EFFECTIVENESS OF TEN ADULTICIDES AGAINST *PSOROPHORA CONFINNIS* (LYNCH ARRIBALZAGA) IN ARKANSAS[1]

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ABSTRACT. Ten adulticides were tested in a portable wind tunnel for effectiveness as contact aerosols against adult female *Psorophora confinnis* (Lynch Arribálzaga). Synergized resmethrin, pyrethrins, and tetramethrin were 7.4, 5.8, and 5.4 times more effective than malathion, respectively. Fenthion, chlorpyrifos, and naled were 2.6, 2, and 1.8 times more toxic than malathion, respectively; Plant Protection PP-511 (*O*-[2-(diethylamino)-6-methyl-4-pyrimidinyl] *O,O*-dimethyl phosphorothioate), Montecatini, L-561 (ethyl mercaptophenyl-acetate *S*-ester with O,O-dimethyl phosporodithioate), and Dowco 214 were all about equal to malathion in toxicity.

Previous large-scale tests in Arkansas (Mount *et al.*, 1972) indicated that adult *Psorophora confinnis* (Lynch Arribálzaga) were more susceptible to malathion, naled, and chlorpyrifos than adults of our standard test species, *Aedes taeniorhynchus* (Wiedemann). Thus, we decided to obtain more precise data on toxicity for chemicals that have potential as adulticides against *P. confinnis*. The present paper reports the effectiveness of ten adulticides as contact aerosols in a wind tunnel.

METHODS AND MATERIALS. The mosquitoes used in the test were adult female *P. confinnis* in a rice field near Stuttgart, Arkansas. The specimens were drawn into plastic holding tubes with battery-powered aspirators and kept in insulated chests containing ice in cans, and moist cotton, while being transported to the laboratory, which was located in Stuttgart. The tubes of mosquitoes (approximately 25 each) were anesthetized with carbon dioxide and transferred to tubular galvanized metal cages with screened ends until they were used in the tests.

The insects were exposed to the adulticides in a portable wind tunnel (Figure 1) patterned after the laboratory model described by Davis and Gahan (1961). It consisted of a cylindrical tube 4 inches in diameter; a column of air was drawn through this tube at a rate of 4 miles per hour by a suction fan. The insecticides (one-fourth milliliter) dissolved in deodorized kerosene were atomized at a pressure of 1 pound per square inch into the mouth of the tunnel, and the mosquitoes were exposed momentarily to the aerosol droplets as they were drawn through the exposure cages. Duplicate cages were used in each test, and one to five tests were made with each concentration of each adulticide. After treatment, the mosquitoes were anesthetized with carbon dioxide, transferred to cardboard holding cages, and furnished with a 10 percent sugar-water solution. Knockdown and mortality counts were taken 1 and 24 hours after exposure, respectively. Mosquitoes not exposed to the chemicals showed 3 percent knockdown and 9 percent kill.

RESULTS AND DISCUSSION. Table 1 gives the concentrations of each insecticide estimated to give 90 percent knockdown and 90 percent kill of *P. confinnis* (KC_{90} and LC_{90}, respectively).

Resmethrin, pyrethrins, and tetramethrin synergized with piperonyl butoxide were the outstanding adulticides being 7.4, 5.8, and 5.4 times more effective than malathion, respectively. Fenthion, chlorpyrifos, and naled were 2.6, 2, and 1.8

[1] This paper reflects the results of research only. Mention of a pesticide, commercial or proprietary product in this paper does not constitute a recommendation or an endorsement of this product by the U.S. Department of Agriculture or the Arkansas Experiment Station and Extension Service.

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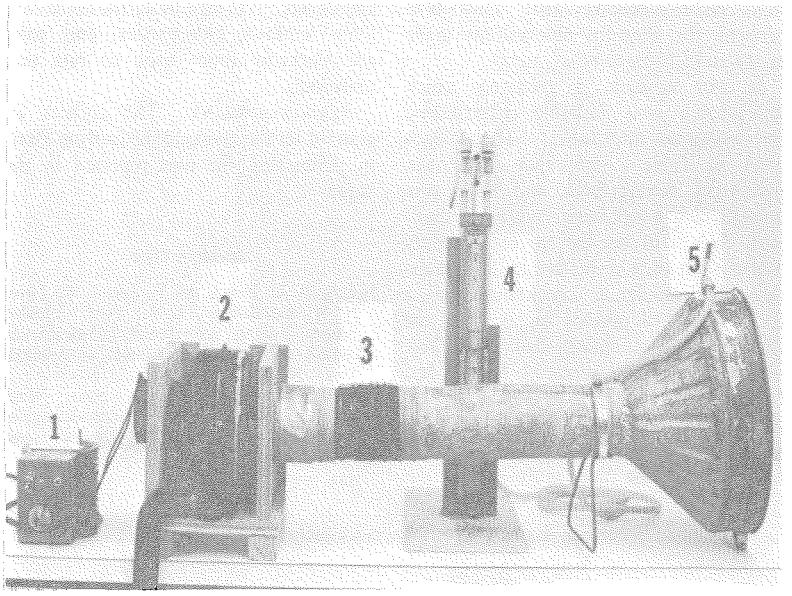

FIG. 1.—Portable wind tunnel: (1) rheostat for suction fan motor, (2) suction fan, (3) exposure cage, (4) manometer, and (5) atomization chamber.

times more toxic than malathion, respectively. Plant Protection PP-511 (*O*-[2-(diethylamino)-6-methyl-4-pyrimidinyl] *O*, *O*-dimethyl phosphorothioate), Montecatini L-561 (ethyl mercaptophenylacetate *S*-ester with *O*,*O*-dimethyl phosphorodithioate), and Dowco 214 were all about equal to malathion.

The LC_{90}'s for *P. confinnis* and *A. taeniorhynchus* (Table 1) indicate that *P. confinnis* are about twice as susceptible to fenthion, chlorpyrifos, naled, and mala-

TABLE 1.—Effectiveness of ten adulticides in contact spray tests against adult female *P. confinnis*.

Adulticide	ENT-no.	1 hr knockdown (KC_{90})	24-hr kill (LC_{90}) [a]	LC_{90} reciprocal ratio to malathion	Mammalian toxicity [b] (oral LD_{50} mg/kg)
Resmethrin [c]	27474	0.0017	0.0019	7.4	3500–4500
Pyrethrins [c]	3107	.0016	.0024	5.8	200–2600
Tetramethrin [c]	27339	.0013	.0026	5.4	>20,000
Fenthion	25540	.06	.0054 (.008)	2.6	178–310
Chlorpyrifos	27311	.03	.0069 (.014)	2.0	97–267
Naled	24988	.009	.0078 (.015)	1.8	430
Plant Protection PP-511	27699	.05	.012	1.2	>2000
Malathion	17034	.025	.014 (.034)	1.0	885–2800
Montecatini L-561 (Cidial®)	27386	.06	.017	.8	200–2000
Dowco 214	27520	.07	.019	.7	941–2140

[a] Values in parentheses show comparable LC_{90}'s for *A. taeniorhynchus*.
[b] Data on rats from Bulletin of the Entomological Society of America 15(2):85–148 and 16(1):68.
[c] Adulticide plus piperonyl butoxide at 1:5 ratio (w/w).

thion as *A. taeniorhynchus*. These data confirm the previous observations made in the field (Mount *et al.*, 1972).

In our opinion, a relatively quick knockdown is a desirable characteristic for mosquito adulticides. The KC_{90}'s given in Table 1 show that resmethrin, pyrethrins, tetramethrin, and naled produced quick knockdown (within 1 hour) with KC_{90}'s of one-half to only slightly higher than their respective LC_{90}'s. Malathion had moderate knockdown and a KC_{90} about 70 percent higher than the LC_{90}. Fenthion, chlorpyrifos, Plant Protection PP-511, Montecatini L-561, and Dowco 214 had relatively poor knockdown.

The acute oral toxicities (Table 1) for rats indicate that most of the ten adulticides are at least as safe as malathion. Only fenthion, chlorpyrifos, and naled are markedly more toxic to rats than malathion.

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Davis, A. N. and J. B. Gahan. 1961. Wind-tunnel tests with promising insecticides against adult salt-marsh mosquitos. *Aedes taeniorhynchus* (Wied.). Mosq. News 21(4):300–303.

EFFECT OF AGRICULTURAL SPRAYING ON *ANOPHELES ALBIMANUS* DENSITIES IN A COASTAL AREA OF EL SALVADOR[1]

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INTRODUCTION. In connection with malaria investigations in Central America, several investigators have reported a marked reduction in the vector *Anopheles albimanus* populations following the aerial application of insecticides in cotton growing areas. In coastal plain regions of Guatemala, El Salvador, Honduras, and Nicaragua, the insect pests of cotton are treated with very large quantities of organochlorine and organophosphorus insecticides, applied by aircraft during five or six months of the year. Rachou *et al.* (1965) reported that the application of insecticides by airplane to the cotton fields reduced the anopheline density and shortened the periods of high malaria transmission in a study area near Acajutla, El Salvador. Georghiou (1972) in his studies of insecticide resistance of *A. albimanus* in Central America stated that anopheline densities show a dramatic decline during the cotton spraying season in spite of abundant rainfall.

For the past four years the Central American Malaria Research Station (CAMRS) has been investigating the epidemiology of malaria in various parts of El Salvador. One component of these studies has been the routine measurement of

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