The Effect of Adulticide Application on Mosquito Counts in Orleans Parish, 2021

Carli Harvey, Alex Pavlakis, Dr. Jen Breaux, Dr. Susanne Straif-Bourgeois

Louisiana State University Health Sciences Center School of Public Health sph.lsuhsc.edu

Background

West Nile Virus (WNV) is the most common arboviral disease in Louisiana. Mosquitoes are infected from feeding on a WNV+ bird, then transmit WNV to humans. In 2021, LA reported 22 cases of WNV in humans. Seventeen cases were West Nile Neuroinvasive diseases, and five were West Nile Fever. East Baton Rouge Parish had the most cases for a single parish, and many parishes, including Orleans, had 1 reported case.

The New Orleans Mosquito, Rodent, and Termite Control Board (NOMRTCB) conducts weekly surveillance for arboviruses and high mosquito activity in Orleans Parish. NOMRTCB uses Gravid Traps for counts of *Culex quinquefasciatus,* the local vector for West Nile Virus. The number of mosquitoes and lab results detecting West Nile Virus inform decisions for mosquito abatement, typically applying adulticide, or pesticides that kill adult mosquitos, from a truck. NOMRTCB uses Integrated Pest Management (IPM) to control mosquitoes. IPM is economically and environmentally sensitive and includes setting action thresholds, monitoring and identifying pests, prevention, and control.

Objective

The aim of the study is to determine if mosquito counts before adulticide application are significantly different from mosquito counts after adulticide applications in Orleans Parish 2021.

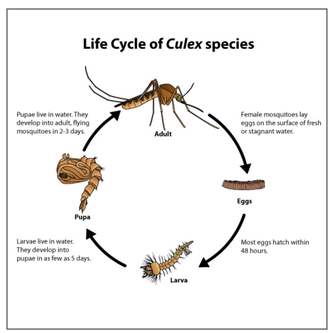
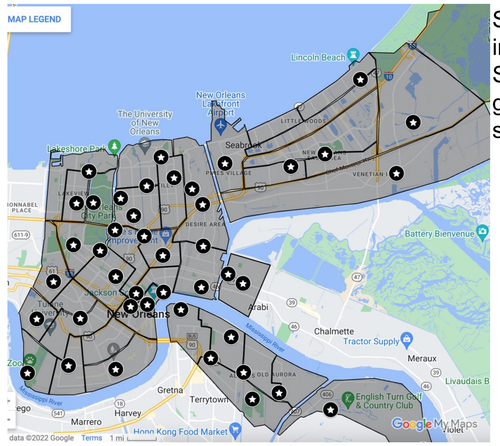


Image of a gravid trap, which is used by NOMTRCB to conduct mosquito surveillance.
This trap is specifically designed to catch gravid, or egg carrying, females.

Map of Orleans Parish Spray Zones and Gravid Trap Locations



Spray zones are outlined in black.
Starred points are the gravid traps for weekly surveillance.

Methods

First, dates and zones of 2021 adulticide application were matched with traps located within the spray zones. The sum of *Culex quinquefasciatus* males, females, and parts collected on the nearest dates before and after adulticide application were recorded. NOMTRCB applied adulticide 134 times in 2021. After removing applications with missing trap counts, due to trap malfunction, poor weather, or Hurricane Ida, n=103. The difference between counts before adulticide application and after adulticide application was calculated and averaged. Then a Wilcoxon Signed Rank test assessed if the counts before and after adulticide application were significantly different.

Results

The 206 traps (103 pairs) had a mean of 190.7 mosquitoes, standard deviation 225. The trap counts ranged from 0 to 1,123 mosquitoes. The average difference between pre-adulticide and post-adulticide traps is 2.42 mosquitos, standard deviation 221.8. The Wilcoxon Signed Rank test has p = .5639, so we fail to reject the null hypothesis. Therefore, for 2021 there is no significant difference between mosquito counts before and after adulticide application.

Discussion

While these results may seem disappointing, they are not entirely surprising. Adulticide application only kills adult mosquitoes that are flying; it does not kill eggs, larvae, or pupae. Integrated Pest Management works to address other avenues to control mosquitoes, like breeding site reduction and controlling mosquito larvae. Applying larvicide and adulticide in tandem is more likely to break the life cycle of mosquitoes.
A limitation is that we did not account for temperature, precipitation, and humidity, all of which affect mosquito populations. Also, insecticide resistance in certain areas of Orleans Parish could limit the effectiveness of adulticide.

Conclusion

- Adulticide application is a practice to reduce WNV transmission.
- In 2021, mosquito counts before spraying adulticide and after spraying adulticide were not significantly different, with an average difference of 2.42 mosquitoes in Orleans Parish.

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Contact Information

Carli Harvey, MPH Candidate
LSU Health Sciences Center School of Public Health
charve@lsuhsc.edu
630-456-5550