

compared favorably with all other containers in the percentages positive and the population numbers.

It must be recognized, however, that, in addition to the factors above, the attractiveness of a given container is also influenced by its position with regard to shade, protection from the wind and ability to collect and retain water.

**SUMMARY.** In field studies at Meridian, Mississippi, in 1967, water-holding containers were exposed in pairs in close proximity to determine the effects of color and capacity of the container and temperature and organic content of the water as attractant factors for ovipositing *Aedes aegypti*. Various sizes of containers were included; and both containers of a pair were of the same material—glass, metal, rubber, or plastic. Rubber tires were the containers most preferred and clear glass containers were the least preferred. Dark colors and a larger capacity were positively correlated with attractivity. The addition of organic matter increased

the attractivity of all types of containers. The ovitraps showed equal or higher attractivity than other types of containers except for the rubber tires.

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## OVIPOSITION TRAPS AND POPULATION SAMPLING FOR THE DISTRIBUTION OF *Aedes aegypti* (L.)<sup>1</sup>

G. D. TANNER

### INTRODUCTION

The oviposition trap has been used effectively to detect infestations of the yellow fever mosquito, *Aedes aegypti*, by providing an attractive oviposition site for gravid females (Fay and Eliason, 1966; Hoffman and Killingsworth, 1967). The trap consists of a black, tapered mason jar supplied with an inch of tap water and an absorbent

pressed-wood paddle clipped to the inside of the jar in a perpendicular position. Paddles from traps in the field are collected weekly and examined for *Ae. aegypti* eggs, which, if the species is present, the females will deposit on the rough sides and edges of the paddles.

During 1967, the *Aedes aegypti* Eradication Program operated 30,875 ovitraps in 24 southern cities to determine the distribution and densities of *Ae. aegypti*. Of these ovitraps, 306 were placed in Waycross, Georgia, a city in which no insecticidal treatment for *Ae. aegypti* had been applied. The traps in Waycross were de-

<sup>1</sup> From *Aedes aegypti* Eradication Program, Environmental Control Administration, Consumer Protection and Environmental Health Service, U. S. Department of Health, Education, and Welfare, Atlanta, Georgia 30333.

ployed on 500- and 600-foot grid patterns in four zones in an area containing 6700 premises, 5,737 of them no more than 400 feet from a trap, i.e., within the normal flight range of *Ae. aegypti* (Christophers, 1960). Thus the ratio of traps to premises in Waycross was 1 to 19 (see Table 1).

curve (percent of traps positive for *Ae. aegypti*) for the area of Waycross under study. Because weeks 26-40 (June 26-October 7) represented the period of maximum ovipositional activity, the data from that 15-week period were used to make the analysis herein reported. During this

TABLE 1.—Ovitraps and premises data—Waycross, Georgia, 1967.

Zone No.	No. Traps	Grid Size (feet)	Total Premises In Study Area	No. Premises Sampled	No. Premises Per Trap
3	99	500	1494	1419	14.3
5	70	500	1362	1337	19.1
6	56	600	2408	1548	27.6
7	81	600	1436	1433	17.6
Totals	306		6700	5737	18.7

The traps remained in place for 37 weeks (April to December) and were serviced weekly.

In the study reported here, the data collected in Waycross during 1967 were analyzed to determine if a relatively small number of traps will provide sufficient information with which to assess distribution of *Ae. aegypti* within an area.

### METHODS AND RESULTS

Figure 1 shows the 1967 oviposition

period, the weekly totals of the traps positive ranged from 43 to 72 percent and averaged 57 percent. The locations of traps that were positive ten or more times are shown in Figure 2. Ovitraps in all study zones indicated uniformly heavy infestations of *Ae. aegypti*. Ninety-seven percent of the traps were positive at least once, and 5 percent were positive in all 15 weeks.

**SAMPLE TRAP LINES.** Using a map showing the 1967 trap locations, several lines were drawn connecting traps along the

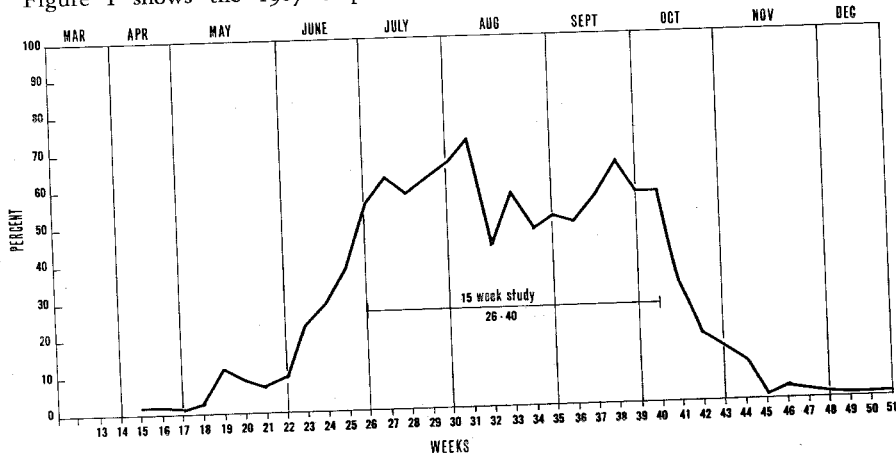
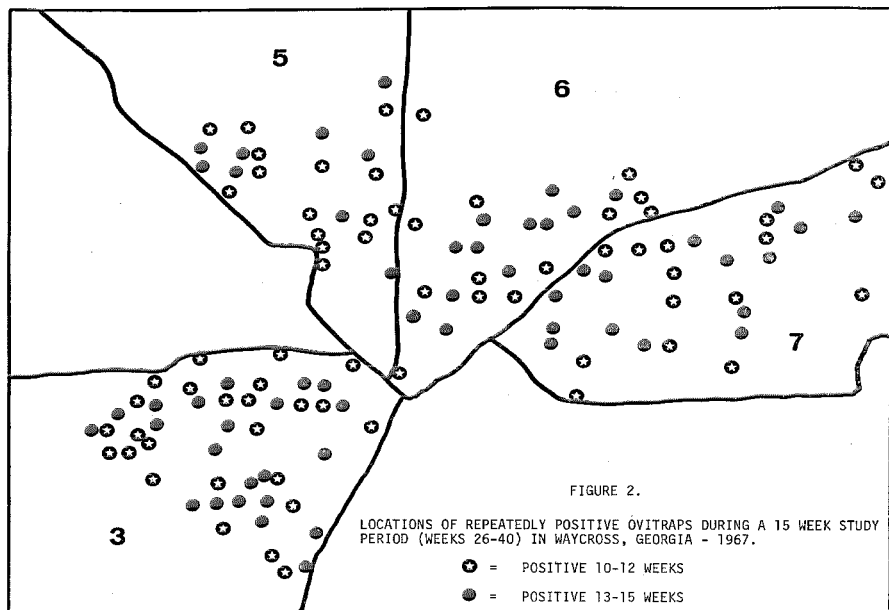


FIG. 1.—Weekly percent ovitraps positive in Waycross, Georgia—1967.



major roadways throughout the city. Seventy-six trap sites were chosen in this manner at intervals no greater than 600 feet apart. This represented a ratio of one ovitraps for every 75 premises in the study area. Ovitrap data for these sites in 1967 were extracted, and a tabulation was made

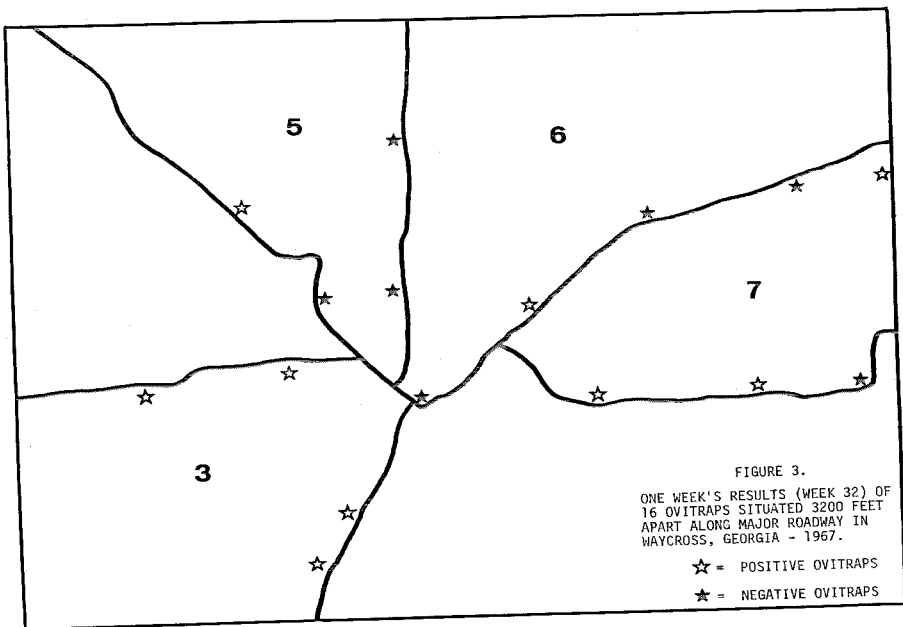
of the positives in a 5-week sample. Results showed that 89 percent of the traps were positive at least once, and 12 percent were positive in all 5 weeks.

Since such favorable results were obtained for a 5-week sample, a 1-week sample (week 32) was extracted using various

TABLE 2.—Results of selected trap lines along several major roads in Waycross, Georgia—1967.

Week No.	Distance Between Traps (feet)	Trap to Premises Ratio	No. Traps	No. Positive	% Positive
32	600	1:75	76	32	42
32	1200 *	1:147	39	19	49
		1:155	37	14	38
	1600	1:205	28	12	43
32	to *	1:239	24	10	42
	2400	1:261	22	10	45
		1:359	16	9	56
32	3200 *	1:382	15	8	53
		1:337	17	8	47
Average Percent Positive =					47

\* Each ratio for these distances represents a different combination of traps.



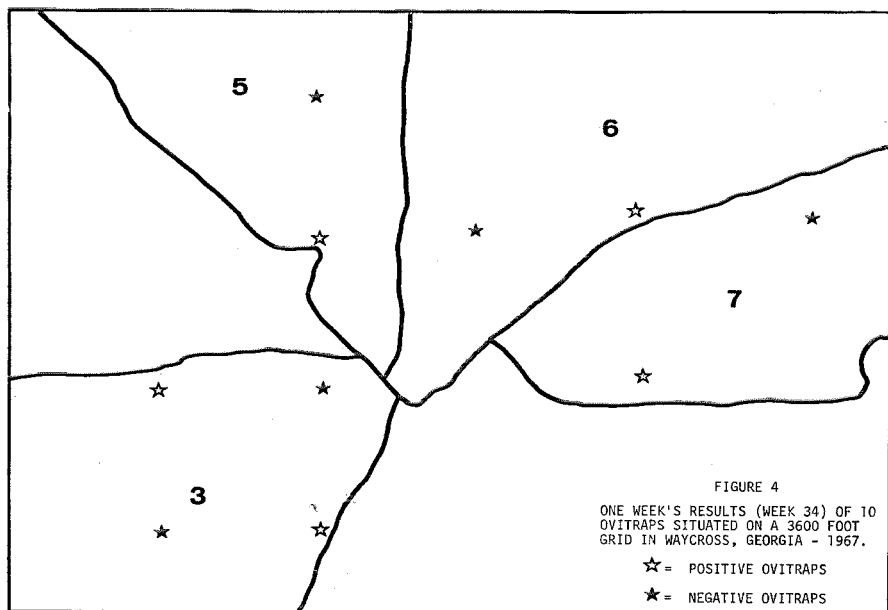
combinations of the selected trap sites. The resulting distances between traps, in feet, were 600, 1200, 1600-2400, and 3200. Week 32 was chosen for this sample because it was the week of the study period with the fewest positives (see Figure 1).

The results of each combination of traps may be seen in Table 2. The rate of traps positive ranged from 38 to 56 percent and averaged 47 percent for all combinations and spacings. Figure 3 shows the distribution of positives for one combination

TABLE 3.—Results of selected trap grids in Waycross, Georgia—1967

Week No.	Grid Size (feet)	Trap to Premises Ratio	No. Traps	No. Positive	% Positive
32	1200	1:65	88	43	49
32	2400 *	1:229	25	10	40
		1:273	21	12	57
32	3600 *	1:637	9	6	67
		1:574	10	5	50
		1:574	10	4	40
		Average Percent Positive =			51
34	3600 *	1:637	9	4	44
		1:574	10	5	50
		1:574	10	5	50
Average Percent Positive =			48		

\* Each ratio for these grid sizes represents a different combination of traps.



of traps at the widest spacing (3200 feet).

**SAMPLE TRAP GRIDS.** A map of Waycross was ruled off on a 1200-foot grid, and the 1967 trap sites nearest the intersecting lines were selected as sample traps. This selection provided 88 traps at a ratio of one trap per 65 premises. When the positives were tabulated for a 5-week sample (weeks 31-35), results showed that 92 percent were positive at least once, and 17 percent were positive in all 5 weeks.

Various combinations of trap sites were selected for a 1-week sample (week 32). The resulting grids were on 1200-, 2400-, and 3600-foot patterns. Table 3 shows that the traps positive ranged from 40 to 67 percent and averaged 51 percent for all combinations.

Another 1-week sample (week 34) was extracted from the collection data, giving results similar to week 32 (see Table 3). Figure 4 shows the distribution of positives for one combination of traps (week 34-3600-foot grid).

**RANDOM SAMPLE.** Ten traps were chosen at random throughout the study area—a ratio of 1 trap to 574 premises. Tabulation of collection data for these traps for a 3-week period revealed that 80 percent were positive in all three weeks.

## SUMMARY

The 1967 ovitrapp results from Waycross, Georgia, were analyzed to determine if the distribution of a generalized infestation of *Ae. aegypti* could be detected by operating a small number of ovitraps for a short period of time. Trap collection data were tabulated for combinations of trap sites selected from a 1967 trap location map.

Tabulation of collection data from as many as 88 trap sites and from as few as 9 trap sites resulted in 38 to 67 percent or an average of 48 percent traps positive in only one week. Every combination of trap sites gave an accurate picture of *Ae. ae-*

*gypti* distribution throughout the study area.

Larval surveys often have proved misleading because of discontinuous sampling and the varying skill among inspectors. Ovitrap in Waycross, Georgia, provided a continuous (weekly) monitoring of the existing *Ae. aegypti* population largely independent of entomological skills.

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## GENETICALLY MARKED *Aedes aegypti* IN STUDIES OF FIELD POPULATIONS

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Through the use of sterilized males of certain dipteran species, successful eradication of the target species over extensive areas has been obtained (Knipling, 1960; Steiner *et al.*, 1965). Attempts to apply the method to mosquitoes have not met with success (Weidhaas *et al.*, 1962; Morlan *et al.*, 1962). The success of an eradication campaign by this means depends upon several factors, such as: (a) the dispersion pattern of the released males in seeking out the females; (b) the acceptance of the released males by the females; (c) the normal number of effective matings of each female; (d) the competitiveness of

the released males with the normal males; (e) the timing of the releases and the number of generations per season for the species; and (f) the population levels of the species in the field area.

The present paper describes preliminary trials to obtain information on the first two factors, (a) and (b), with respect to *Aedes aegypti* at Meridian, Mississippi, during the fall of 1967 through the release of genetically marked, nonsterile males reared in an insectary.

**MARKER STRAIN.** To obtain stock for genetic marking, eggs were collected from Meridian, Mississippi, by means of ovitraps during June 1967. After removal from the ovitraps, the eggs were conditioned on the paddles for 48 hours and then held in a refrigerator until sufficient numbers had accumulated. The eggs were then shipped to the University of Notre Dame for establishment of a laboratory strain, designated MERIDIAN. In addition, adults from field-collected eggs were crossed to a synthetic laboratory strain,

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