

Towards residential control of *Aedes triseriatus* – results of a larval bioassay field trial of Altosid SR-20 in a La Crosse endemic area



Jaslyn Stamey^{1,4}, Michael Riles², Daniel Killingsworth², Roxanne Connelly³, Mary Nordgulen⁴, and Brian Byrd⁴

[1] Department of Biology, Western Carolina University, [2] Central Life Sciences, [3] Centers for Disease Control and Prevention
[4] Mosquito and Vector-borne Infectious Disease Laboratory, Western Carolina University,

Background and Problem Statement: La Crosse virus (LACV) is an important cause of pediatric arboviral neuroinvasive disease in the United States and is endemic within western North Carolina (WNC). The eastern tree hole mosquito *Aedes triseriatus* (Figure 1a), is the primary LACV vector and abundant in WNC. Two invasive species, *Ae. albopictus* (Figure 1b) and *Ae. japonicus* (Figure 1c) are likely secondary vectors and are also commonly found in WNC. All three species are container-inhabiting species.

Figure 1.

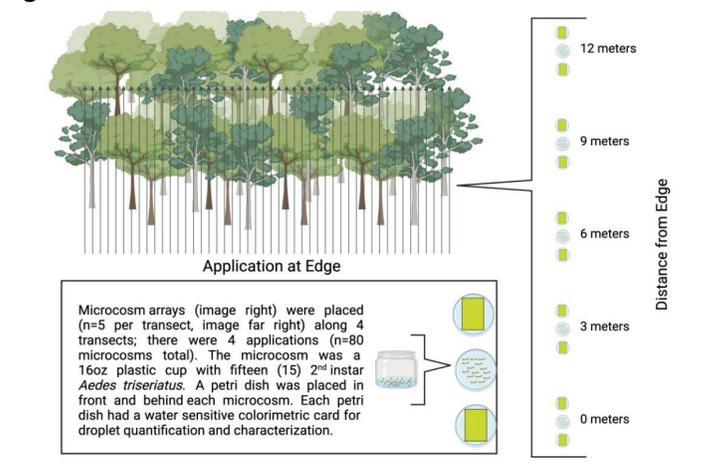


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Entomological and epidemiological evidence suggests that 1) *Aedes triseriatus* exposure may be higher at La Crosse encephalitis case residences (Alexander, Presentation 84, AMCA 2025), 2) Risk of LACV disease persists at a household, often over multiple years, and 3) Edge habitat is a critical interface for both the native (*Ae. triseriatus*) and invasive LACV vectors.

Thus, there is a clear need to develop residential level interventions to reduce La Crosse virus exposure risk. This field study investigated the application of methoprene (Altosid SR-20 liquid larvicide) on second instar *Ae. triseriatus* in and near the edge environment.

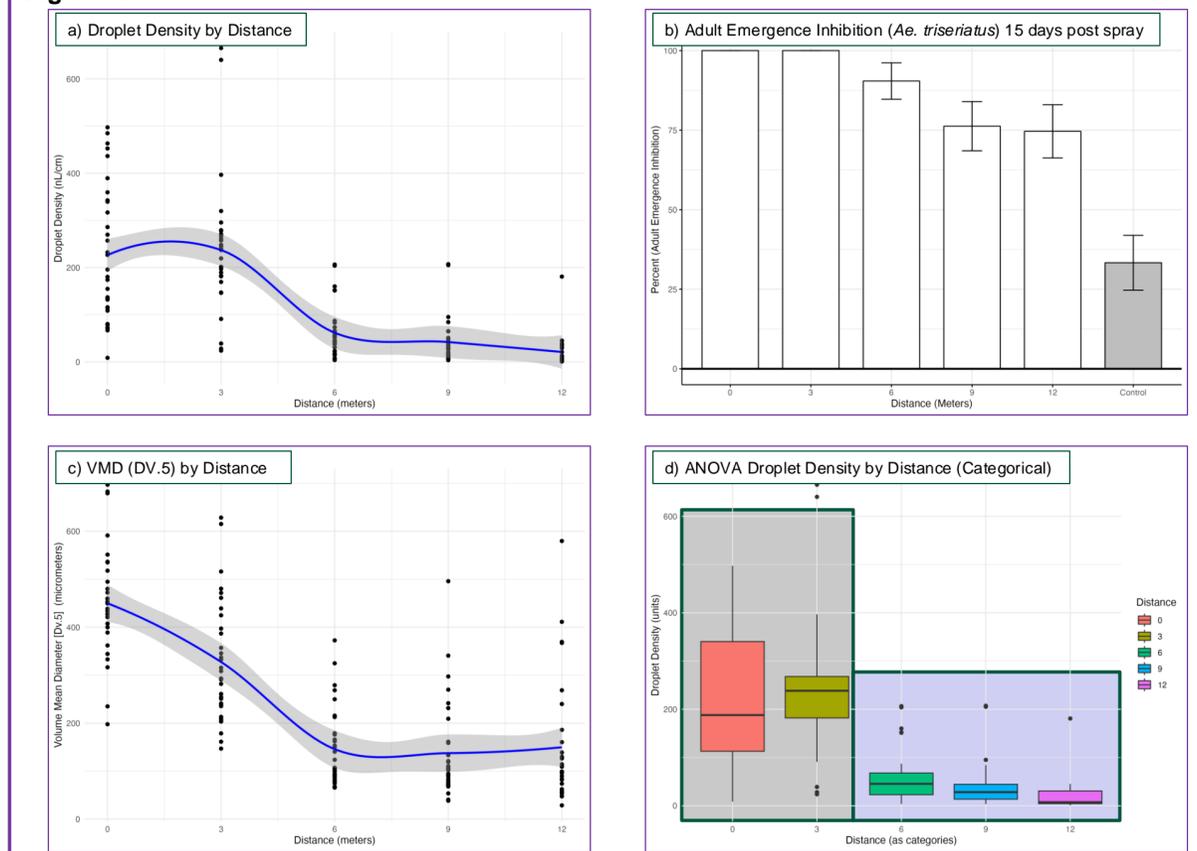
Figure 2.



Field Methods: We applied Altosid SR-20 (1 oz/acre AI, 1 gallon/acre spray rate, 1.5 mph speed, Stihl SR 200) at an edge habitat to measure *Aedes triseriatus* emergence inhibition in larval bioassays. A total of 80 microcosm assays (n=5 per transect, 4 transects, and 4 applications [16 replicates]) were evaluated. TeeJet colorimetric papers were used to characterize product droplets; image analyses were performed with DropVision AG.

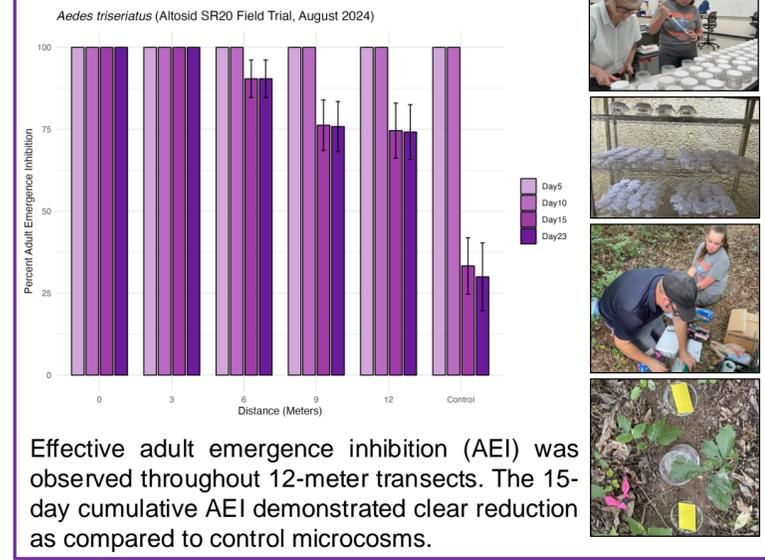
Abstract: Native and invasive *Aedes* mosquitoes (Figure 1) are important vectors of La Crosse virus (LACV) in western NC. Residential level interventions to reduce LACV exposure risk are urgently needed. In this study (Figure 2) we applied Altosid SR-20 liquid larvicide (AI rate: 1 oz/acre; Spray rate: 1 gallon/acre and a walking application speed of 1.5 mph with a Stihl SR 200 backpack blower mister) at an edge habitat to measure penetration, droplet characterization, and percent inhibition of emergence for *Aedes triseriatus* in larval bioassays. Microcosm assays contained fifteen (15) 2nd instar *Ae. triseriatus* (80 total assays). TeeJet spray cards were placed in tandem at each microcosm to confirm product delivery, characterize droplet density (Figure 3a), evaluate adult emergence inhibition (Figure 3b), and determine midpoint (Volume Median Diameter: VMD) droplet sizes (Figure 3c). Droplet densities were compared based on distance from the forest edge (Figure 3d). Effective adult emergence inhibition was observed (Figures 3b and Figure 4). These results suggest Altosid SR-20, delivered with standard industry backpack equipment, can effectively penetrate the forested (edge) environments typical of LACV cases residences up to 12 meters and may be used to control larval *Ae. triseriatus* populations.

Figure 3.



Droplet density decreased over the length of the 12-meter transects. When Day 15 (Cumulative) Adult Emergence Inhibition (AEI) was compared across the transects, there was a significant effect of distance on inhibition ($F(4,75) = 4.698, p < 0.01$). Specifically, 0 vs 9 meters and 0 vs 12 meters were significantly different ($p = 0.034$ and $p = 0.019$, respectively). However, the AEI (~75%) at these distances (9 and 12 m) are biologically meaningful from a control perspective.

Figure 4.



Effective adult emergence inhibition (AEI) was observed throughout 12-meter transects. The 15-day cumulative AEI demonstrated clear reduction as compared to control microcosms.

Implications for Public Health Practice: Evidence-based mosquito control interventions for LACV disease are limited. The results reported here are the first field studies of Altosid SR-20 liquid larvicide (methoprene) targeting *Ae. triseriatus* in a La Crosse virus endemic region. Here we demonstrate 1) effective adult emergence inhibition of the primary LACV vector *Ae. triseriatus* with Altosid SR-20, and 2) successful product penetration of the forest edge (up to 12 meters) with a Stihl SR 200 backpack sprayer. This demonstration study is important as LACV control must account for vertical (transovarial) transmission of the virus. Thus, knockdown of adult populations should be supplemented with effective larval control. The data presented here will be used to guide our next steps (e.g., duplex application of a barrier product with Altosid SR-20) as we develop SOPs for La Crosse virus disease interventions at case residences.

This project was supported, in part, by the Centers for Disease Control (CDC) Cooperative Agreement Number 1U01CK000662: Southeastern Regional Center of Excellence in Vector-Borne Diseases: The Gateway Program. The contents of this poster are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention. M. Riles and D. Killingsworth provided technical support for the field trial (product application). The emergence assays (J. Stamey) and data analyses (J. Stamey and B. Byrd) were conducted at WCU, promoting an independent evaluation of the product's efficacy and performance.

