

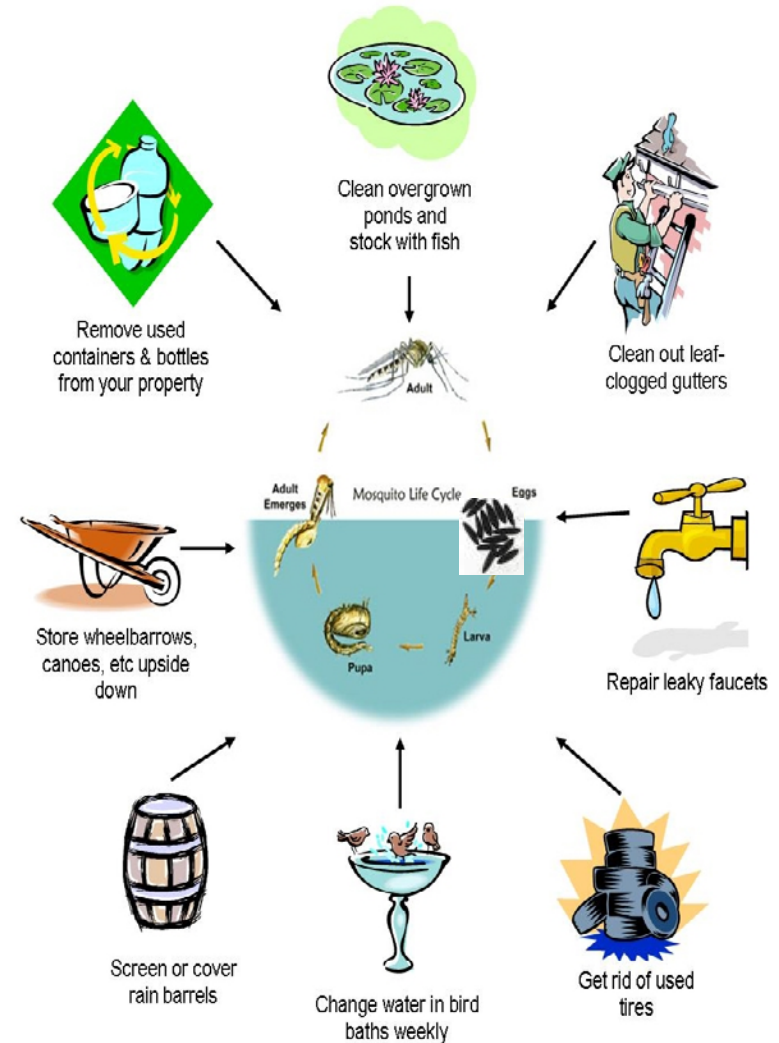
Impact of the Insect Growth Regulator Pyriproxyfen on Life Table Characteristics of *Aedes albopictus*

Megan Rhyne and Stephanie Richards

Environmental Health Science Program
Department of Health Education and Promotion
East Carolina University

Introduction

- *Aedes albopictus* is a competent vector of dengue, chikungunya, and Zika viruses (among other arboviruses).
- Significant nuisance species in suburban environments.
- Control of this species is difficult due to its day-active behavior and skip oviposition ability.



Insect Growth Regulator (IGR)

- Insect growth regulators (IGRs) are pesticides that don't usually kill insects outright but instead affect the ability of insects to grow and mature normally.
- Pyriproxyfen is a pyridine-based insect growth regulator that affects the hormonal balance in arthropods.
 - Disturbs egg-laying and egg-hatch by mimicking natural insect hormones to keep young insects from maturing into adult forms, preventing target insects from multiplying.
- Pyriproxyfen products can come in many forms, including liquids, granules, dusts, and pellets.

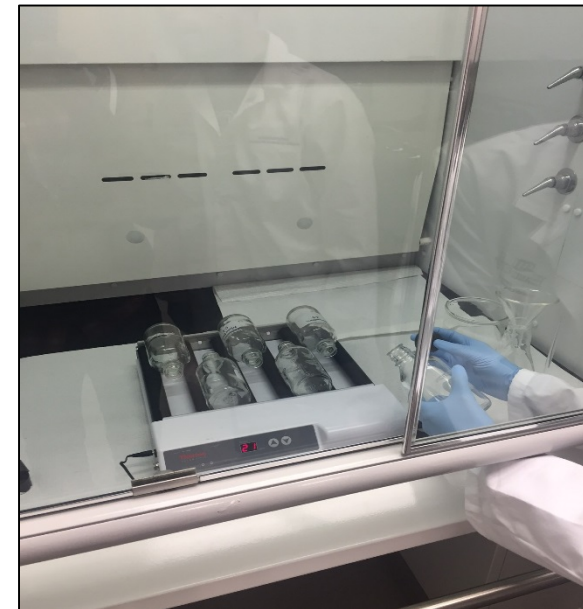
Study Objective

- Characterize the extent to which Archer[®] (active ingredient: pyriproxyfen)(insect growth regulator) impacts life table characteristics of *Aedes albopictus* in a laboratory study designed to simulate barrier spray exposure.



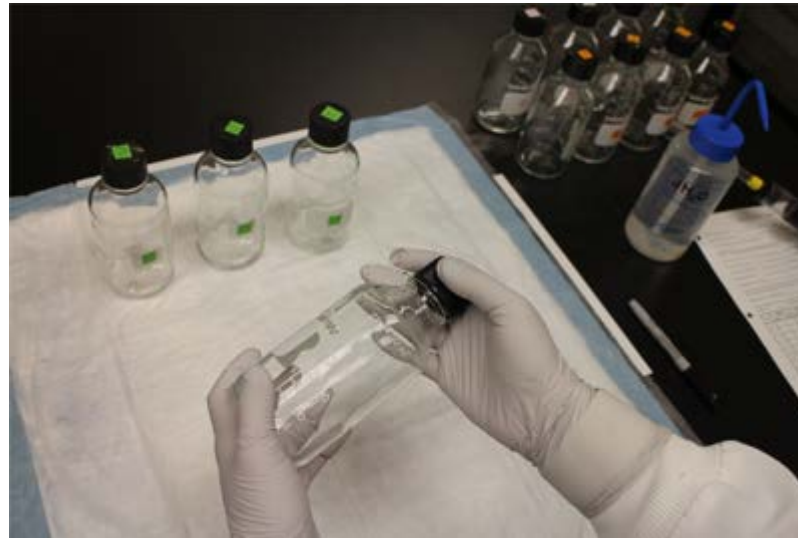
Study Design

- Glass bottles coated with either:
 - 1 mL Archer[®] (AI: pyriproxyfen)(1 oz/gallon made in acetone)
 - 1 mL acetone control
- Caps removed and bottles placed on bottle roller until contents evaporated (1 - 2 minutes).
- Uncapped bottles placed into dark drawer and used within 24 h.



Study Design

- 100 blood fed *Ae. albopictus* introduced into bottles and exposed for 2 hours.
- Bottles rolled every 30 minutes to ensure mosquito tarsi were exposed.



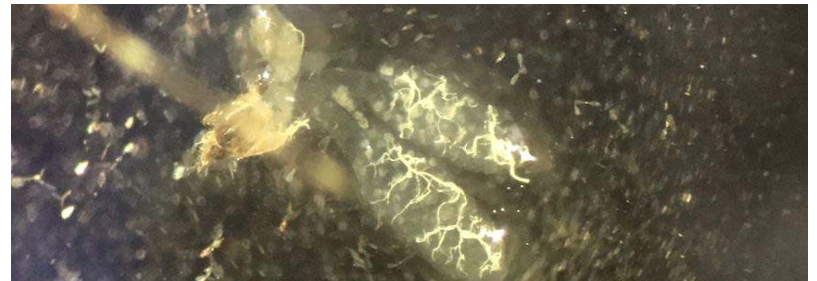
Study Design

- Mosquitoes were transferred into individual number-coded cardboard cages containing shallow (59 mL) or deep (177 mL) oviposition cups with oviposition substrate.
 - 88 cages total:
 - 22 large, control
 - 22 large, pyriproxyfen
 - 22 small, control
 - 22 small, pyriproxyfen



Study Design

- Six days post-blood feeding, egg strips retrieved and eggs counted (fecundity rate).
- Ovaries dissected and retained eggs counted.
- Egg strips dried and then submerged back into same oviposition cups.



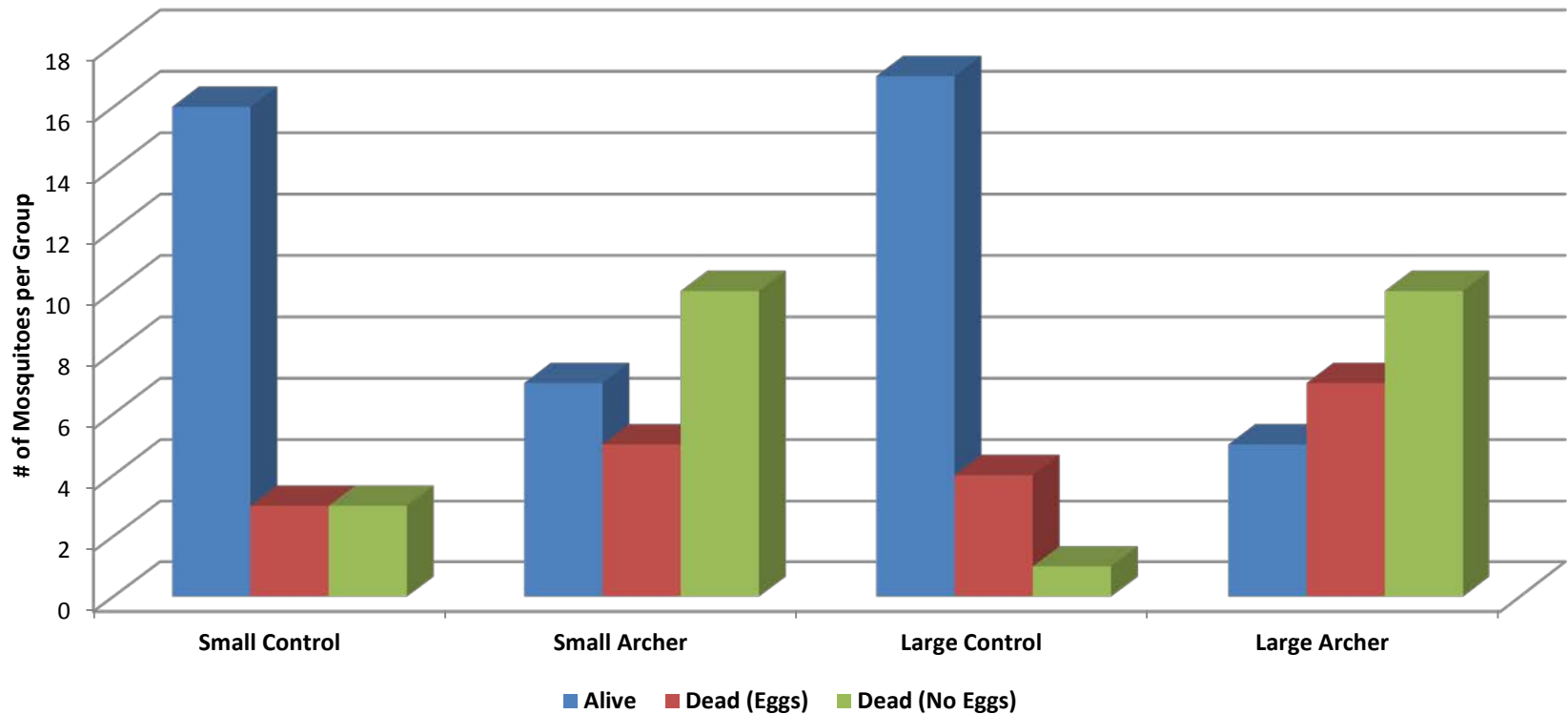
Study Design

- At 6 days and 12 days after egg strips were submerged, larvae were counted in oviposition cups (fertility).
- All emerged adults were counted (emergence) for the duration of the study.



Results

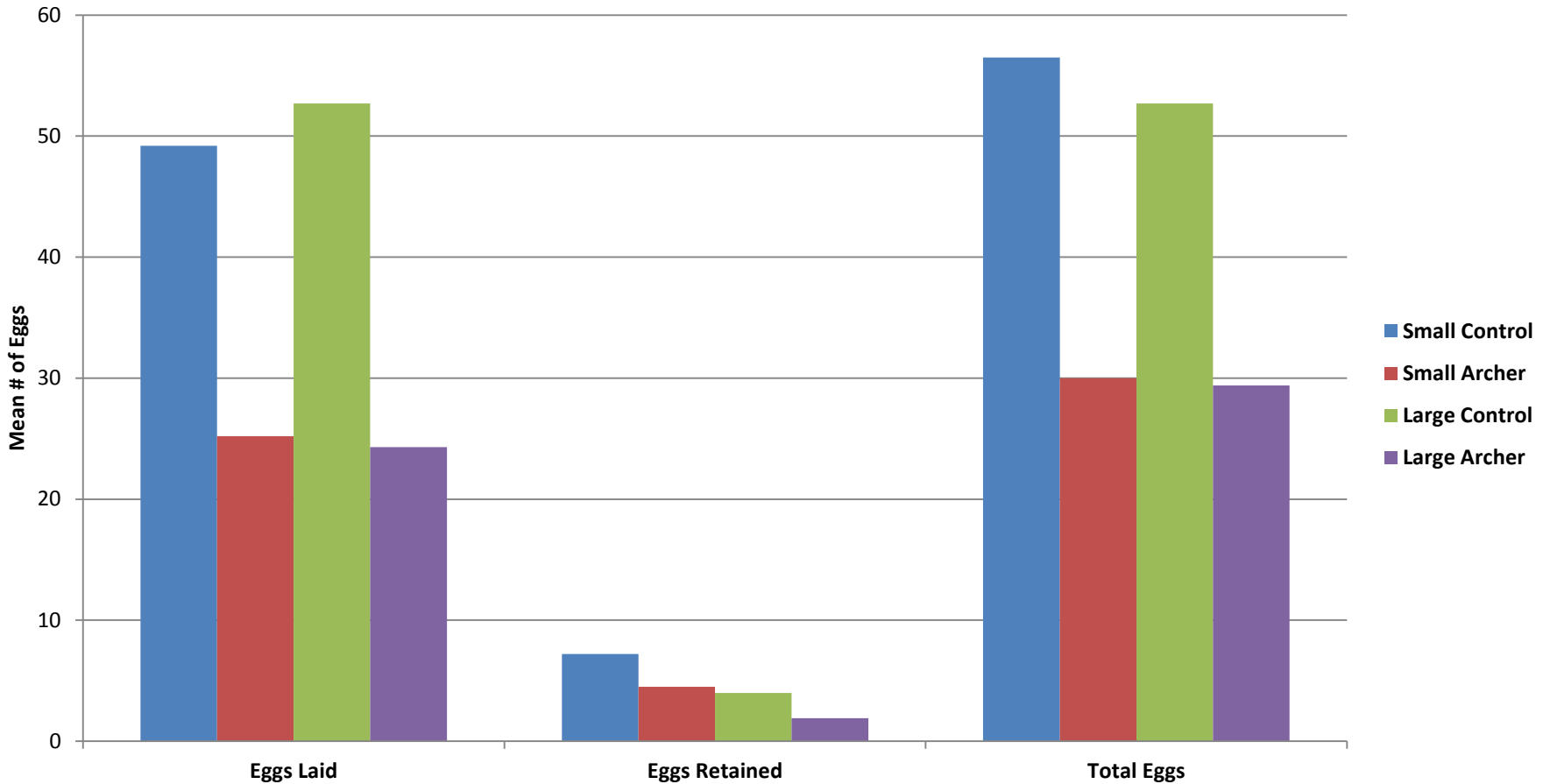
Survival of Mosquitoes Post-treatment (Pre-ovarian Dissection)



- Survival rates for those who laid and those who did not lay eggs by group.
 - Control group: 18-21 mosquitoes laid eggs (up to 48%)
 - Treatment group: 10-11 mosquitoes laid eggs (up to 25%)

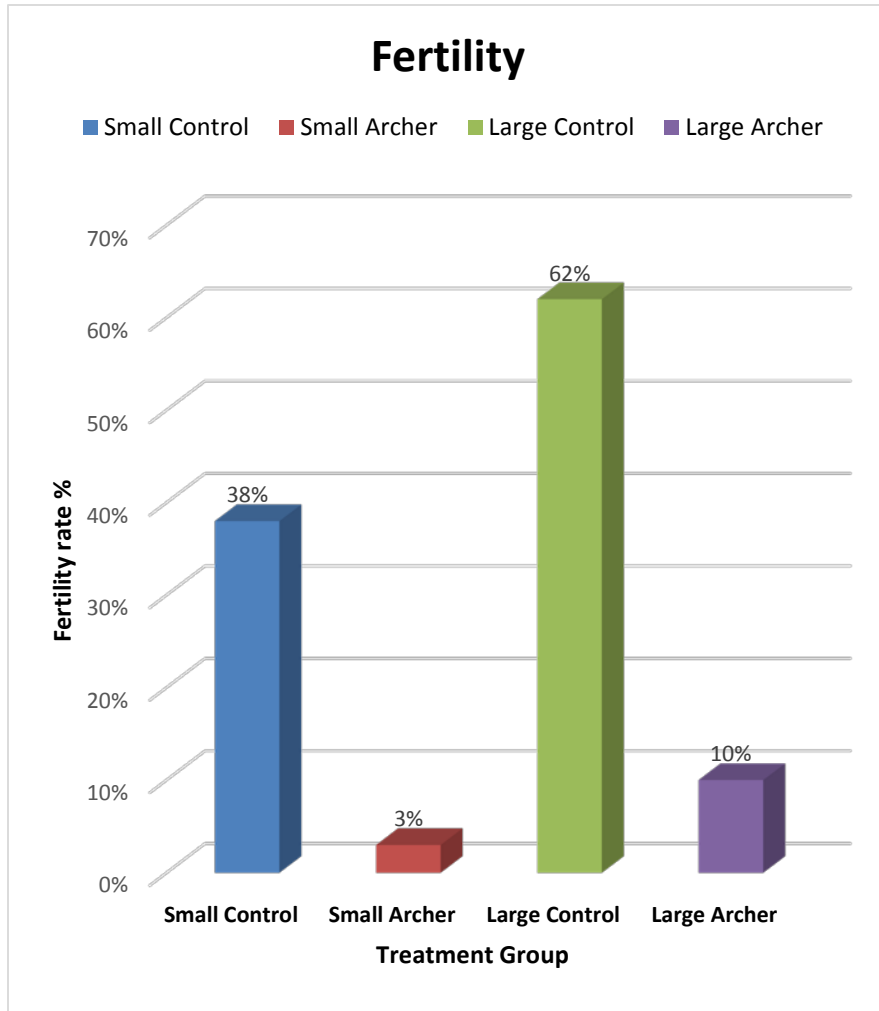
Results

Fecundity

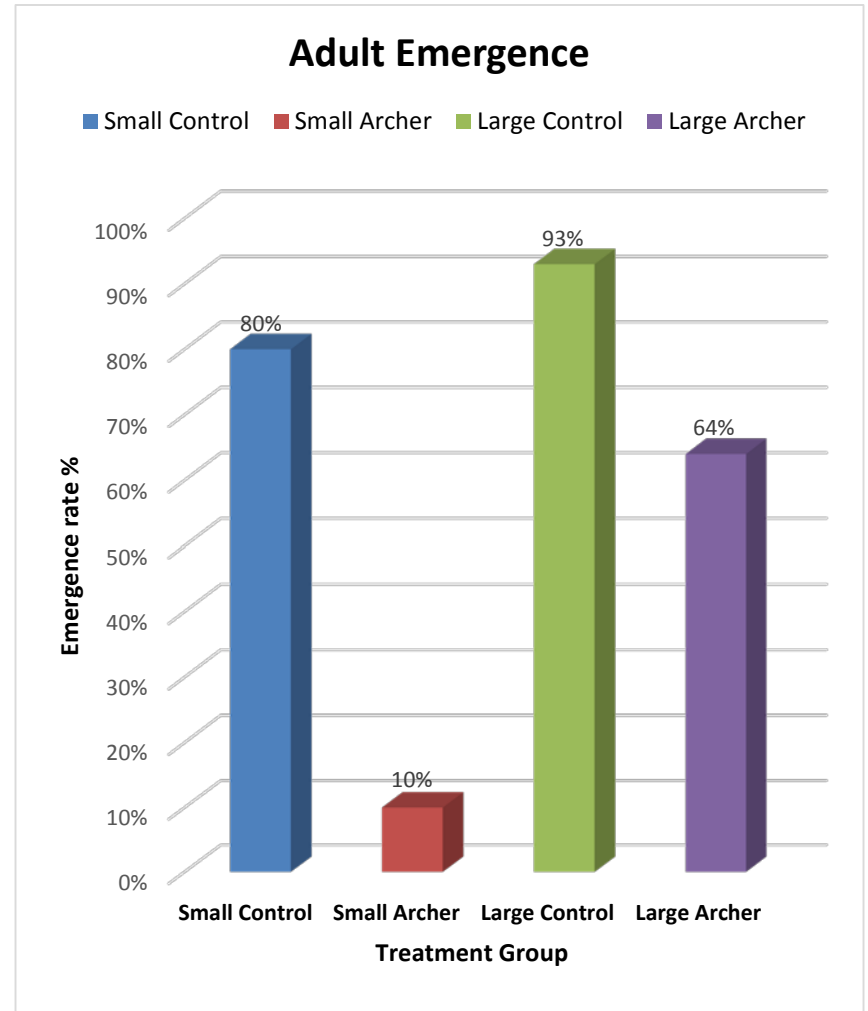


Fecundity significantly lower in mosquitoes exposed to pyriproxyfen
(compared to control)

Results



Fertility rate significantly lower in the pyriproxyfen group (compared to control) & larger containers showed significantly higher hatch rate (compared to smaller)



Adult emergence was higher among the control group & emergence was significantly higher among large containers (compared to smaller)

General Observations

- Exposure to IGR: pyriproxyfen reduced fecundity, fertility, and subsequent adult emergence.
- Not all mosquitoes exposed to pyriproxyfen experienced the same degree of reduction in life table characteristics.

Discussion

- Comparisons should be done to evaluate efficacy of pyriproxyfen on life table characteristics of other mosquitoes (such as *Culex pipiens/quinqüefasciatus*, *Aedes aegypti*, *Aedes triseriatus*).
- We expect variation in these relationships between species, populations, and under different environmental conditions.



Acknowledgements

- This research was supported, in part, by Syngenta.
- M. Rhyne was supported by a graduate assistantship from East Carolina University.
- We thank A. White and H. Knecht for helping with bioassays.

Questions?



rhyne12@students.ecu.edu