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BIOLOGICAL EVALUATION OF THE C-47 AERIAL SPRAY SYSTEM FOR LARVAL MOSQUITO CONTROL

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During August and September 1961, studies were conducted at Eglin Air Force Base and Destin, Florida, to evaluate the effectiveness of aerially dispersed insecticides (DDT) against DDT-susceptible anopheline and culicine mosquito larvae. A C-47 aircraft equipped with underwing discharge booms, as described by Husman (1949), was used.

Two areas of twenty acres each were selected as the test plots. Test plot number 1 was in a coastal freshwater swamp with high, dense tree cover accompanied by heavy growths of aquatic vegetation. Test plot number 2 was a coastal piney wood habitat, i.e., low tree cover accompanied by dense growths of brush and aquatic grasses. One area, approximate ¼ acre, in this plot was void of tree cov but was partially covered with growths aquatic grasses.

Pre-spray mosquito density surveys we conducted in both test plots four hou preceding the insecticide application (T bles 1 and 2). Larvae in the 1st, 2nd, 3r

TABLE 1.—Pre- and post-spray larval coun test area No. 1

Station No.	Larval rates (pre-spray) (Total/10 dips)	Larval rates (post-spray) (Total/10 dips	
		14 hrs.	20 h
1	51	62	67
2	37	35	36
3	15	14	15
4	12	11	12
5	7	7	6
6	10	12	14
7	6	6	6

and 4th instar were present. Twenty-s oil-sensitive cards were placed througho both test plots immediately preceding t insecticide application in order that t atomization and actual quantity of t insecticide solution reaching the grou

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surface could be estimated (Davis and Elliott, 1953). Seven percent DDT in No. 2 fuel oil was applied between 1820 and 1845 hours on 31 August from an altitude of 150 feet at 140 mph. Using a single swath width with 44-T jet nozzles, .388 gallon or .228 pound of DDT per acre was applied. Wind velocity at the time of the application was above the maximum prescribed for effective aerial dispersal operations. At test plot number 1 the wind velocity varied between 10–12 mph. while the variance was between 15–18 mph. at test plot number 2. Post-spray mosquito density surveys were conducted at 14- and 20-hour intervals following the insecticidal application (Table 2).

TABLE 2.—Pre- and post-spray larval counts-test area No. 2

tation No.	Larval rates (pre-spray) (Total/10 dips)	Larval rates (post-spray) (Total/10 dips)	
		14 hrs.	20 hrs.
1	350	350	352
2	240	240	234
3	10	1	0
4	3	2*	3*
5	25	24	26
6	27	30	25
7	2	1*	1*

* Pupae.

RESULTS. In breeding areas where dense tree cover, accompanied by either growths of underbrush or aquatic vegetation, was present aerial dispersal of DDT at .228 pound per acre produced no reduction in the larval mosquito population. In breeding areas void of tree cover but partially covered by aquatic grasses, 100 percent control was obtained. In areas where dense tree cover, accompanied by either growths of underbrush or aquatic vegetation, was present oil-sensitive cards showed the maximum ground deposition to be .05 gallon per acre. In areas void of tree cover partially covered with aquatic grasses the ground deposition was .1 gallon per acre. Measurement of spray particle sizes deposited on oil-sensitive cards revealed that only 13 percent of the total volume of insecticide solution dispersed was in the aerosol range. Apparently, therefore only these small particles were, consequently, capable of penetrating dense tree cover accompanied by growths of underbrush or aquatic vegetation.

CONCLUSIONS. Results of this evaluation indicate that the aerial application of insecticides using the C-47 spray system, when applied under the conditions described in this paper, was ineffective for the control of mosquito larvae in areas where dense tree cover accompanied by growths of underbrush or aquatic vegetation existed. In breeding areas partially covered by aquatic grasses only, the aerial application of insecticides by C-47 aircraft for the control of mosquito larvae appeared to be highly effective.

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