

# TESTS OF INSECTICIDES APPLIED BY ULTRA LOW VOLUME GROUND EQUIPMENT FOR THE CONTROL OF ADULT STABLE FLIES, *STOMOXYS CALCITRANS* (L.)<sup>1</sup>

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**ABSTRACT.** Malathion, fenthion, resmethrin (SBP-1382), Actellic (methyl pirimiphos), Dowco 214, Dursban (chlorpyrifos), Baygon 1 MOS, 5% pyrethrins, and naled (Dibrom) were tested by ultra low volume (ULV) ground equipment against caged adult stable flies, *Stomoxys calcitrans* (L.).

Resmethrin at 0.25 and Actellic at 1.0 gal./hr. gave a minimum kill of 95% at a vehicle speed of 5 miles per hour (mph). Malathion, fenthion, Baygon 1 MOS, Dursban, and 5% pyrethrins

killed 92% or more of flies at dosage rates of 1.0, 0.5, 4.0, 1.0, and 4.0 gals./hr., respectively at 10 mph. Dowco 214 killed 75 and 84% at 0.5 and 1 gal./hr., respectively at 5 mph.

Tests of 3% Dibrom 14 by volume in diesel oil, heavy aromatic naphtha (HAN) or Chevron 400 solvent dispersed at 10 gals./hr., 10 mph, killed a minimum of 96% of the flies. Two percent Dibrom 14 by volume in diesel oil applied at 10 gals./hr., 10 mph killed 89%, and 1% at 20 gals./hr. killed 98% of the flies.

**INTRODUCTION.** In West Florida the stable fly, *Stomoxys calcitrans* (L.) is known as the "dog fly" and is a serious pest of man as well as livestock. This laboratory has a continuing project for evaluating chemicals applied as aerosols with ground equipment for the control of this pest. Previous tests reported by Clements and Rogers (1967) showed that naled applied as a thermal aerosol was highly effective against this fly. Mount et al. (1966) reported that thermal and non-thermal aerosols were about equally effective against stable flies when malathion, fenthion, and naled were used as toxicants. This report gives the results obtained with 9 chemicals applied as non-thermal aerosols against the stable fly under field conditions.

**METHODS AND MATERIALS.** All tests were conducted with a Leco ULV

(HD Model) machine<sup>3</sup>, except in tests where 1 gallon per hour (gph) of malathion was applied using a Buffalo Turbine Sonic ULV<sup>4</sup> machine; and a Buffalo Turbine (MULV) machine was used in the application of 1% Dibrom by volume in diesel oil. The Leco machine was operated at a nozzle air pressure of 4 psi, except when applying 3% Dibrom by volume in heavy aromatic naphtha (HAN) where a nozzle pressure of 1.5 psi was used, as recommended by Mount and Pierce (1972). Both Buffalo Turbine machines were operated at 80 psi air pressure and 40 psi liquid pressure. The Buffalo Turbine (MULV) machine contained 5 Sonicore<sup>®</sup> nozzles and is capable of discharging high and low volumes of liquids.

The flow rate of insecticides through each machine was measured by a flowmeter. The size flowmeter tube and ball float used for each insecticide

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was predetermined by calibration. Temperature-flow rate curves were established for each machine and insecticide. In each test, the insecticide temperature was recorded prior to treatment and the flowmeter adjusted to give the desired discharge. Solution temperature was recorded after each test to monitor any unusual variation that might have occurred in the discharge rate. The length of time the insecticide was discharged during each test was recorded on an accumulative stop watch, and the amount used was measured in milliliters and converted to gallons per hour. Tests were discarded when the actual output varied more than  $\pm 10\%$  of the intended dosage.

At this laboratory many tests of insecticides applied by ground aerosol equipment are conducted simultaneously against both stable flies and

mosquitoes. Descriptions of the test areas, cage locations, and applications of insecticides are similar and have been previously reported by Rathburn and Boike (1975). However, differences do occur in the evaluation of results between the test insects.

Twenty 3-day-old flies of mixed sexes were placed in each cage. A total of 12 cages represented one test or replication. The flies were not blood-fed prior to the test. Immediately after treatment the flies were suppressed with  $\text{CO}_2$ , transferred to clean holding cages and then to the laboratory where they were held under moist cotton for approximately 12 hours prior to post-treatment mortality counts.

**RESULTS AND DISCUSSION.** Results of dosage tests of various insecticides are shown in Table 1. The fly kills are averages of all stations at 165 and 330

Table 1. Tests of insecticides applied by ultra low volume ground equipment against caged adult stable flies, *Stomoxys calcitrans* (L.).

| Insecticide            | Discharge<br>gals/hr | Avg.<br>wind<br>mph | Avg.<br>temp<br>°F | No. of<br>tests | Vehicle<br>speed<br>mph | Average<br>corrected<br>percent<br>kill | Range  |
|------------------------|----------------------|---------------------|--------------------|-----------------|-------------------------|---|--------|
| Resmethrin             | 0.5                  | 5.8                 | 79                 | 5               | 5                       | 100                                     | 99-100 |
|                        | 0.25                 | 5.5                 | 76                 | 5               | 5                       | 97                                      | 93-100 |
| Actellic               | 1.0                  | 3.1                 | 77                 | 3               | 5                       | 95                                      | 92-99  |
|                        | 0.5                  | 5.7                 | 82                 | 5               | 5                       | 75                                      | 54-96  |
| Dowco 214              | 1.0                  | 6.1                 | 80                 | 3               | 5                       | 84                                      | 75-95  |
|                        | 0.5                  | 3.9                 | 78                 | 3               | 5                       | 75                                      | 69-80  |
| Malathion <sup>a</sup> | 2.0                  | 7.7                 | 76                 | 4               | 10                      | 92                                      | 89-100 |
|                        | 1.0                  | 8.9                 | 81                 | 4               | 10                      | 96                                      | 90-100 |
| Malathion              | 2.0                  | 5.8                 | 78                 | 6               | 10                      | 99                                      | 93-100 |
| Fenthion               | 0.5                  | 4.3                 | 81                 | 5               | 10                      | 97                                      | 94-100 |
| Chlorpyrifos           | 1.0                  | 5.9                 | 75                 | 4               | 10                      | 92                                      | 86-98  |
|                        | 0.6                  | 3.8                 | 81                 | 8               | 10                      | 69                                      | 31-100 |
|                        | 0.5                  | 4.3                 | 75                 | 3               | 10                      | 65                                      | 59-70  |
| Baygon 1 MOS           | 4.0                  | 7.3                 | 70                 | 6               | 10                      | 99                                      | 98-100 |
| Pyrethrins (5%)        | 4.0                  | 6.3                 | 84                 | 1               | 10                      | 100                                     | .....  |
|                        | 2.0                  | 5.2                 | 82                 | 1               | 10                      | 54                                      | .....  |

<sup>a</sup> Buffalo Turbine Sonic ULV machine operated at 40 psi liquid and 80 psi air; all other tests were with Leco HD-ULV at 4 psi.

Table 2. Tests of Dibrom 14 formulated by volume in various solvents and applied by ultra low volume ground equipment at 10 miles per hour against caged adult stable flies, *Stomoxys calcitrans* (L.).

| Dibrom formulation (v/v)         | Discharge gals/hr | Avg. wind mph | Avg. temp °F. | No. of tests | Average corrected percent kill | Range  |
|----------------------------------|-------------------|---------------|---------------|--------------|--------------------------------|--------|
| 3% in diesel oil <sup>a</sup>    | 10                | 6.2           | 81            | 4            | 98                             | 94-100 |
| 3% in HAN                        | 10                | 4.6           | 83            | 3            | 96                             | 93-99  |
| 3% in Chevron 400                | 10                | 6.0           | 81            | 3            | 99                             | 97-100 |
| 2% in diesel oil <sup>a</sup>    | 10                | 7.4           | 77            | 4            | 89                             | 74-97  |
| 1% in diesel oil <sup>a, b</sup> | 20                | 3.0           | 77            | 4            | 98                             | 96-100 |

<sup>a</sup> Ortho additive—Dibrom 1:1.

<sup>b</sup> Buffalo Turbine MULV machine operated at 40 psi liquid and 80 psi air; all other tests were with the Leco HD-ULV machine operated at 4 psi (except HAN, which was at 1.5 psi).

feet at the indicated rate, and were corrected to the mortality of the untreated controls.

Several insecticides were evaluated at a vehicle speed of 5 mph; therefore, for comparison of these compounds with those tested at 10 mph the discharge rate of the former would be twice those shown in Table 1. Based on quantity of technical material applied, Resmethrin and fenethion were the more effective compounds tested. However, it should be noted that some of the other concentrates also were highly effective when compared on the basis of active ingredient (AI), e.g., Baygon 1 Mos which contains only 1 lb. AI per gallon.

Fly kill by malathion at the rate of 1 gph was similar when applied by the Buffalo Turbine Sonic ULV machine or the Leco ULV machine.

Since higher concentrations of Dibrom when applied as aerosols can be very irritating to the eyes and respiratory tract, tests were made of lower concentrations in several solvents in an

effort to solve this problem. The 3% concentration reduced irritation to an acceptable level. Data in Table 2 show that results were good with all 3% formulations at 10 gph and with 1% at 20 gph, but 2% in diesel oil at 10 gph was marginal.

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