AERIAL APPLICATION OF PROPOXUR FOR ADULT MOSQUITO CONTROL[1]

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ABSTRACT. Propoxur 1 MOS was diluted with No. 2 fuel oil and applied by air for adult mosquito control (mostly *Aedes vexans* and *A. sollicitans*). Applications of 0.5 and 1 oz AI per acre were applied in a volume of 32, 24 and 12 fluid ounces per acre by adjustment of the dilution ratio or by varying the swath width.

A greater initial mosquito reduction was recorded at 0.5 oz AI per acre applied over an open area than at 1 oz AI per acre applied over areas with dense foliage. Control for the low rate ranged from 88% at 1 hr post-treatment to 98% at 24 hr post-treatment compared with 40% at 1 hr post-treatment and 91% at 24 hr for the high rate.

The volume applied had no effect on the results.

Propoxur is now sold as a 70% wettable powder for mosquito control. It can be mixed with either fuel oil or water and applied by air at the rate of 4 oz of the 70 W.P., usually in a volume of 2 to 4 quarts per acre. Some applicators dislike the mixing of wettable powders, especially with oil, and have experienced difficulties such as plugged nozzles and settling out. Therefore, we evaluated a new formulation of propoxur that contained 1 lb of propoxur per gal in a miscible oil solution (MOS). The results are reported herein.

MATERIALS AND METHODS

Propoxur (1 lb MOS) was applied using a Cessna 182 Skyplane equipped with an 800 lb capacity Sorenson spray unit. All applications were made at 40 lb psi using 8 nozzles equipped with number D-8 orifices and No. 45 disc that delivered 1 gal per min. The nozzles were positioned downward. Applications were made at a ground speed of 100 miles per hour from an altitude of 100 ft.

Counts were made before and at selected intervals after treatments were applied. To accomplish this, two persons stood facing each other and counted the mosquitoes on or in the immediate vicinity of the opposite person.

TEST 1. Propoxur 1 lb MOS was diluted 1:2 with No. 2 diesel fuel and applied in 200-ft swaths to obtain 1 oz AI in a total volume of 32 fluid oz per acre. Application was made at 5:40 p.m. on September 18 with a temperature of 78° F, a wind speed of 4 mph and clear skies. The temperature varied from 70 to 80° F, with no appreciable change in wind speed during the counts.

The test site was approximately 200 acres of densely wooded swampy area with adjacent open fields on one side and a small rural housing development on the other. Counts were made for a 2-min period at 15 locations in the test area. Mosquito species found in these areas were *Psorophora ciliata* (Fabricius), *P. howardii* Coquillett, *P. ferox* (Humboldt), and *Aedes vexans* (Meigen) with the last species being predominant.

TEST 2. Propoxur 1 MOS was diluted 1:3 with No. 2 diesel fuel and applied in 150-ft swaths to obtain 1 oz AI per acre in 24 fluid oz. Application was made at 4:00 p.m. on September 19 over ca. 50 acres of a densely wooded area with a 4-acre open area within the center. The wind speed was ca. 2 mph with the temperature at 80° F and a clear sky. The temperature ranged from 72 to 82° F dur-

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ing the test. Owing to a heavy population of *Aedes sollicitans* (Walker) counts were made for 30 seconds in 10 locations in the test area.

TEST 3. Using the same mixture as in Test 2, a 0.5 oz AI in a total volume of 12 fluid oz per acre was applied over a 225-acre open grass area by flying 300 ft swaths. This application was made within the same hour as was Test 2. Mosquito counts were done as in Test 2.

RESULTS AND DISCUSSIONS

At 1 oz AI per acre (Test 1, Table 1) control was 40% at 1 hour post-treatment and increased to 91% at 24 hours and 94% at 48 hours. This test site was not checked for mosquitoes during the day, owing to the type of mosquitoes involved. One oz AI per acre (Test 2, Table 1) showed much the same results at 1 hour post-treatment as did Test 1, i.e., 37% vs. 40% reduction. However, in Test 2, a 2-hour, 3-hour (not shown in Table 2) and a 16-hour post-treatment control increased to 92, 96 and 97%, respectively. At 24 hours, control was still 99% but decreased to 80% at 40 hours after treatment. The decrease was attributed to drifting of mosquito populations from adjacent untreated wooded areas. The mosquito found in this test site was *Aedes sollicitans* which is noted for its migratory habits. Because of a more dense population of this species than those found in Test 1 and due to the fact that this species can be disturbed almost any time of the day, we were able to obtain more counts than in Test 1. Mosquito activity was apparent in untreated adjacent areas at the times all counts were made.

Because the percentage control in Test 2 was based on a 7-hour pretreatment count which ranged from 10 to 25 adults per min., it is possible that control was greater than that shown by the data. This speculation is based on research in this same test area in prior years (Knapp and Roberts, 1965; Knapp and Pass, 1966a, 1966b; Knapp and Gayle, 1967; Knapp, 1967; Knapp and Rogers, 1968 and Knapp, 1968) in which adult mosquito counts in late afternoon to early evening ranged from 60 to 100 in 30-second periods. Results reported here in Test 2 are based on lower counts which are typical during early morning hours.

At the 0.5 oz AI per acre, applied over an open area (Test 3, Table 1), mosquito reduction was more dramatic at 1 hour (88%) but decreased to 73% at 2 hours. Sixteen hours post-treatment, virtually 100% control was achieved. By 24 hours the control decreased to 96% and at 40 hours to 89%. This was attributed to the small area treated. Although 225 acres were sprayed, the total swath was only 900 ft. Therefore, the reinfestation within this area within 24 to 40 hours was expected.

No problems occurred in application of the propoxur, and it mixed readily with the number 2 fuel oil used as the carrier.

Table 1. Effectiveness of aerial application of propoxur against adult mosquitoes.

Treatment			Landing Count/min	Percent Reduction				
				Hours After Treatment				
oz AI/acre	Fluid oz/acre	Test No.[a]	0	1	2	16	24	48
1	16	1	9	40	..	..	91	94
1	24	2	20	37	92	97	97	80[b]
0.5	16	3	12	88	73	99+	96	89[b]

[a] 1=open area adjacent to woods and within light to heavy wooded areas.
2=open area surrounded by heavy wooded area.
3=open area.
[b] 40-hour count.

The different volume applied to achieve the dosage required appeared to have no effect on the results.

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1272 9

A PRELIMINARY STUDY ON INDUCING RECIPROCAL TRANSLOCATIONS AND OTHER CHROMOSOMAL ANOMALIES IN *CULEX TARSALIS*

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ABSTRACT. Following radiation treatment with approximately 2400 r., young *C. tarsalis* male adults fathered stocks which produced large numbers of inviable embryos over 15 generations. Cytological examinations of the primary spermatocytes of viable offspring indicated that in some cases this reduction in egg hatch was due to reciprocal translocations or other inherited chromosomal aberrations. This preliminary investigation suggests that inherited chromosomal anomalies, with possible application in control programs, can be induced and successfully maintained in this species.

Introduction. Following the suggestions of Serebrovskii (1940) that chromosomal interchanges causing semi-sterility could theoretically serve as a control system for obnoxious insects, chromosomal interchanges have been successfully induced in several mosquito species in the last decade: *Aedes aegypti* (Asman 1966); *Culex pipiens* (Laven 1969); *Culex tritaeniorhynchus* (Sakai et al. 1971); *Anopheles albimanus* (Rabbani and Kitzmiller 1972). The growing interest in this phenomenon and the various roles these aberrations as well as other genetic systems might play in integrated control programs is well documented in recent reviews by Pal and Whitten (1974) and Whitten and Foster (1975).

In light of the importance of *Culex tarsalis* as a vector of western equine encephalomyelitis virus, and the need to control this species to tolerable levels, genetic mechanisms leading to autocidal control are being investigated. This preliminary study describes the successful induction of reciprocal translocations as well as other chromosomal anomalies that can function as heritable control mechanisms contributing to zygote lethality in *C. tarsalis*.

Translocation heterozygotes result when 2 non-homologous chromosomes exchange genetic material after breakage—either

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