

University of Florida Natural Area Teaching Laboratory 2013 NATL Minigrant Program

Proposer

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Experience or training related to proposed project

Summer 2008- Collected mosquitoes for CDC funded West Nile Virus Surveillance Program using modified CDC light traps, collection sites were located across Kansas, processed collections sorting down to species level.

Additional experience in medical and veterinary entomology, statistics, ecology, collecting, preserving insects, molecular techniques, and related coursework and research during MS degree program (graduated University of Florida Summer 2012)

Sponsor

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Title of project: Spring species composition and sampling techniques for mosquitoes collected within the University of Florida's Natural Area Teaching Laboratory

Project summary-

Mosquitoes are vectors of numerous human and animal pathogens including the causative agents of West Nile virus, yellow fever, dengue, filariasis and malaria. Understanding species diversity and the best trapping method is important to achieve control of pathogen vectors. Typically mosquito sampling has been highly species or stage specific. Most researchers are only interested in relative rates or relative abundance to historical data, which are predominated by Centers for Disease Control and Prevention (CDC) style or similar light traps. The techniques employed herein will be two aspirator styles, sweep netting, and a carbon dioxide-baited trap (CDC style). This will lead to the first through comparison of these sampling techniques while still maintaining a historical measure (CDC trap). Results of this study will benefit the NATL by obtaining an accurate mosquito species diversity for NATL and provide data for future collection techniques targeting species of interest.

Starting date- January 7, 2013

Completion date- June 3, 2013

Introduction and Objective

Mosquitoes (Diptera: Culicidae) are a diverse family predominated by adult females that feed on the blood of mammals, avians, reptiles, and/or amphibians to obtain a protein source for vitellogenesis. Numerous mosquito species have been documented as pathogen vectors causing diseases such as yellow fever, numerous encephalitides, dengue, filariasis, and malaria.

Mosquito field collections that typically are conducted focus on highly specific age or biological stages. Centers for Disease Control and Prevention (CDC) style or similar light or carbon-dioxide traps attract mosquitoes that are seeking a blood meal. Additional traps exist that are attractive to ovipositing females. However, most mosquitoes in the environment are not seeking either a host or an oviposition site. This “resting” sub-population represents a majority within the mosquito population, yet is difficult to passively trap. Therefore, the objective of this study will be to compare the collection efficiency of mosquitoes by four techniques through the early spring to early summer in the NATL. By utilizing a multi-faceted sampling tool, this project will generate a qualitative measure of species diversity in NATL.

Methods

The four collection techniques to be utilized will be two aspirator models (large and small opening), sweep netting, and a CO₂-style host-seeking trap. The first aspirator will be a modified CDC backpack aspirator model 1412 (John W. Hock Co., Gainesville, FL <http://www.johnwhock.com/products/1412.htm>). The second aspirator is a foliage aspirator (custom manufactured in-house, for description see Obenauer et al. 2010). The third active collection technique will be a sweep net purchased from Bioquip (<http://www.bioquip.com/search/DispProduct.asp?pid=7112NA>). The fourth collection technique that will be utilized is a modified CDC miniature light trap model 512 (<http://www.johnwhock.com/products/512.htm>). The trap utilizes a cooler containing dry ice hung over the trap to dispense CO₂, and will be used for comparative purposes to other studies that did not compare directly the methods used herein.

Beginning January 7, 2013, the three active collection techniques will be completed in a randomized order weekly. Each collection technique will use a 10 m transect (following a trail) sampling the vegetation near the ground (< 1 m) and leaf litter, rocks, tree trunks and other areas where adult mosquitoes rest. These sampling techniques will be followed by placing and operating a dry ice-baited CDC light trap for 24 h in an area adjacent to but not previously sampled by other collection methods. Total sampling area will extend ~40 m following a trail. The trap will be properly labeled to identify ownership. Samples will be taken to the Medical and Veterinary Entomology Laboratory and identified using the keys of Darsie and Ward (2004). Sampling will continue on a weekly basis until May 27, 2013.

The data generated will be descriptive of the seasonality of when and what species of mosquitoes become active in the spring in the NATL. Therefore, the general counts will be observational data and not analyzed. The comparative efficiency of each sampling technique will be evaluated based upon species number and diversity captured using an adequate statistical model (likely negative binomial distribution or Poisson distribution). Randomization of collection technique will allow a test for significant differences in order of collection method to ensure collection order does not influence insect capture.

Lasting Impacts on the NATL

The results of this study will yield valuable species phenology, diversity, and abundance for the mosquitoes of the NATL. The methods employed with this project are not expected to identify each mosquito species present, but will, at the very least, yield a list of early spring through early summer mosquitoes that rest near the ground and seek hosts during this time. An

established goal of the NAAC is to develop a species list of each animal and plant in the NATL, this project will help to achieve this valuable and worthy undertaking.

Additionally, if future researchers are interested in studying a specific species that has been identified during this project for pathogen studies or any other purpose, a starting point will have been established relative to phenology, diversity, and abundance. A fact sheet of all species identified and a summary of all data will be presented to the NAAC chair for incorporation into the NATL website. All mosquitoes collected will be analyzed for presence or absence of *Dirofilaria immitis*, the causative agent of dog heartworm. These results will be presented to the NAAC, but this component will exceed the time limitations and be above the budgetary constraints of this project.

References

Obenauer, PJ, PE Kaufman, DL Kline, and SA Allan (2010) Detection of and monitoring for *Aedes albopictus* (Diptera: Culicidae) in suburban and sylvatic habitats in North Central Florida using four sampling techniques. *Environ. Entomol.* 39: 1608-1616.

Darsie Jr., RF and RA Ward (2004) *Identification and Geographical Distribution of the Mosquitoes of North America, North of Mexico*. Gainesville, FL Univ. Press of Florida. pp. 383

Budget

Number	Item	Est. Cost	Notes
N/A	Aspirators/traps	0	Previously purchased by sponsor
2	CDC Cups	25	Trap replacement parts
4	Aspirator Bags	25	Trap replacement parts
2	Coolers	25	To modify traps from CO ₂ gas cylinder operation
150 lbs.	Dry Ice	200	CO ₂ source
6	Batteries	200	For trap and aspirator operation
-	Misc. Disposables	25	Sample storage cups, etc.
Total		500	

Provision for periodic communication with NAAC administration

Monthly meetings on a date and time of convenience for the chair of the NAAC will be established and held for the duration of the study. Digital photographs of activities will be collected and provided to the chair for incorporation into the social media outlets and website.

Signatures

Only the paper copy needs to be signed.

Student _____ Date _____

Sponsor _____ Date _____

