CONTROL OF MOSQUITO ADULTS AND LARVAE USING BAYTEX® AND BAYGON® IN A SiO_2 CHEMICAL FOG

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Under conditions prevalent in many northern states mosquito control is left primarily to the individual or to small political units not affiliated with abatement districts. Equipment available to these individuals or groups is limited since standard equipment now in use is expensive and requires some technical knowledge for proper operation. The authors felt that the chemical fog method described in this paper might ultimately fill this need since a low-cost, easily operated unit can be utilized to control mosquito adults and larvae over a wide range of terrain. As reported by Stokes (1967), the chemical fog method seemed to offer a greater swath width and better penetration of cover than other available methods.

To evaluate this method a series of tests were conducted using BAYTEX® (O-O-diethyl O-[4-(methylthio)-m-tolyl] phosphorothioate) and BAYGON® (o-isopropylphenyl methylcarbamate) in a chemical fog produced by combining a $SiCl_4$—insecticide mixture with a 5.25 percent ammonia solution. This paper describes the procedures, and summarizes the results obtained in these tests.

In all tests a modified Buffalo Turbine Mity Mite sprayer was used. This sprayer was mounted on a trailer which was pulled by an automobile moving at a speed of 5 mph. The discharge rate of $SiCl_4$—insecticide mixture was 1 gal. per 1,760 linear feet. The dosage for each chemical was calculated on the basis of a 900-foot swath. The sprayer was modified in such a way that 2½ parts of ammonia solution were combined with 1 part of $SiCl_4$—insecticide mixture in the air blast. The reaction takes place in the air blast to form a fog of SiO_2, NH_4Cl, and insecticide. The proportion of $SiCl_4$ used with each of the insecticides is indicated in Tables 1 and 2.

The tests on larvae were conducted at Douglas, Michigan in a large open field where the grass was mowed. This field was relatively level and there were no trees or shrubs in the test area to interfere with the distribution of the fog. Larvae used in these tests were *Culex restuans* (Theob.). Ten larvae were placed in 32-oz. wax-coated cottage cheese cartons. A series of cartons without covers were placed at 100, 200, 300, 600, 900, and 1,200 feet, perpendicular to the line of travel of the fogging vehicle. This series of cartons was replicated four times at 50-foot intervals. Another series of covered cartons was placed in the center of the treated area at each distance mentioned above. These covered cartons served as a check on the natural mortality occurring during the period of the test. The figures given for percent control in the data which follow have been adjusted to account for natural mortality.

In each test cartons were laid out in a north-south direction. The fog was dis-

TABLE 1.—Control of mosquito larvae *(Culex restuans)* using BAYTEX* in a chemical fog. Douglas, Michigan, 1967.

Distance from fogger	Percent mortality 24 hours after treatment **		
	Test 1	Test 2	Test 3
100	100.0	100.0	100.0
200	100.0	86.0	69.8
300	100.0	78.3	37.5
600	65.5	35.5	8.0
900	20.2	15.0	13.5
1,200	29.0	23.5	10.3

* BAYTEX 8 lb./gal. Spray Conc. was used at 0.88 oz. act./acre.
** Average of 4 replicates adjusted for natural mortality.

Details of application:	Test 1	Test 2	Test 3
Date:	6/20/67	6/21/67	6/21/67
Time:	10:00 p.m.	8:30 a.m.	9:30 p.m.
Wind direction:	south	east-southeast	north-northeast
Wind velocity:	2 m.p.h.	10 m.p.h.	12 m.p.h.
Temperature:	65° F.	65° F.	60° F.
Dilution (oz. BAYTEX/oz. $SiCl_4$):	30/98	30/98	30/64 [a]

[a] Plus 34 oz. of kerosene.

TABLE 2.—Control of mosquito adults (mostly *Aedes stimulans)* using BAYGON * in a chemical fog. Gobles, Michigan, 1967.

Station	Adult landing counts **			
	Pre-count	12 Hours	24 Hours	72 Hours
1	25.5	4.0	3.0	9.0
2	27.5	1.5	1.5	4.0
3	27.5	1.5	1.5	2.0
4	25.0	5.0	4.0	2.0
5	25.0	6.0	3.0	5.0
6	11.5	2.5	5.0	6.0
7	22.5	1.0	4.0	5.0
8	12.0	2.5	5.5	4.5
Average	22.6	3.0	3.4	4.6
Percent Control	....	86.7	85.0	79.6

* BAYGON 1.5 lb./gal. Spray Conc. was used at the rate of 0.33 oz. act./acre.
** Each figure represents the average of two individual counts of mosquitoes landing on one person in one minute.

Details of application:
Date: 6/22/67
Time: 9:15 p.m.
Wind direction: west
Wind velocity: 2 m.p.h.
Temperature: 75° F.
Dilution (oz. BAYGON/oz. $SiCl_4$): 64/64

persed from the vehicle traveling in an east-west direction so that the fog would flow over the cartons toward the north in tests 1 and 2 and toward the south in test 3. The data obtained from these tests are shown in Table 1. It should be noted that the results obtained in test 1 were most favorable because the wind velocity of 2 mph and the wind direction were such that the cartons were most uniformly treated. In test 3 the wind direction was favorable but the wind velocity of 12 mph caused the fog to move too fast and the dropout was not even over the treated area.

The purpose of the test in which larvae were used was twofold: (1) to determine the larviciding efficiency of the chemical fog method; and (2) to determine the effective swath under varying conditions of application. The conditions were most desirable for test 1 but even in this test they were not optimum. However, the conditions under which commercial applications are made are seldom optimum and therefore each of these tests is representative of the variation which can occur during a commercial application. In these tests the effective swath width appeared to be between 300 and 600 ft. Some control was achieved in cartons 1,200 ft. from the vehicle. The authors believe that the results of these swath tests may not necessarily be representative of the control which could be obtained when trees and shrubs are present to create barriers to dispersion, in which case a narrower swath might be expected.

The tests on adults were conducted at Mill Lake near Gobles, Michigan. The predominant species in this area was *Aedes stimulans* (Walker). The plots used had a dense cover of trees and shrubs so that the results reflect what can be done under difficult conditions of coverage. For these tests, stations were chosen throughout the plots and landing counts were made prior to and at intervals after the application. The figures given are an average of the number of mosquitoes landing on one of two persons for a period of one minute. In each case the stations were located from 100 to 600 feet at right angles from the line of travel by the fogging vehicle. Counts were made at five stations in an untreated check area at the same time counts were made in the treated area. The population in the untreated area remained constant throughout the period during which data were collected. The results obtained from this test are shown in Table 2. The control obtained from this treatment was most impressive even though the physical barriers created by trees and shrubs within the plots were extremely adverse to good penetration.

From the results obtained in this series of tests the authors concluded that BAYTEX and BAYGON used in a chemical fog gave excellent control of mosquito adults and larvae and are worthy of further evaluation.

Literature Cited

STOKES, G. M. 1967. A preliminary report on a potential new mosquito control weapon. Proceed. 35th Annual Conference of the California Mosquito Control Association, Inc. 35:122.