CONTROL OF *AEDES TAENIORHYNCHUS* AT CRESCENT BEACH, FLORIDA, WITH AEROSOLS OF PROPOXUR (BAYGON® MOS) AND NALED (DIBROM®$_{14}$)[1]

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ABSTRACT. Field trials with ultralow volume ground aerosols against native infestations of the black salt-marsh mosquito, *Aedes taeniorhynchus* (Wiedemann), showed that propoxur (Baygon® MOS) (*o*-isopropoxyphenyl methylcarbamate) was about equal to a naled standard (10% Dibrom®$_{14}$ in heavy aromatic naphtha) (1,2-dibromo-2,2-dichloroethyl dimethyl phosphate). The percentage control of the native mosquito population determined on the basis of human landing counts was about equal to the mortality of caged mosquitoes of the same species.

Alternate adulticides are needed to control *Aedes taeniorhynchus* (Wiedemann) in Florida that are resistant to malathion (diethyl mercaptosuccinate *S*-ester with *0,0*-dimethyl phosphorodithioate) (Seawright and Mount 1975). Previous laboratory wind tunnel tests by Mount et al. (1974) indicated that both naled (1,2-dibromo-2,2-dichloroethyl dimethyl phosphate) and propoxur (*o*-isopropoxyphenyl methylcarbamate) were equally effective against malathion-susceptible and -resistant strains of species of mosquitoes. Naled is currently registered by EPA for control of adult mosquitoes as 10% Dibrom®$_{14}$ diluted in heavy aromatic naphtha (HAN). This formulation of naled was tested against native infestations of malathion-resistant *Ae. taeniorhynchus* in the Florida Keys (Mount and Pierce 1974) and was compared with propoxur in tests at Crescent Beach, Florida. At the present time, propoxur is not registered for ultralow volume (ULV) aerosol use against adult mosquitoes. Also, aerosol tests of a Baygon® MOS (Mosquito Oil Spray) formulation of propoxur against caged adult female *Ae. taeniorhynchus* and *Anopheles quadrimaculatus* Say have been reported by Mount et al. (1975a).

During August and September of 1975 we made additional tests of aerosols of undiluted Baygon MOS and 10% Dibrom$_{14}$ in HAN against native infestations and laboratory-reared caged specimens of *Ae. taeniorhynchus* at Crescent Beach. Our objectives were to determine the effects of propoxur and naled aerosols against *Ae. taeniorhynchus* in a residential area on the coast of Florida and to compare the control of the native population with the mortality of caged adult females of the same species.

METHODS AND MATERIALS. The test site was the old residential section of Crescent Beach between the Intracoastal Waterway and Highway AIA. This area was chosen because it is representative of many residential areas along coastal Florida where aerosols are used as a supplement to source reduction and larviciding for control of salt-marsh mosquitoes. This section of Crescent Beach consists of ca. 50 acres that is normally treated with adulticides by the St. Johns Mosquito Control District.

The aerosols were applied by moving a truck-mounted aerosol generator over a network of streets and private roads that

[1] This paper reports the results of research only. Mention of a pesticide in this paper does not constitute a recommendation for use by the USDA nor does it imply registration under FIFRA as amended. Also mention of a commercial or proprietary product in this paper does not constitute an endorsement of this product by the USDA.

made up a total of ca. 2 miles. The application time was ca. 25 min, when the truck speed was 5 mph. This low truck speed was used because the private roads in the test area were very narrow and contained several sharp curves. Complete coverage was difficult because of erratic street spacings, shifting winds, and dense vegetation in some portions of the area.

A Leco® HD aerosol generator was used to disperse the adulticide formulations. The instrument panel for the generator was mounted in the cab of the dispersal truck so that liquid flow rate, liquid temperature, and nozzle air pressure could be monitored during application. The flowmeter was calibrated just before each application so the formulations could be applied at ca. the same temperature. Furthermore, the volume of each formulation was measured before and after each application to determine the actual amount applied. Nozzle air pressures used for Baygon MOS and 10% $Dibrom_{14}$ in HAN were 4 and 1.5 psi, respectively, since Mount and Pierce (1972) and Mount et al. (1975b) determined that the droplet sizes were 14 and 15 μm volume median diameter when the materials were atomized at these pressures.

The native infestations of salt-marsh mosquitoes were estimated by making landing counts on humans at 12 stations immediately before and 45 min after each treatment. These counting stations were selected on the basis of favorable mosquito habitat and were fairly well-distributed throughout the test area. Four additional stations were established in an untreated area just west of the Intracoastal Waterway and ca. 1.5 miles from Crescent Beach; counts were made therefore to determine any variations in density of salt-marsh mosquitoes due to natural causes. Also, adult female *Ae. taeniorhynchus*, 3–5 days old, from our OP-susceptible laboratory colony were placed in cages (25/cage) and hung 2–4 ft above the ground on shrubs and trees (which gave them some protection from the spray) at each of the counting stations. The cages were put in position just before each application and removed 45 min posttreatment. Before and after the exposure, the caged mosquitoes were protected in insulated chests containing moist cotton and canned ice, and after each test, they were returned to Gainesville and held for 24-hour mortality observations. Cages of mosquitoes placed at the counting stations in the untreated area were handled in exactly the same manner.

RESULTS AND DISCUSSION. The pretreatment counts showed a mean number of mosquitoes per plot of 74, indicating a relatively light density. Application data and test results are presented in Table 1. Percentage control of the native mosquito population was adjusted for variations in

Table 1. Efficacy of ground ULV aerosols against *Aedes taeniorhynchus* at Crescent Beach, Florida, 1975. Aerosols applied at 5 mph with a Leco HD generator operated at 4 psi for propoxur (Baygon MOS) and 1.5 psi for naled (10% $Dibrom_{14}$ in HAN).

Flow rate (fl oz/min)	Dose (lb AI/acre)		No. of tests	Percentage control[a] of native population	Percentage mortality of caged mosquitoes
	Assumed (300 ft swath)	Actual			
		Baygon MOS (1 lb AI/gal)			
4.75	0.012	0.02	3	56	59
9.5	.024	.038	2	72	70
		10% $Dibrom_{14}$ in HAN (1.4 lb AI/gal)			
6	.02	.033	3	85	65

[a] Percentage control $= 100 - \left(\frac{\%\text{ of pretreatment in treated area}}{\%\text{ of pretreatment in untreated area}} \times 100\right)$.

density in the untreated area, which had a mean increase of 21%. The percentage mortalities of the caged mosquitoes were not adjusted since untreated caged mosquitoes had a mean mortality of only 2%.

The 4.75 fl oz/min flowrate of Baygon MOS at 5 mph dispersal speed was inadequate. The higher rate of Baygon and the treatment with 10% Dibrom$_{14}$ in HAN gave relatively low percentage control and percentage mortality (65–85%, respectively). However, these rates provided complete control and mortality at many count stations: The mean was low because of poor coverage at several stations attributable to very dense vegetation and/or shifts in the wind direction during application.

Overall, there was close agreement between percentage control of the native population of *Ae. taeniorhynchus* as determined by landing counts and percentage mortality of caged adult females of the same species (Table 1). However, the correspondence was closer with Baygon MOS than with Dibrom$_{14}$. We do not have a logical explanation for this difference and assume that it is caused by experimental error. Since Mount et al. (1974) showed that both propoxur and naled provided rapid knockdown of *Ae. taeniorhynchus* in laboratory aerosol tests, knockdown rate would not explain the 20% difference with Dibrom$_{14}$.

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