

***Culex erythrothorax*: Temporal Pattern of Adult Activity and Resistance to Pesticides**

Allen Esterly¹, Dereje Alemayehu¹, Cheryl Sebay², Theresa Shelton², Nayer Zahiri², Eric Haas-Stapleton¹

¹ Alameda County Mosquito Abatement District
23187 Connecticut Street, Hayward, CA 94545; 510.783.7744

² San Mateo County Mosquito and Vector Control District,
1351 Rollins Road, Burlingame, CA 94010; 650.344.8592

Culex erythrothorax Dyar is a West Nile virus (WNV) vector produced in wetland habitats that contain bulrush and cattails. In the absence of effective mosquito control, *Cx. erythrothorax* can be extremely abundant. We quantified the temporal abundance of adult *Cx. erythrothorax* at 3 h intervals in a marsh bordering the San Francisco Bay of California (USA) over 3 days using a CO₂- and light-baited collection bottle rotator trap. Mosquito abundance was highest during the first 3 h after sunset (>5000 mosquitoes per trap night) and declined in a linear fashion during the subsequent 21 h. By comparison, the abundance of *Culex tarsalis* Coq., another important WNV vector species that also exploits wetland habitats, peaked 3 – 6 h after sunset (>80 mosquitoes per trap night) and then declined over the following 18 h. Although the susceptibility of *Cx. tarsalis* to a wide range of insecticides has been well studied, less is known of *Cx. erythrothorax*. Adult *Cx. erythrothorax* were collected using CO₂-baited suction traps and tested for insecticide resistance using the CDC bottle bioassay. Our results showed *Cx. erythrothorax* were more sensitive to permethrin and naled compared to a laboratory-reared insecticide-sensitive strain of *Culex pipiens* (*Cx. pipiens*SEN; LC50 for *Cx. erythrothorax* and *Cx. pipiens*SEN were < 0.8 µg / bottle). Field-collected *Cx. erythrothorax* were also more sensitive to etofenprox than *Cx. pipiens*SEN, however, the quantity of insecticide required to elicit mortality was higher than what was needed for permethrin (LC50 for etofenprox was < 4 µg / bottle). In contrast, *Cx. pipiens*SEN were more sensitive to resmethrin relative to field-collected *Cx. erythrothorax* (LC50 for *Cx. erythrothorax* was < 0.6 µg / bottle). Inclusion of piperonyl butoxide (PBO) in the CDC bottle assay test containing 0.5 µg of permethrin reduced survivorship of *Cx. erythrothorax* by 8%. The results of this study demonstrated that *Cx. erythrothorax* in wetland habitats can be very abundant with peak adult flight activity occurring shortly after sunset. In laboratory trials, this species was highly susceptible to permethrin, resmethrin, naled and etofenprox. Quantifying the pesticide susceptibility of mosquito populations in ecologically sensitive habitats, such as wetlands, may provide the opportunity to establish a regional baseline for insecticide resistance in mosquitoes.