

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

J. P. Cuda¹, L. W. Treadwell and W.A. Overholt²

¹Entomology & Nematology Dept., Gainesville, FL

²BioControl Research & Containment Lab, Indian River REC, Ft Pierce, FL



Acknowledgements

- Janis Col
- Alison Fox
- Judy Gillmore
- Kaoru Kitajima
- Bancroft Whitely
- Sandra Wilson



(Photo credit: Bryan Harry, NPS)

-
- FWC
 - SFWMD

Outline

- Introduction
- Materials & Methods
- Results
- Conclusions



Brazilian Peppertree

Schinus terebinthifolia Raddi



Brazilian pepper-tree
Schinus terebinthifolius
Photo by Ann Murray
© 2000 University of Florida

Severe BP Infestation

Galveston, Texas



UGA1299198

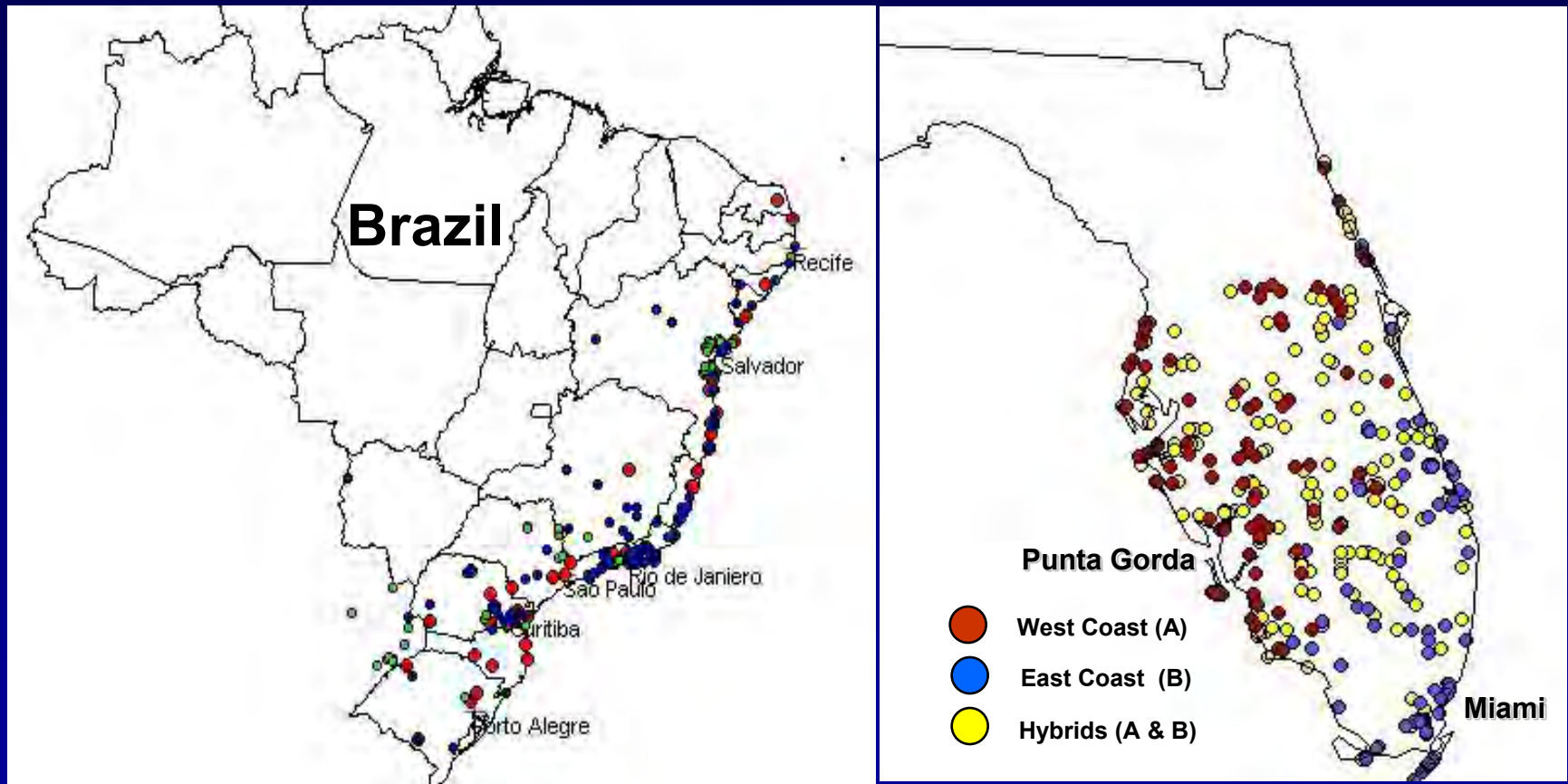
Distribution of BP

- **ORIGIN-** Brazil, Argentina, Paraguay
- **US DISTRIBUTION-**
 - California, Florida, Georgia ?, Hawaii
 - Texas, **Alabama**, Caribbean Islands
- **DESCRIPTION-**
 - Evergreen Shrub
 - Compound Leaves
 - Red Berries
 - Several 'Varieties'
 - Dioecious



Why is BP Invasive in FL?

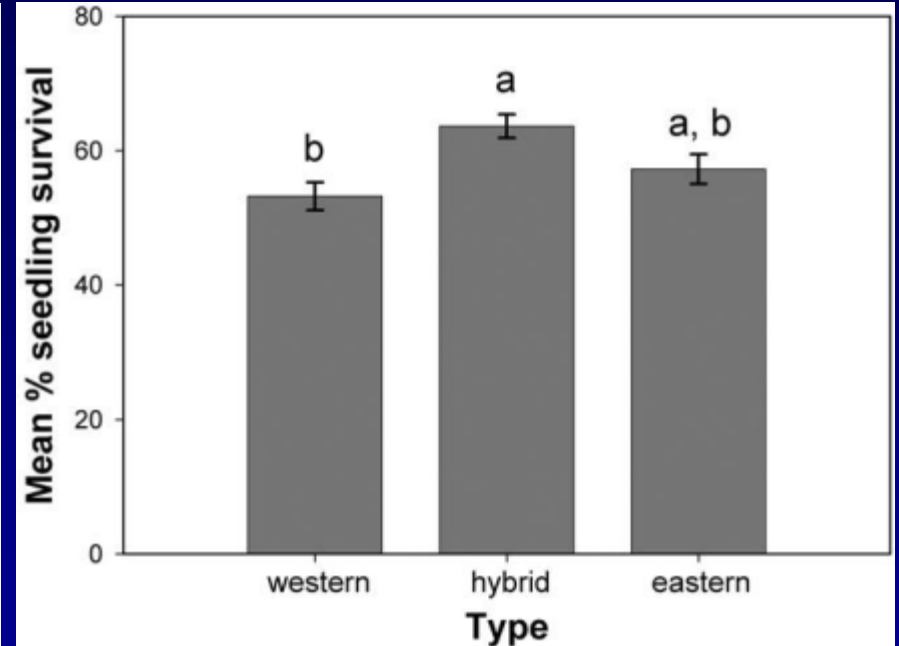
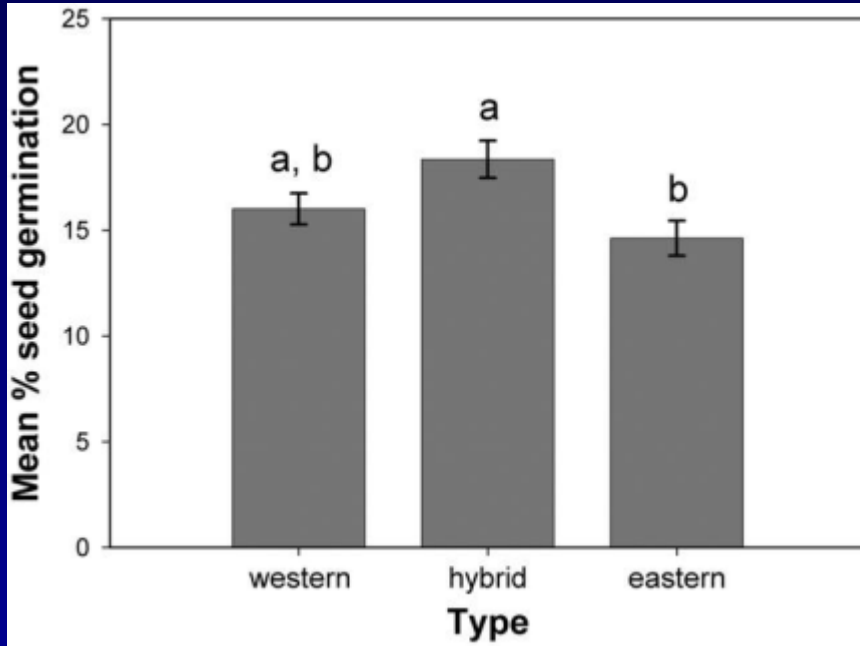
- Multiple Genotypes in South America



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**

BP Natural Enemies

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

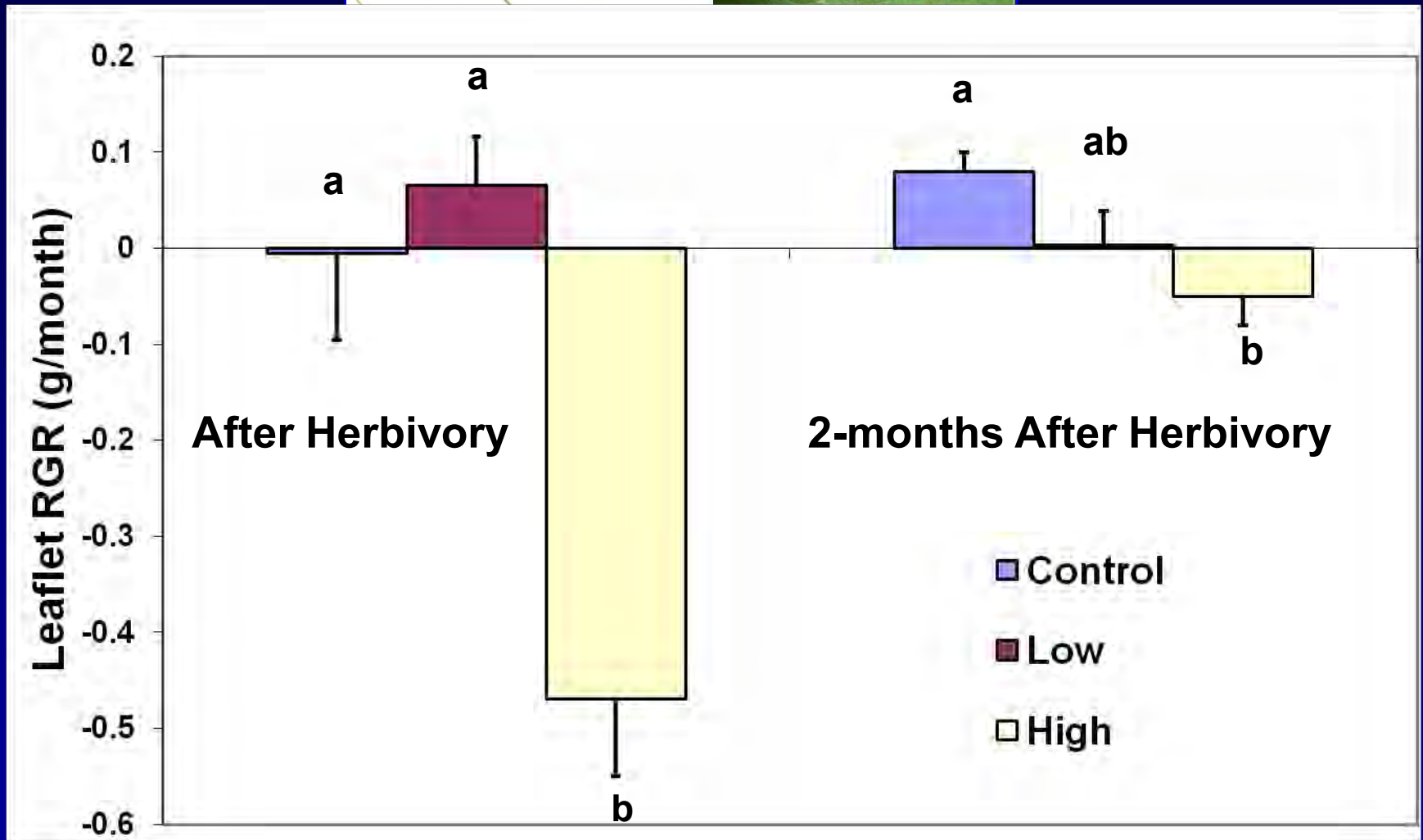


Downer et al. (1988)

Weevil Leaflet Damage



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

Table 1. Treatment groups and schedule of defoliation events.^a

Treatment ^b	n	M	F	Defoliation dates				
				2001	2002		2003	
				August 27	May 11	September 27	April 26	October 5
Control	12	6	6					
1/1	6	4	2	x				
1/2	6	2	4	x		x		
2/1	6	4	2	x	x			
2/3	6	3	3	x	x	x	x	x

^a Abbreviations: M, male; F, female.

^b 1/1, one defoliation yr^{-1} for 1 yr; 1/2, one defoliation yr^{-1} for 2 yr; 2/1, two defoliations yr^{-1} for 1 yr; 2/3, two defoliations yr^{-1} for 3 yr.

Materials & Methods

- Measuring Canopy Diameter

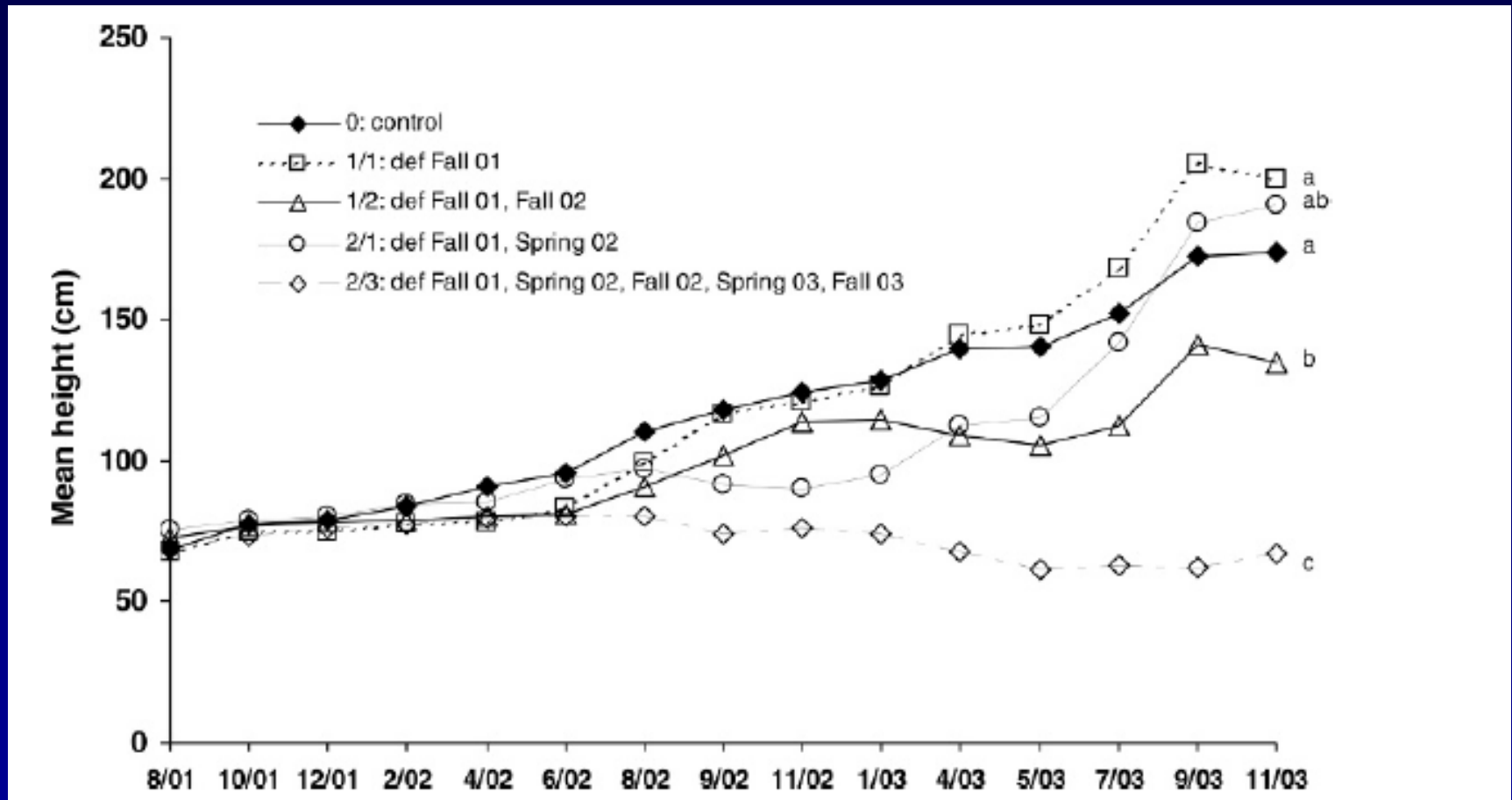


Materials & Methods



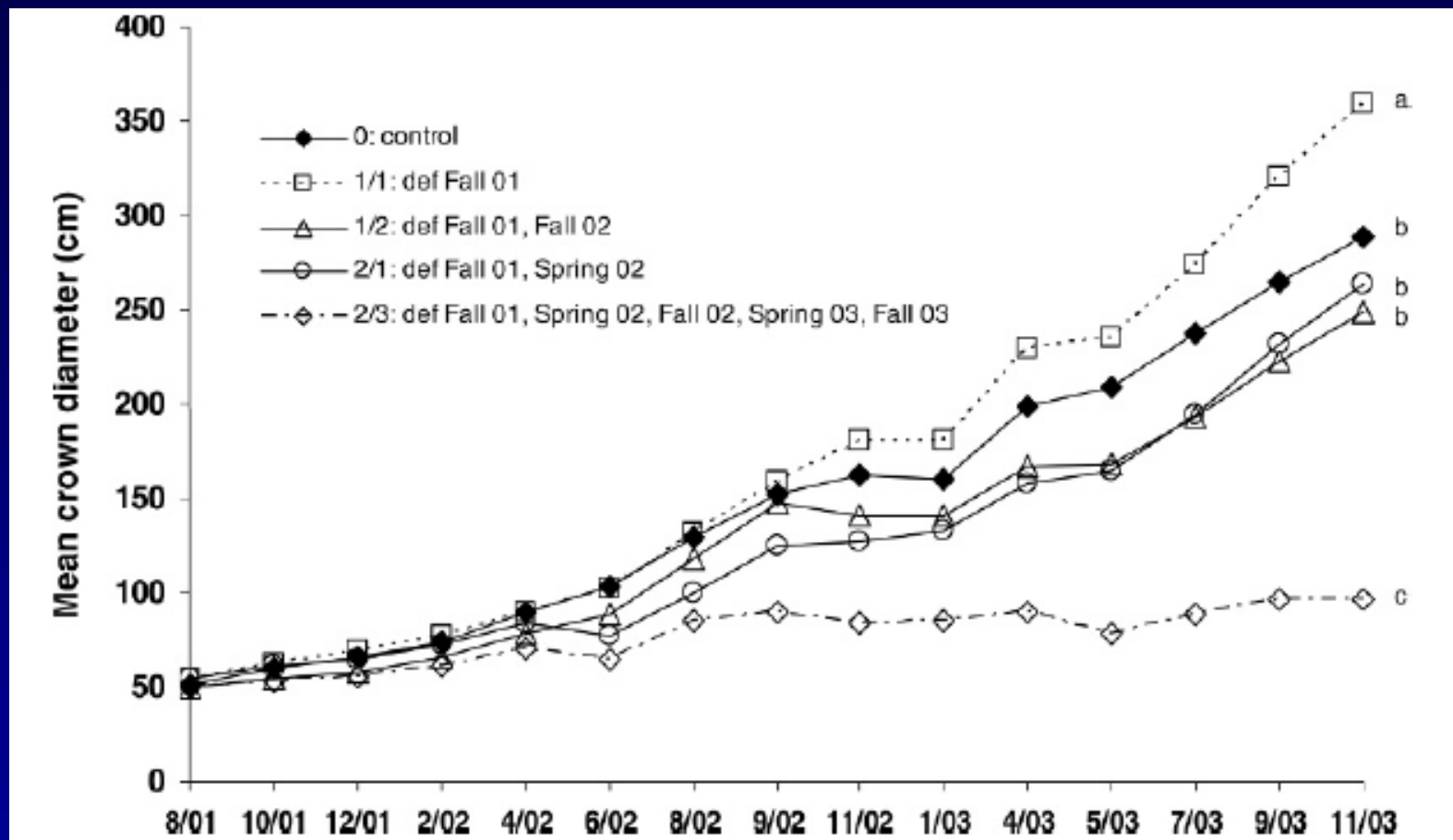
field plots at
Fort Pierce IRREC

Results: Height



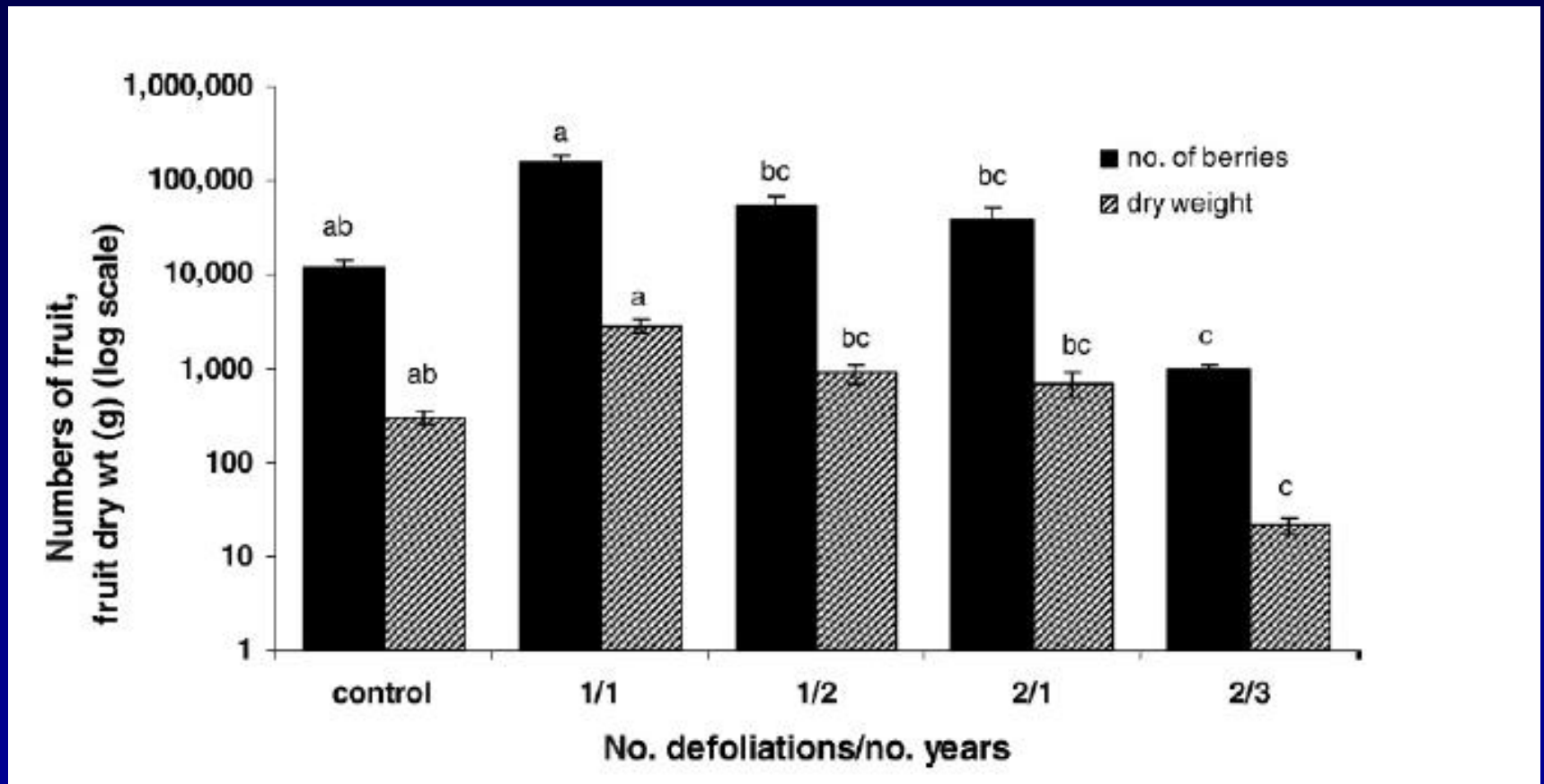
Sequences with the same letter not statistically different, $\alpha = 0.05$ (SAS PROC MIXED)

Results: Crown Diameter



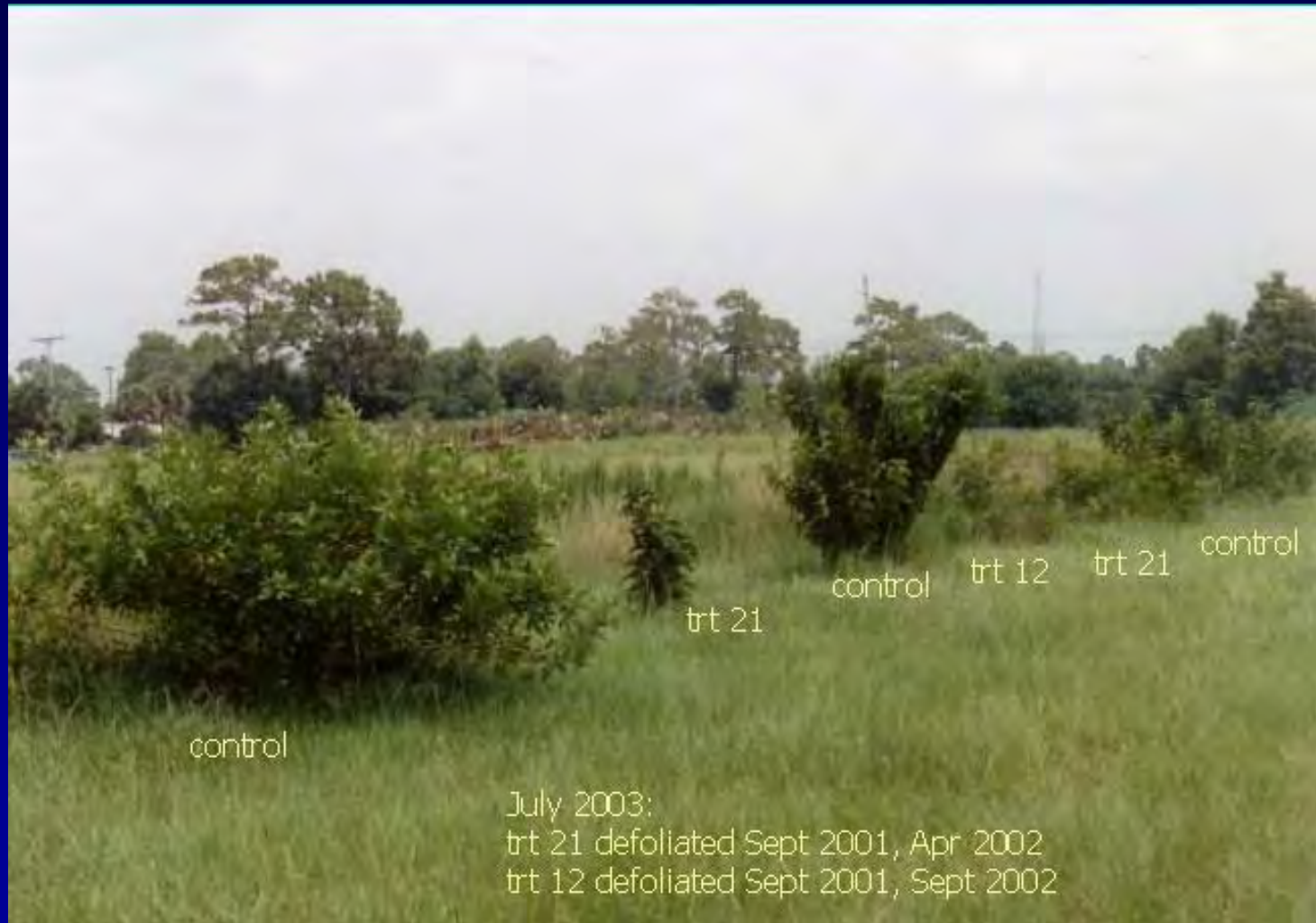
Sequences with the same letter not statistically different, $\alpha = 0.05$ (SAS PROC MIXED)

Results: Fruit Production



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

Results



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

Thank You

