sprays containing a range of concentrations of each insecticide in a wind tunnel. The wind tunnel is a cylindrical tube 4 inches in diameter through which a column of air is drawn at 4 m.p.h. by a suction fan. Twenty-five mosquitoes were confined in a tubular galvanized metal cage with screened ends which was placed in the center of the tube. One-fourth milliliter of a solution of the insecticide in kerosene was atomized at a pressure of 1 p.s.i. into the mouth of the tunnel, and the mosquitoes were exposed momentarily to the solution as it was drawn through the cage. Duplicate cages were used in each test, and four replicate tests were made with each concentration of each insecticide. After treatment, the mosquitoes were anesthetized with carbon dioxide, transferred to cardboard holding cages, and furnished with a 20 percent sugar-water solution. Mortality counts were taken after 24 hours.

RESULTS. The results obtained with 13 experimental insecticides and a malathion standard are presented in Table 1, arranged in descending order of toxicity to mosquitoes.

Based on the computed LC_{90} for each insecticide, five compounds were more toxic to adult mosquitoes than the malathion standard. Niagara NIA–10242 was about four times as toxic; Shell SD–8280, three times; Shell SD–8436, two times; and Geigy GS–13005 and Shell SD–8211

TABLE 1.—Effectiveness of various insecticides in contact-spray tests against adult females of *Aedes taeniorhynchus.*

Insecticide	LC_{50} (%)	LC_{90} (%)	LC_{90} reciprocal ratio to malathion
Niagara NIA–10242 (2,3-dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate	0.0037	0.0134	3.7
Shell SD–8280 (2-chloro-1-(2,4-dichloropheynl)vinyl dimethyl phosphate)	.0051	.01487	3.2
Shell SD–8436 (2-chloro-1-(2,4-dibromophenyl)vinyl dimethyl phosphate)	.0058	.0227	2.1
Geigy GS–13005 (*O,O*-dimethylphosphorodithioate *S*-ester with 4-(mercaptomethyl)-2-methoxy-Δ^2-1,3,4-thiadiazolin-5-one)	.0143	.0328	1.5
Shell SD–8211 (2-chloro-1-(2,5-dichlorophenyl)vinyl dimethyl phosphate)	.0109	.0363	1.3
Bayer 42696 (3-(dimethylamino)-*p*-tolyl methylcarbamate)	.0138	.0470	1.0
Malathion	.0201	.0481	1.0
Geigy GS-12968 (*O,O*-dimethyl phosphorodithioate *S*-ester with 2-ethoxy-4-(mercaptomethyl)-Δ^2-1,3,4-thiadiazolin-5-one)	.0275	.0634	.8
Shell SD–8530 (3,4,5-trimethylphenyl methylcarbamate)	.0318	.0675	.7
Monsanto CP-40296 (*O*-4-chlorobutyl *O*-(*alpha,alpha,alpha*-trifluoro-4-nitro-*m*-tolyl) methylphosphonothioate)	.0319	.06848	.7
Shell SD–8447 (2-chloro-1-(2,4,5-trichlorophenyl) vinyl dimethyl phosphate	.0281	.0705	.7
Stauffer N–2404 (*O*-(2-chloro-4-nitrophenyl) *O*-isopropyl ethyl phosphonothioate)	.0277	.0730	.7
Stauffer R-5723-a (*O*-ethyl *O*-methyl phosphorodithioate *S*-ester with *N*-(mercaptomethyl)phthalimide)	.0430	.0948	.5
Bayer 44632 (*O*-ethyl *O*-[2-(ethylthio)-6-methyl-4-pirimidinyl] ethylphosphonothioate)	.0489	.1225	.4

one and one-half times. The standard was equal to Bayer 42696, slightly better than Geigy GS–12968, less than twice as effective as Shell SD–8530, Monsanto CP–40296, Shell SD–8447, and Stauffer N–2404; and more than twice as toxic as Stauffer R–5723–A and Bayer 44632.

One of the most important factors that governs the use of chemicals as insecticides is their mammalian toxicity. Table 2 lists the acute oral toxicity of these insecticides. Of the six insecticides that were equal to or better than the malathion standard, only Shell SD–8211 is less toxic than malathion. Shell SD–8436 is slightly more toxic. Another material that is fairly safe is Shell SD–8280. No information was available on Bayer 42696, and the remaining two compounds are very toxic. Of the materials which are slightly less effective than malathion, only Shell SD–8447 has less toxicity than malathion.

SUMMARY. Wind tunnel tests were conducted with adult females of *Aedes taeniorhynchus* (Wiedemann) to compare the toxicity of a malathion standard and

TABLE 2.—Mammalian toxicity of 14 insecticides.[a]

Insecticide	Acute oral toxicity (LD_{50} in mg./kg.)
Niagara NIA–10242	2.5—rats
Shell SD–8280	176—mice
Shell SD–8436	946—mice
Geigy GS–13005	*ca* 50—mice and rats
Shell SD–8211	>5000—mice
Bayer 42696	No data
Malathion	1375—rats
Geigy GS–12968	288–443—rats
Shell SD–8530	101—mice
Monsanto CP–40296	79.4–120—rats
Shell SD–8447	5000—mice
Stauffer N–2404	32—rats
Stauffer R–5723–A	50—rats
Bayer 44632	No data

[a] Based on information given by the manufacturers.

13 organic compounds. The materials equal to or better than the standard were Niagara NIA-10242, Shell SD-8280, Shell SD-8436, Geigy GS-13005, Shell SD-8211, and Bayer 42696.

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