Development of analytical tools for the study of Aedes aegypti exposure to common pesticides

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Goals

- Develop a quantitative mass spectrometry-based method to detect common insecticides
- Study levels of insecticides in wild-caught Collier strain *Aedes aegypti*

(CDC, 2018)

Figure 1. *Aedes aeqypti* mosquito

- *Aedes aegypti* is known to spread Zika, Yellow fever, and Dengue worldwide

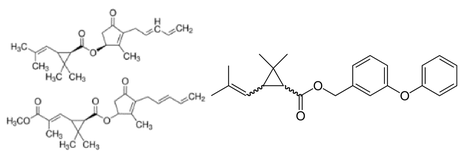
- Mass Spectrometry allows for a direct and label-free detection of commonly used pesticides

Figure 2. Bruker LC-MS/MS instrument

Research Methodology

- Assess insecticide susceptibility of *Aedes aegypti* Orlando (ORL 1952) and Puerto Rico (NR-48830) lab reference strains using the CDC Bottle Bioassay
- Determine optimal treatment dose to study phenotype changes in surviving mosquitoes
- Recover live treated mosquitoes for insecticide quantitation

Insecticide	Active Ingredient	Diagnostic Dose	Diagnostic time
Merus	Pyrethrins	15 µg	15 min
Anvil	Sumithrin	22 µg	10 min



Pyrethrin I and II Sumithrin

Figure 5. Commonly used insecticides for vector control and their active ingredients

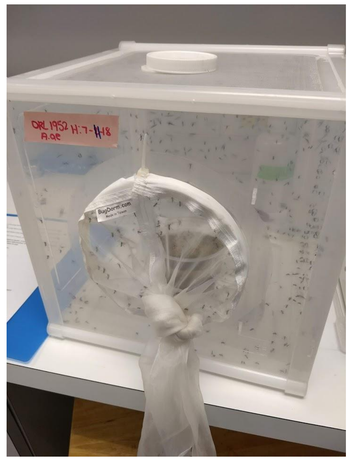


Figure 3. *Aedes aegypti* in an emergence chamber for manipulation

Figure 4. Application of insecticide during CDC Bottle bioassay

Results

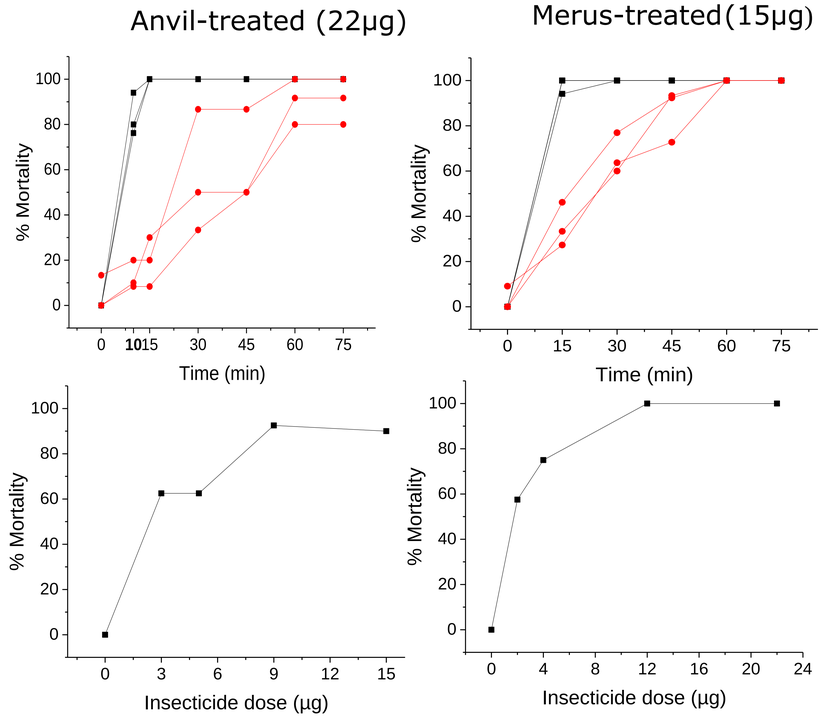
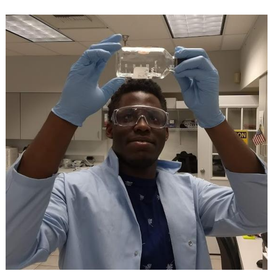


Figure 4. Percent mortality over time when treated with diagnostic dose of common insecticides (top row) and determination of optimal pesticide dose to enable survival (bottom row) of susceptible ORL strain

Figure 5. Helicopter used by CMCD to spray the county for vector control

Future Directions

- Continue developing quantitative LC-MS/MS method
- Apply insecticide using mosquito traps and foggers



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