Effects of Defoliation on Growth and Reproduction of Brazilian Peppertree (*Schinus terebinthifolia*)

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- FWC
- SFWMD

(Photo credit: Bryan Harry, NPS)
Outline

• Introduction
• Materials & Methods
• Results
• Conclusions
Brazilian Peppertree

*Schinus terebinthifolia* Raddi
Severe BP Infestation

Galveston, Texas
Distribution of BP

- **ORIGIN**: Brazil, Argentina, Paraguay

- **US DISTRIBUTION**: California, Florida, Georgia, Hawaii, Texas, Alabama, Caribbean Islands

- **DESCRIPTION**:
  - Evergreen Shrub
  - Compound Leaves
  - Red Berries
  - Several ‘Varieties’
  - Dioecious

EDDmapS 2012
Why is BP Invasive in FL?

- Multiple Genotypes in South America

Williams et al. (2005, 2007)
Why is BP Invasive in FL?

- Hybrid Vigor

Geiger et al. (2011)
Why is BP Invasive in FL?

Enemy Escape Hypothesis (Williams 1954)

- Native Specialist Enemies Strongly Control the Abundance and/or Distribution of Native Plants
- Escape from Specialist Enemies is a Key Contributor to Exotic Plant Success
- Enemy Escape Benefits Exotics Because They Gain a Competitive Advantage Over Native Plants as a Result of Being Liberated from Their Pests
BP Targeted for BioControl

- Non-native Invasive Species
- Causes Severe Ecological Damage
- Toxic and Allergenic (Poison Ivy Family)
- Low Beneficial Value (Beekeepers?)
- Conventional Controls Temporary, Costly
- No Native Congeners in US !!!
BioControl Project Goals

- Collect Promising Natural Enemies in SA
- Conduct Biological & Impact Studies with Candidate BioControl Agents
- Import BioAgents & Develop Rearing Procedures
- Perform Host Specificity Testing Required for Release into Florida
- Release / Evaluate Performance of Approved BioControl Agents
1. Thrips
   - Damages Shoots
2. Sawfly
   - Defoliator
3. Seed Wasp
   - Attacks Fruits
4. Weevil
   - Stem Feeder
5. Psyllid
   - Galls Leaves
6. Leafroller
   - Defoliator
7. Fungus
   - Leaf Spot
Sawfly Defoliated Plants in Brazil
Psyllid Defoliated Peruvian Peppertree

Downer et al. (1988)
Leaflet Roller Impact Study

Manrique et al. (2009)
Research Objectives

- Simulate Insect Defoliation to Brazilian Peppertree Under Field Conditions in Florida
- Measure Effect of Defoliation Events on Growth and Reproduction of Brazilian Peppertree
Materials & Methods

• Study Area- IRREC Ft. Pierce
## Materials & Methods

Treadwell and Cuda (2007)

<table>
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<th>Treatment</th>
<th>n</th>
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<th>F</th>
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**Abbreviations:** M, male; F, female.

*b* One defoliation yr\(^{-1}\) for 1 yr; 2/1, two defoliations yr\(^{-1}\) for 1 yr; 2/3, two defoliations yr\(^{-1}\) for 3 yr.
Materials & Methods

• Measuring Canopy Diameter
Materials & Methods

field plots at Fort Pierce IRREC
Results: Height

Sequences with the same letter not statistically different, $\alpha = 0.05$ (SAS PROC MIXED)

Treadwell and Cuda (2007)
Results: Crown Diameter

Sequences with the same letter not statistically different, $\alpha = 0.05$ (SAS PROC MIXED)

Treadwell and Cuda (2007)
Results: Fruit Production

Sequences with the same letter not statistically different, $\alpha = 0.05$ (SAS PROC MIXED)

Treadwell and Cuda (2007)
Results

July 2003:
trt 21 defoliated Sept 2001, Apr 2002
trt 12 defoliated Sept 2001, Sept 2002
Summary

• Multiple Defoliations Reduced BP Height & Canopy Growth Compared to Controls or Plants Defoliated Only Once

• Trees Subjected to Repeated Defoliations Had Fewer Fruits & Lower Fruit Dry Weights Than Control Plants or Those Defoliated Only One Time
Conclusions

• Findings Consistent w/ Guideline 3, International Code of Best Practices¹ “Select Agents w/ Potential to Control Target Weed”
  – Defoliating Insects Capable of Reducing BP Growth & Fruit Production
  – Sustained Defoliation Should Reduce Invasiveness of BP in Florida

Balciunas (2000)
Thank You