THERMAL AEROSAL INSECTICIDE TESTS FOR THE CONTROL OF ADULT MOSQUITOES, 1961–62 [1]

CARLISLE B. RATHBURN, JR. AND ANDREW J. ROGERS
Entomological Research Center, Florida State Board of Health, Vero Beach, Florida

In 1961 the authors reported on tests with several insecticides applied as thermal aerosols against caged adult *Aedes taeniorhynchus* Wied. (Rathburn and Rogers, 1961). This is a continuing program designed to keep the mosquito control districts of Florida abreast of current developments in this field. The present paper is a report on results of tests conducted during 1961–62.

METHODS. Methods used in these tests were similar to those reported by Rogers *et al.* (1957). All tests were conducted in the early evening hours after sunset on level open areas having little or no underbrush. Two cages of mosquitoes, each containing approximately 25 females, were attached to each stake, one at 6 feet and the other at 2 feet from the ground. The stakes were placed at intervals of 165 and 330 feet downwind from and perpendicular to the line of travel of the fogging vehicle. Each test replicate consisted of the cages from three sets of stakes placed a block (approximately 330 feet) apart or a total of 12 cages.

All tests were conducted with a Leco 80 [2] thermal aerosol generator operated at a burner temperature of 850° F. and calibrated to deliver 40 gallons per hour. The fogging vehicle was driven at 5 miles per hour. Machine operations were checked constantly during the tests and the insecticides were measured before and after each test. Tests in which the output varied more than 6 percent were discarded. The wind velocities at the times the tests were conducted were between 1 and 7 miles per hour and the temperatures between 64° and 81° F.

All mosquitoes used in the tests were between 2 and 8 days old and had been fed only sugar water. After exposure to the fog the mosquitoes were transferred to clean cages. Mortality counts, of female mosquitoes only, were made at 12 hours after treatment.

A variety of factors, including wind and temperature, can affect test results. Owing to the effect of these variables, some paired tests were made using a standard formulation and an unknown on the same night. The average mortality of the standard formulation for many replications is well established, as well as the range of mortality to be expected under a variety of conditions. Thus, from the results obtained with the standard formulation, it was determined whether the tests were conducted under good or poor conditions and whether the results obtained with a candidate formulation were in the higher or lower portion of its range of mortality.

INSECTICIDES. Because thermal fogging with ground equipment is used primarily in urban areas, candidate insecticides for these tests are carefully selected on the basis of their relative toxicity to warm-blooded animals, thus the number of prospective materials is rather limited. Insecticides tested in 1961–62 were DDVP, Dilan, dibrom (Naled) and malathion. A limited number of tests with dibrom included in this report also were included in the 1961 report. Label approval of this insecticide for urban fogging early in 1962 stimulated further testing to refine dosage levels.

RESULTS. Results of the 1961–62 tests are shown in Table 1. Discrete tests are those in which the individual insecticides were tested separately, that is, without comparing results against a standard formulation tested on the same night, as was the case with the paired tests. Percent

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[2] Lowndes Engineering Co.

mortality is the average combined kill obtained at 165 feet and 330 feet from the line of discharge with a single swath. It is not intended to imply that results reported in this paper would apply to species other than *Aedes taeniorhynchus*.

It is evident from results shown in Table 1 that neither DDVP nor Dilan was effective in these tests, even at relatively high dosage levels. Schoof *et al.* (1962) also reported poor results with DDVP thermal fogs against *Aedes taeniorhynchus*.

Dibrom at 1¼ oz. per gallon was less effective than the standard formulation used in the paired tests, and this is supported by the discrete tests at the same dosage level. Dibrom at 1½ oz. per gallon gave good results in the discrete tests and also compared favorably with the standard formulation in the paired tests. Dibrom at 1¾ oz. per gallon was slightly more effective than 1½ oz. per gallon.

Malathion at 6 oz. per gallon proved to be equally as effective as the standard malathion-Lethane formulation. Some tests have been conducted with malathion at lower dosages but the data are not conclusive at this time; therefore, additional testing of this chemical will be required to determine if it can be used effectively at less than 6 oz. per gallon.

The differences in the mortality obtained with the standard formulation are probably due to variations between tests of wind, temperature and other factors. The average mortality obtained with over 50 replications of the standard formulation under a variety of conditions is about 90 percent with a range of about 60 to 100 percent.

TABLE 1.—Results of discrete and paired tests with insecticides applied as thermal aerosols against caged adult *Aedes taeniorhynchus* Wied. 1961–62.

Insecticide	Ounces per gallon [1]	No. of tests	Percent mortality	Range
Discrete tests				
DDVP	4	9	54	6–78
	8	1	20	..
Dilan	8	5	17	4–36
	16	6	15	1–36
Dibrom	1	9	71	56–81
	1¼	18	83	18–99
	1½	10	92	79–100
	1¾	5	96	92–100
Paired tests				
Dibrom	1¼	7	76	36–98
Standard [2]	..	7	97	86–100
Dibrom	1½	5	90	79–100
Standard [2]	..	2	96	95–97
Malathion	6	10	91	72–100
Standard [2]	..	5	87	72–98

[1] Ounces by weight of actual toxicant per gallon in No. 2 diesel oil.
[2] Four oz. by weight of malathion plus 3 percent by volume of Lethane 384 in diesel oil.

DISCUSSION. The conditions of these tests permit maximum opportunity for contact of the test cages by the insecticides, the cage itself being the only barrier. On the other hand, the caged mosquitoes are not free to fly around in the fog as free-flying insects would be, thus increasing the chances for the latter to accumulate a larger dosage of the insecticide. Also, it is not known at this time just what effect overlapping swaths, as in operational fogging, might have in increasing the dosage applied to a given area, or how natural barriers such as buildings and dense vegetation might interfere with effective cover-

age in actual control operations. However, based upon results obtained in the Florida mosquito control districts over a period of several years, using recommendations based upon this testing program, it is felt that these tests provide a reasonably accurate measure of effective dosage levels for this type of mosquito control operation.

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A PORTABLE DISEASE TRANSMISSION STUDY HUT

GEORGE J. BURTON [1]

A sturdy, collapsible hut for studying biting rates and pickup of filarial or other blood parasites from infected, sleeping persons, by mosquitoes, can be constructed of ¼″ thick 4′ x 8′ plywood sheets and right-angled metal beams known commercially as "Dexion." The beam resembles one of the right-angled bed supports for a mattress, except that it has numerous ½″ x ⅜″ slots which alternate horizontally and vertically. This design permits easy interlocking of the beams with bolts, so as to make a strong supporting framework. By drilling ¼″ holes near each edge of the plywood sheet, Dexion beams cut to size can be attached with nuts and bolts to each edge of the plywood, thus making a complete support which also prevents damage during transportation. The Dexion comes in 10′ lengths, and can be cut to size by using a hacksaw or a Dexion cutter.

Each plywood sheet is designated as a "panel." Each side of the hut consists of 2 such panels set vertically, and joined side by side by using bolts having wing nuts. There are altogether 12 panels needed: 8 for the four sides, 2 for the floor, and 2 for the roof.

Since a person must sleep in the hut, it must be of adequate size. Using the standard panels, its dimensions are 8 x 8 x 8′, but the sides can be cut down to about 7′ in height, after which a 6″ slope is cut so as to permit rain runoff. Wing nuts are used with bolts 6″ to 12″ apart in places where the panels are to be separated or disassembled, otherwise the permanent hexagonal-head nuts are used.

Although the hut can be set on the ground, it is recommended that it be raised off the ground at least 6″ by a Dexion frame. Three indented, screened windows, 22″ x 26″ are cut into three sides (Fig. 1). Each has 2 louvres made

[1] Formerly Vector-Borne Disease Specialist (Filariasis), U.S.A.I.D. Mission to British Guiana, Georgetown, British Guiana. Present address: Scientist Director, U.S.P.H.S., N.I.H.-West Africa Research Laboratory, % American Embassy, P.O. Box 194, Accra, Ghana, West Africa.