

## OVIPOSITIONAL RESPONSE OF *Aedes triseriatus* FEMALES TO HORIZONTALLY AND VERTICALLY OPEN OVITRAPS IN SOUTHERN ILLINOIS

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**ABSTRACT.** *Aedes triseriatus* oviposition in standard, horizontally open (open top) ovitraps was compared with that in vertically open (open-sided) ovitraps during 1989 in a deciduous woodland in southern Illinois. This comparison was to determine whether female oviposition preference changed as a result of seasonal photoperiod changes. Results show that *Ae. triseriatus* females prefer horizontally open ovitraps regardless of whether they are depositing eggs which hatch shortly after deposition or whether the eggs diapause because of shortened late summer/early fall photoperiods.

The standard population monitoring device for the eastern tree hole mosquito, *Aedes triseriatus* (Say), is an open jar or can painted black containing several inches of water and strip of cloth, balsa wood or other substrate which absorbs water and upon which female mosquitoes deposit eggs (Craig 1983). Although providing only a qualitative population measure, ovitraps are used by most state or local agencies in the upper midwestern USA to determine the presence, relative abundance and, in some cases, the LaCrosse virus vector potential of *Ae. triseriatus*.

While ovitraps are used throughout the mosquito season, little work has been done to determine if female *Ae. triseriatus* in the field respond to standard open-top (horizontally open) ovitraps in the same manner during the entire season. Although exposure of midwestern strains of adult female *Ae. triseriatus* to photoperiods shorter than 14 h does not induce diapause in their eggs (Kappus and Venard 1967), it is possible that such photoperiods, which will induce diapause in exposed eggs, may also trigger subtle changes in the oviposition site preference among females. Such photoperiodically induced behavioral changes in oviposition have been reported in the mite, *Bryobia praetiosa*, which lays nondiapausing eggs on the backs of apple tree leaves but lays diapausing eggs on main tree branches (Andrewartha and Birch 1982). Oviposition behavioral changes in *Ae. triseriatus* triggered by photoperiod could alter the interpretation of ovitrap data collected during an entire mosquito season encompassing both longer and shorter photoperiods.

In this study, I attempted to determine whether modified ovitraps with only side openings (vertically open) and providing a more protected environment could be used in monitoring *Ae. triseriatus* activity. An additional goal was

to determine whether vertically open traps might be more attractive than the standard horizontally open traps to females laying eggs which subsequently diapause. Although Wilton (1968) showed that *Ae. triseriatus* females had a strong preference for ovitraps with horizontal openings, his tests were confined to caged laboratory mosquitoes exposed only to long nondiapausing photoperiods.

This study was conducted during 1989 in the Julius J. Knobeloch Woods Nature Preserve in St. Clair County, Illinois. The 40-acre (16-ha) site is dominated by white oaks and hickories on upland sites and red oak, maple, elm and cottonwood in bottoms. Farmland and scattered private residences surround the preserve.

Four sites, roughly 25-50 m off of a nature trail through the preserve, were selected for trap placement. All sites were in upland areas, and sites were at least 100 m apart. At each site a standard *Ae. triseriatus* ovitrap (black, open-top 2.8-liter can containing oak leaf-infusion water and a 7.5-cm wide piece of muslin cloth attached by a paper clip to the rim and extending into the water) was paired with a modified ovitrap. Modified ovitraps were the same as standard traps except that they had black plastic lids and a 9- x 10-cm vertical hole cut in the upper third of the can. Drain holes were punched in all traps about 8 cm up from the bottom. Standard and modified ovitraps were tied to opposite sides of the same tree approximately 1.2 m above ground level.

Traps were checked at 10-day intervals from May 17 through July 16 and at weekly intervals from August 13 through October 1. Muslin strips were replaced when the traps were checked, and traps were rotated among sites twice during each study period. The muslin strips were examined for *Ae. triseriatus* eggs using a 30× dissecting microscope. On several occasions, the cloth strips were submerged in individual cups of tap water infused with blood meal and were held for 3-4 days to induce egg hatch. After this, eggs were again examined to determine percent

<sup>1</sup> The opinions and assertions contained herein are those of the author and are not to be construed as views of the U.S. Department of the Air Force.

hatch. Larvae were reared to the adult stage to verify identification as *Ae. triseriatus*.

Because of individual trap variability, geometric means based on the  $\log^{(x+1)}$  transformation (Snedecor and Cochran 1968) were calculated for standard and modified ovitraps for each collection period (Fig. 1). Variables of trap type and season were analyzed by ANOVA. During the spring/summer period, means for standard ovitraps were consistently higher than for modified traps, and overall differences were significant ( $P = 0.024$ ). Correlation between the mean numbers of eggs deposited in the two types of traps was excellent during the spring/summer period ( $r = 0.94$ ).

There was no indication that females laying diapausing eggs in late summer and early fall shifted oviposition preference toward the more protected environment of the modified ovitraps (Fig. 1). The overall percentage of eggs deposited in the modified traps dropped considerably from the spring/summer period when 3,731 eggs (43%) of a total of 8,758 eggs collected in all traps were deposited in modified traps to 821 eggs (24%) of a total 3,397 eggs collected during the summer/fall period. Geometric means differed significantly ( $P = 0.004$ ) between the 2 types of traps for the overall summer/fall period. Correlation between standard and modified traps during the summer/fall period was poor ( $r = 0.51$ ). Significantly fewer eggs ( $P = 0.0001$ ) were deposited in both types of traps during the summer/fall period than during the spring/summer period.

Twenty-eight percent of eggs deposited June 17–24 in standard ovitraps hatched, while 14% of those deposited in modified ovitraps hatched on an initial flooding with blood meal-infused water. Of the eggs deposited August 13–20, only 1% hatched from both standard and modified ovitraps. Only one larva developed from 756 eggs collected in both types of traps September 3–10. This was the last recorded egg hatch of the season.

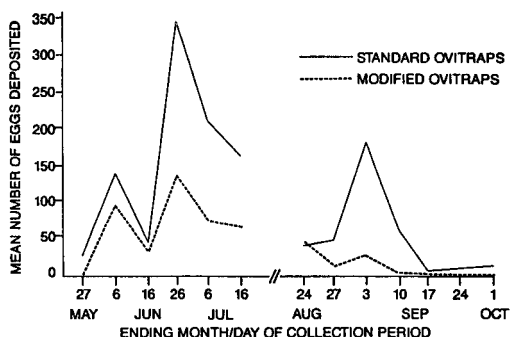


Fig. 1. Geometric number of *Aedes triseriatus* eggs deposited in ovitraps for the period ending on the indicated dates.

While Wilton (1968) demonstrated that caged *Ae. triseriatus* females laying nondiapausing eggs preferred ovipositing in containers with horizontal openings, this preference has only been assumed to hold under field conditions when females are exposed to varying photoperiods. This study shows that the preference for horizontal openings (standard ovitraps) is present in field populations of *Ae. triseriatus*; however, a sizable number of eggs are deposited in ovitraps with vertical openings (modified traps) during spring and early summer when the *Ae. triseriatus* population is highest.

In the summer/fall period, when an increasing number of deposited eggs go into photoperiod-induced diapause and when adult populations are decreasing, ovipositing females continue to show a strong preference for ovitraps with horizontal versus vertical openings. Apparently, there is no additional survival value for diapausing eggs deposited in more environmentally protected sites. Any decrease in winter survival of more weather-exposed eggs may be offset by better hatching conditions in the spring resulting from more stem flow and a greater amount of leaf litter in horizontally open breeding sites (Fish 1983).

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