The Effects of Bifenthrin Barrier-Treatments on Non-Target Arthropods

Ryan Bare
Introduction

- WNV a continuing concern
- Largest arboviral encephalitis outbreak in US history
• Current conditions have opened up a market for pest-management professionals

• Larvicides, Habitat Assessment, Automatic-Misting Systems, and Barrier-Treatments
• Barrier-Treatments Effective Against:
  – Sand flies (Kelly et al., 1997)
  – Biting Midges (Royal, 2004)
  – Mosquitoes (Trout et al., 2007)
Growing Public Concern

• Could using insecticides be more harmful than the diseases they are attempting to control?

• How has this been investigated?
  – Honey Bees (Hester et al. 2001)
  – Crickets (Tietze et al. 1996)
  – Aquatic Insect Larvae (Siegfried 1993)
  – *Daphnia* and *Ceriodaphnia* (Milam et al. 2000)
Purpose of this Study

- Research performed on barrier-treatment efficacy, but far less on non-target effects.
- No significant effect on community structure (Davis and Peterson, 2008)
- To measure the ecological, acute and chronic effects of bifenthrin barrier-treatments on non-target arthropods in contained and field environments.
Questions

• What are the effects of bifenthrin barrier-treatments on non-target arthropods?
  – Monitor community structure
  – Isolate one species
  – Verify efficacy on mosquitoes
When and Where?

- Western Loundes County, Ga

- Study began on 08/08/2011 and will end on 11/08/2011
• http://maps.google.com/maps?hl=en&ie=UTF8&ll=30.811504,-83.400135&spn=0.009122,0.013711&t=h&z=16&vpsrc=6
Site Setup

20m
Site 1
Chemical Used

- Masterline Bifenthrin 7.9
- .75 ounce diluted into one gallon of water
- Dilution performed by another grad student
- One gallon of solution applied to every 1000 square feet.
• Maruyama Power Mist Duster MD150DX
• Flow rate gauge set to 1, producing 30-40 droplets of spray per square cm
• Spray rate verified with Syngenta water-sensitive paper
Pesticide Application

Plots are sprayed with one of two treatments
– Water
– Bifenthrin diluted in water at .75 ounces per gallon

Plots were arbitrarily assigned either the letter A or B in alternating order

Experiment double blinded
Collection Methods
Enclosure Setup

-Megaview Bug Tent

-Potted Daisies

-Coccinellidae
Mosquito Trapping

• CO₂ baited CDC light traps
• Site sampled the day prior to spraying and every seven days after.
Average Diversity of Treatments Over Time

Diversity vs. Time Elapsed (days) Since Spraying

- **A**: Blue bars
- **B**: Red bars

P = 0.02

Time Elapsed (days) Since Spraying:
- 0
- 7
- 14
- 21
- 28

Diversity Scale:
- 0.00
- 0.05
- 0.10
- 0.15
- 0.20
- 0.25
- 0.30
- 0.35
- 0.40
- 0.45
Average Richness of Treatments Over Time

<table>
<thead>
<tr>
<th>Number of Families</th>
<th>Time Elapsed(days) Since Spraying</th>
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<td>28</td>
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</tbody>
</table>

P = 0.07

A
B

Legend:
- Blue: A
- Red: B
Average Evenness of Treatments Over Time

P<0.01
Upcoming Addition to Thesis

- Aquatic Toxicological Studies
  - LOEC
  - NOEC
  - LC50
  - EC50
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Works Cited


