

LABORATORY EVALUATION OF SPRAYS OF SELECTED INSECTICIDES AGAINST THE MOSQUITO *CULEX TARSALIS* COQ.

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The mosquito *Culex tarsalis* Coquillett is considered one of the more important pests of man and domestic animals in the western United States. It has been incriminated as a vector of western equine and St. Louis encephalitis viruses (Lennette, 1955). The occurrence of resistance of this mosquito to insecticides (Gjullin and Isaak, 1957); Eddy *et al.*, 1958) has made necessary a continuous research program to develop more effective compounds. This paper presents laboratory data on the effectiveness of materials applied as mist sprays against adults of *C. tarsalis*. The work reported was conducted at the Western Insects Affecting Man and Animals Investigations laboratory during 1963.

MATERIALS AND METHODS. Twenty-four compounds were evaluated as sprays in a specially designed wind tunnel apparatus (Fig. 1). This equipment is very similar to that used by Davis and Gahan (1961) in their tests against the salt marsh mosquito, *Aedes taeniorhynchus* (Wiedemann).

The test insects were 2- to 4-day-old insecticide-susceptible adult females from the laboratory colony. They were anesthetized with CO₂ and placed in a cylindrical cage 4 inches in diameter with screens on both ends. After recovery, in about 10 minutes, they were placed in the wind tunnel chamber where they were subjected to a

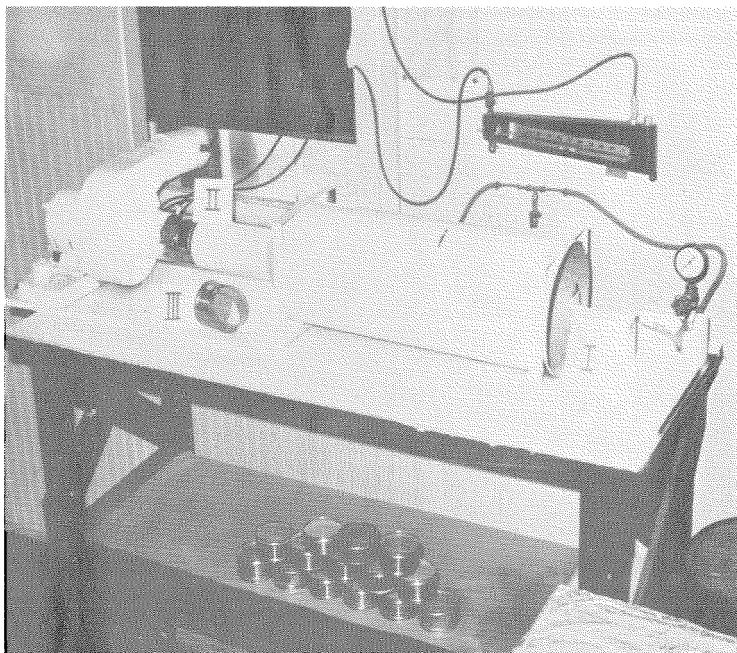


FIG. 1.—Wind-tunnel apparatus: I, mouth of wind-tunnel where test solution is atomized; II, treatment chamber; III, screened treatment cage.

TABLE I.—Toxicity of compounds as mist sprays against insecticide-susceptible 2- to 4-day-old adult females of *Culiseta tarsalis*.

Material	Percent mortality 24 hours after treatment with 0.1 ml. solution at indicated % concentrations 1/										Calculated % conc. to obtain		Ratio ² to malathion
	.006	.010	.015	.020	.030	.060	.10	.20	.30	.60	LC-50	LC-90	
Shell SD-8436	36	86	99	100	..	..	..	..	..	..	0.007	0.011	29.0
Hercules AC-5727	3	33	77	100	..	..	..	..	..	..	.011	.016	20.0
Parathion	..	14	60	86	..	..	..	..	..	..	.013	.021	15.2
Fenthion	..	9	54	86	..	..	..	..	..	..	.014	.022	14.5
Ciodrin	..	3	..	32	77	..	..	..	..	..	.024	.033	9.7
Bayer 39007	50	80	100	..	..	..	..	.020	.038	8.4
Bayer 30554	26	80	99	..	..	..	..	.023	.036	8.9
Bayer 34042	23	61	97	..	..	..	..	.026	.047	6.8
Compound 4072	29	63	93	..	..	..	..	.025	.048	6.6
Phosphamidon	32	75	95	..	..	..	..	.022	.045	7.1
Bayer 41831	39	95	100	..	..	..	.033	.052	6.1
Upjohn TUC U-12927	18	73	100	..	..	..	.048	.070	4.6
Shell SD-8447	9	75	98	..	..	..	.048	.075	4.3
Carbaryl (Sevin)	11	64	92	..	..	..	.055	.11	2.9
Dieldrin	4	53	88	..	..	..	.075	.14	2.3
Shell SD-8306	31	68	95	..	..	.080	.15	2.1
Famophos	23	65	91	..	..	0.085	0.17	1.9
Shell SD-8448	12	51	88	..	..	.10	.21	1.5
Barthrin	23	63	93	..	.20	.26	1.2
Malathion (Standard)	37	78	85	..	.15	.32	1.0
Dichlorvos	5	31	85	..	.23	.31	1.0
Bayer 37342	32	76	100	.24	.38	.84
Bayer 37341	17	63	90	.32	.66	.48
DDT	23	45	80	.33	.78	.41

¹ Mortality of controls (solvents alone) averaged less than 1%.² Reciprocal ratio at LC-90 level.

fine mist spray carried by a 4-mph air column. The spray consisted of 0.1 ml. of the test solution atomized at a pressure of 10 psi at the mouth of the tunnel. Malathion was used as the standard. Three to five tests, with two replicates per test, were conducted with each material. The compounds were dissolved in a mixture of 50 percent acetone and 50 percent refined deodorized kerosene. The insects were exposed to the spray for about 2 seconds, after which they were again anesthetized and transferred to pint jars with screen lids. These were placed in a holding room kept at a temperature of 80° F. \pm 3° and at a relative humidity of 60 percent. Cotton pads soaked in a 10 percent sugar-water solution were placed on top of the screen lids for food. Mortality was recorded 24 hours after treatment.

Materials used for which no common names are available are as follows:

Bayer 30554	<i>o</i> -methyl <i>o</i> -[<i>p</i> -(methylsulfinyl)phenyl]methylphosphonothioate
" 34042	<i>o</i> -ethyl <i>o</i> -[4-(methylthio)- <i>m</i> -tolyl] methylphosphoramidothioate
" 37341	<i>o,o</i> -diethyl <i>o</i> -[4-(methylthio)-3,5-xylyl] phosphorothioate
" 37342	<i>o,o</i> -dimethyl <i>o</i> -[4-(methylthio)-3,5-xylyl] phosphorothioate
" 39007	<i>o</i> -isopropoxyphenyl methylcarbamate
" 41831	<i>o,o</i> -dimethyl <i>o</i> -4-nitro- <i>m</i> -tolyl phosphorothioate
Famophos	<i>o-p</i> -(dimethylsulfamoyl)phenyl <i>o,o</i> -dimethyl phosphorothioate
Compound 4072 (formerly GC-4072)	2-chloro-1-(2,4-dichlorophenyl)vinyl diethyl phosphate
Hercules AC-5727	<i>m</i> -isopropylphenyl methylcarbamate
Ciodrin ® (Shell SD-4294)	<i>alpha</i> -methylbenzyl 3-hydroxycrotonate dimethyl phosphate
Shell SD-8306	<i>alpha</i> -ethylbenzyl 3-hydroxycrotonate dimethyl phosphate
" " 8436	2-chloro-1-(2,4-dibromophenyl)vinyl dimethyl phosphate
" " 8447	2-chloro-1-(2,4,5-trichlorophenyl)vinyl dimethyl phosphate
" " 8448	2-chloro-1-(2,4,5-trichlorophenyl)vinyl diethyl phosphate
Upjohn TUC U-12927	6-chloro-3,4-xylyl methylcarbamate

RESULTS. The results are presented in Table 1. Of the 24 chemicals tested, 19 were more toxic than malathion and 4 were less so, as based on the LC-90 level. Toxicity ranged from 1.2 to 29 times that of malathion. The most effective compound, Shell SD-8436, was 29 times as toxic as malathion. Hercules AC-5727 was 20 and parathion 15 times as toxic as malathion.

Shell compound SD-8436 is of special interest since it was the most effective material and is reportedly not highly toxic to

mammals. Informal data indicate the acute oral toxicity to be approximately 1140 mg./kg. for mice, but less for rats. However, in studies not reported here, the material was not highly effective against larvae of the same mosquito species.

SUMMARY. Twenty-four chemicals were laboratory tested as mist sprays against adult, 2- to 4-day-old insecticide-susceptible females of the mosquito *Culex tarsalis* Coquillett by use of a wind-tunnel apparatus. Nineteen of the 24 compounds caused higher mortalities than malathion, which was used as the standard. Shell compound SD-8436 (2-chloro-1-(2,4-dibromophenyl)vinyl dimethyl phosphate) was the most toxic (29X standard) and DDT the least toxic.

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