

# Tales of Invaders from Two Continents: Air Potato and Brazilian Peppertree.

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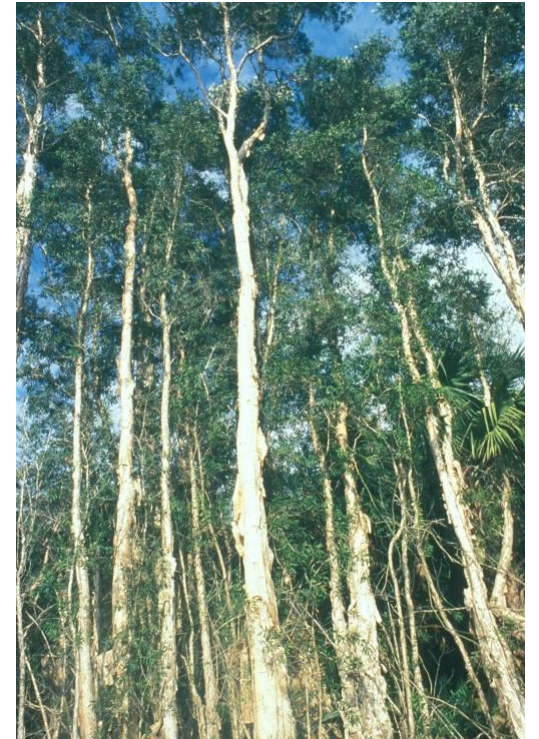
# INVASIVE PLANTS



Willey Durden



FDACS-DPI



Amy Ferriter



James Miller, USFS  
James H. Miller

# PROBLEMS CAUSED BY INVASIVE PLANTS

- Crowd out/out compete native vegetation
- Reduce forage and habitat for native fauna
- Alter fire regimes
- Alter water flow



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- Alter fire regimes
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- Threaten commercial, agricultural, and recreational activities



Photos by Wiley Durden (top) and Charles Bryson (bottom)  
(USDA-ARS). [www.bugwood.org](http://www.bugwood.org)

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- Crowd out/out compete native vegetation
- Reduce forage and habitat for native fauna
- Alter fire regimes
- Alter water flow
- Threaten commercial, agricultural,  
and recreational activities
- Harm to human/animal health





Melissa Smith and Ellen Lake, USDA



# Air Potato

(*Dioscorea bulbifera* L.)

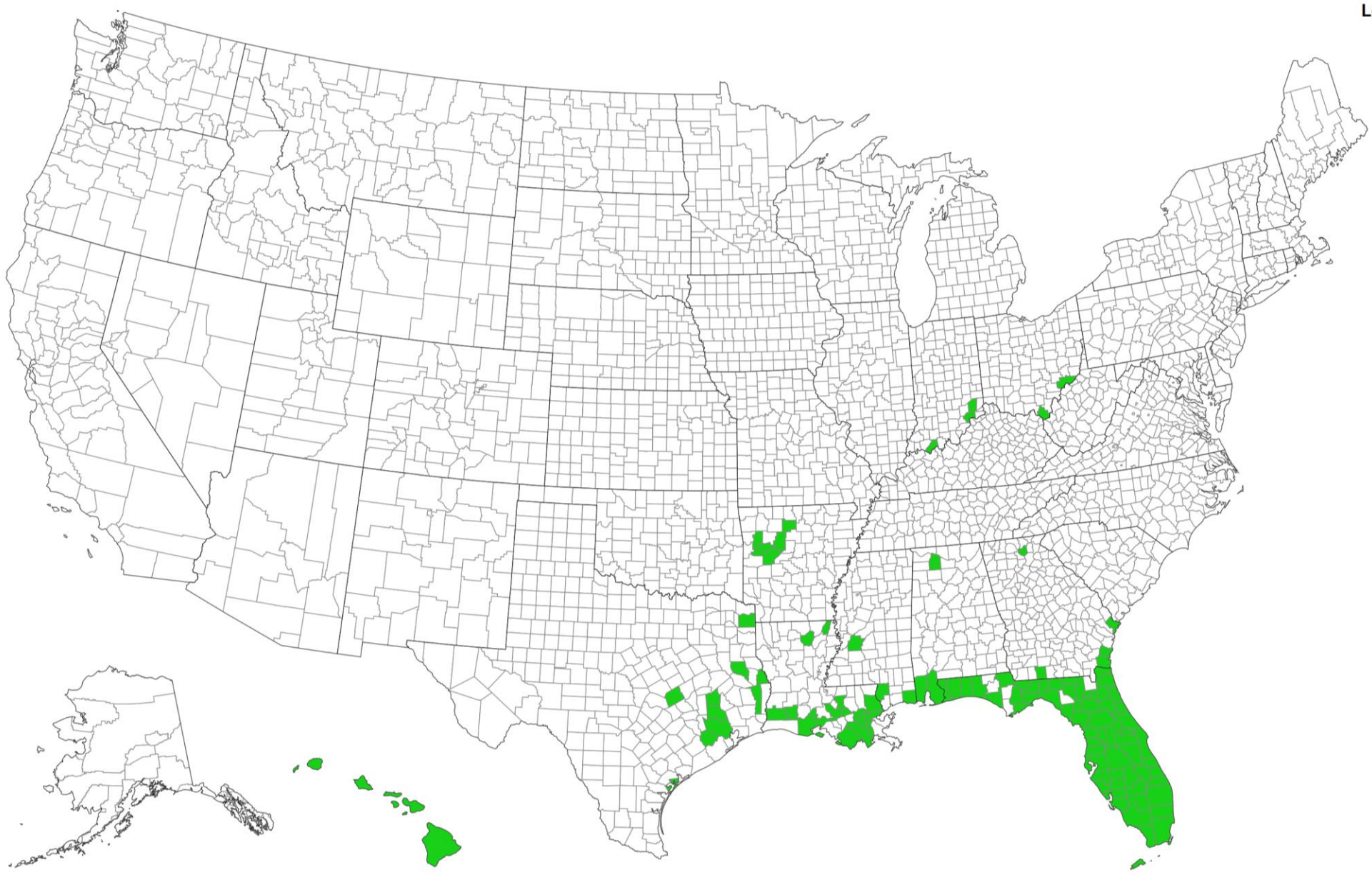


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# AIR POTATO INTRODUCTION

- Unknown introduction into the US (late 18<sup>th</sup> century)
- 1905 introduced into Florida by horticulturalist Henry Nehrling
  - Ornamental and potential food crop
  - USDA food crop evaluation
- By 1990s infestations were spreading very quickly





**Legend**  
□ No Data  
■ Species Reported

# Air Potato

Twining vine

Can grow to ~21 m in length and up to 20 cm a day

Spreads vegetatively through aerial bulbils

Vines grow throughout the summer and senesce during the fall/winter.



# AIR POTATO CONTROL-MECHANICAL

- Difficult due to the climbing nature of the vine
  - Harm desirable vegetation
  - Mowing can be helpful (avoid if bulbils present)
- Air potato “round-ups”
  - Winter
  - Freeze/incinerate bulbils



# AIR POTATO CONTROL-CHEMICAL

- **Foliar application of glyphosate**
- **Application can be difficult (high twining vine)**
  - Often only partial control is achieved
- **Does not kill bulbils that are already present**
  - Important to get rid of the bulbils post treatment!
- **Glyphosate is not effective in killing underground tubers**
  - Resprout after treatment
  - Multiple treatments needed
- **Fall in the best time for spray to be most effective**
- **ALWAYS follow label directions on any herbicide treatment**

# AIR POTATO CONTROL-BIOLOGICAL

- *Lilioceris cheni* (Coleoptera: Chrysomelidae)
- **Discovered in Nepal in 2002**
  - Drs. Robert Pemberton and Min Rayamajhi (USDA-ARS Invasive Plant Research Lab)
- **First released into Florida in 2011**



Photo by E. Gaskin

# AIR POTATO CONTROL-BIOLOGICAL

- *Lilioceris cheni* (Coleoptera: Chrysomelidae)



# LIFE CYCLE



Pupa



Adult



~28 days



Larvae

Eggs





Biological control  
agents have narrow  
host ranges!



# RELEASE PROGRAM IN FLORIDA

- **2014-2019 multi agency effort**
- **3 labs rearing insects**
- **1 Extension agent**



# BIOLOGICAL CONTROL IMPACTS



# *Lilioceris cheni*

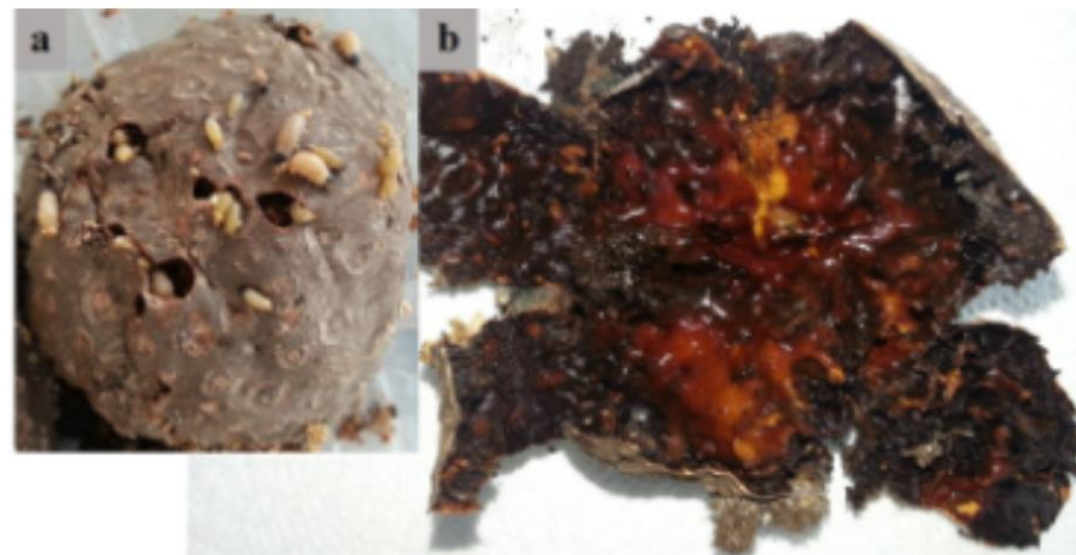


- Well established in Florida
  - No need to release
  - Beetles are dormant over winter
  - Emerge in summer
    - 4-6 weeks after vines
- Available to landowners outside of Florida  
Florida Department of Agriculture and Consumer Services - Division of Plant Industry



# OTHER DEVELOPMENTS

- *Lilioceris egena* (Coleoptera: Chrysomelidae)
- Recommended for release (2018)



# Switching continents



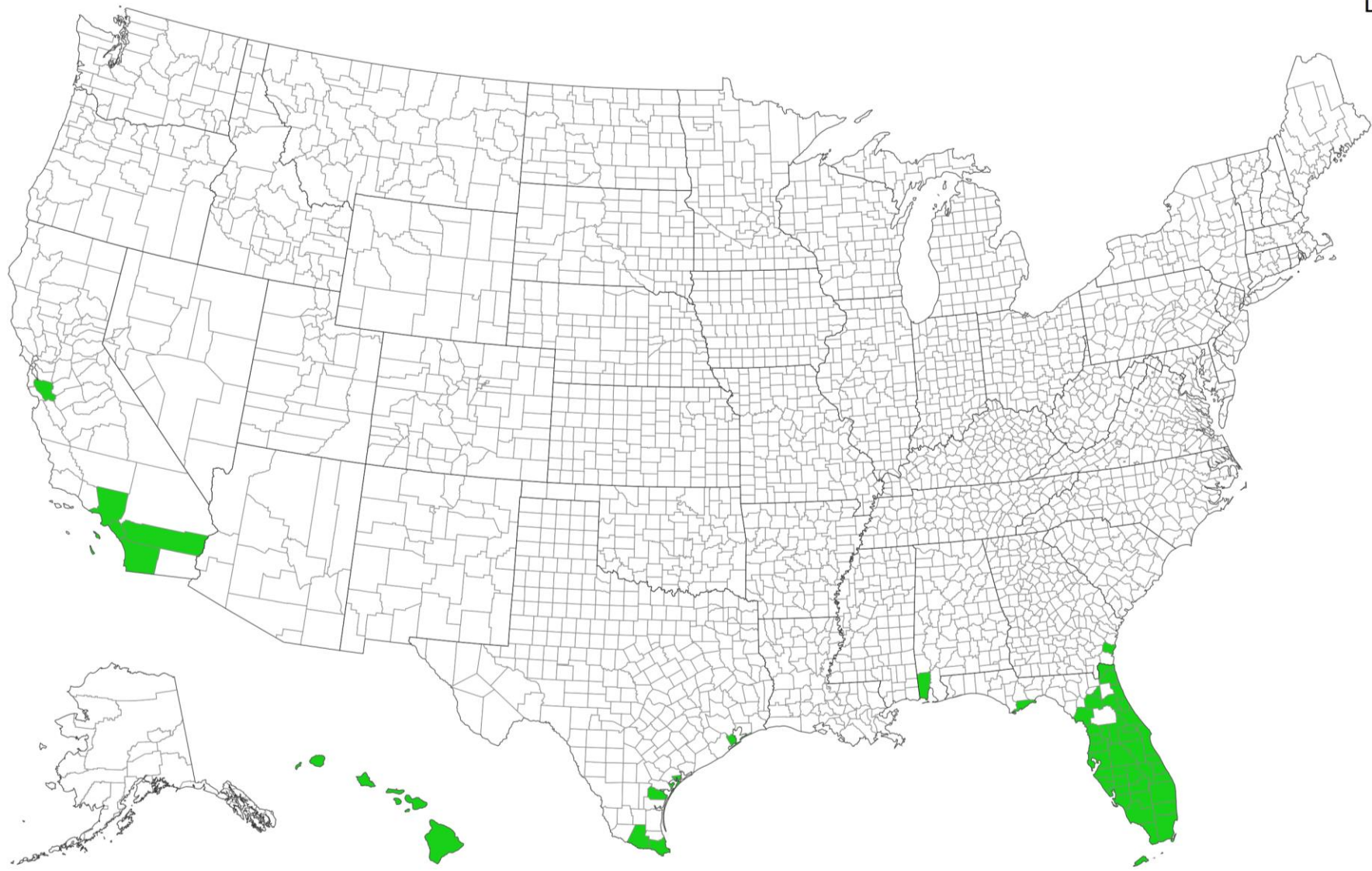
Melissa Smith and Ellen Lake, USDA



# BRAZILIAN PEPPERTREE (BP)

- *Schinus terebinthifolia*
- Anacardiaceae
- Perennial tree
- Coastal and open areas

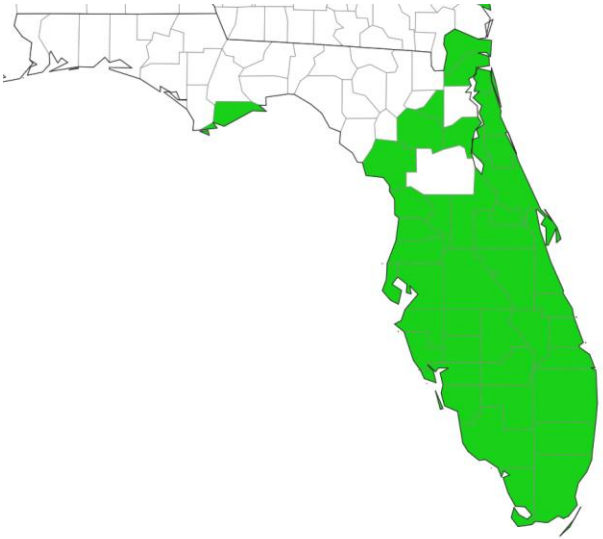




**Legend**

- No Data
- Species Reported

# BRAZILIAN PEPPERTREE WAS INTRODUCED INTO FL IN THE LATE 1800S



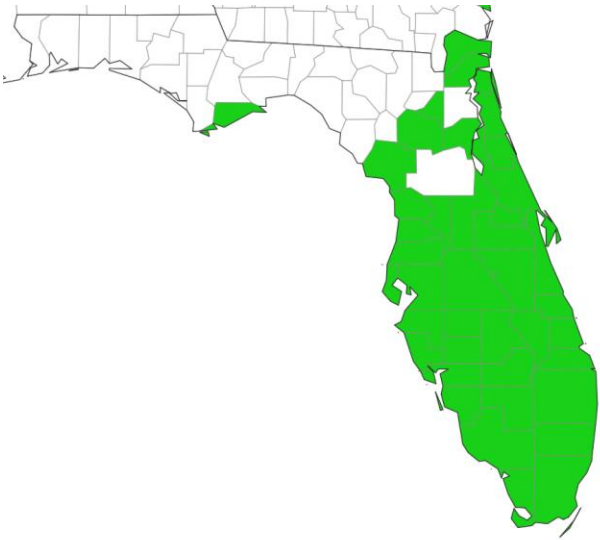
- Nearly 280,000 ha infested
- Invades disturbed and natural sites
- Displaces native vegetation

Cuda et al, 2006  
EDDMaps, 2020

**UF|IFAS**  
UNIVERSITY of FLORIDA



# BRAZILIAN PEPPERTREE WAS INTRODUCED INTO FL IN THE LATE 1800S



- Nearly 280,000 ha infested
- Invades disturbed and natural sites
- Displaces native vegetation
- Dr. Geo Stone (physician who introduced BP into Punta Gorda)  
“It ought to be in every garden in Florida”



# ANNUAL CONTROL COSTS (FLORIDA)

- **State and federal agencies \$2.5 million/ year on publicly-held conservation lands** (Hiatt et al., 2019)
- Does not include private lands



# WHAT MAKES BRAZILIAN PEPPERTREE SO AGGRESSIVE?

- Tolerance to shade, fire, drought and saline conditions
- Allelopathic effects to neighboring plants
- Hybrid vigor
- Massive plant growth and fruit production
- Long dispersal by birds



# BRAZILIAN PEPPERTREE CONTROL

## MECHANICAL



# **BRAZILIAN PEPPERTREE CONTROL CHEMICAL**

- **Cut stump**
- **Basal bark**
- **Foliar**

**ALWAYS read and follow label recommendations!**

# CUT STUMP

- **Herbicides**
  - Glyphosate
  - Triclopyr ester
  - Triclopyr amine
  - Imazapyr
- Apply herbicides to cambium within 5 minutes of cutting



# Basal Bark

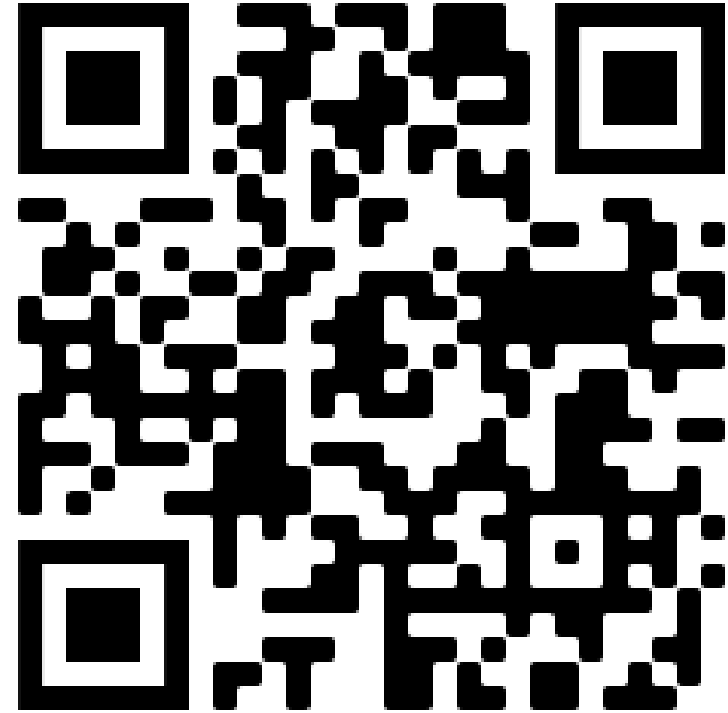


- **Imazapyr**
- **Triclopyr ester**
- 12-18 in. band around lower part of tree



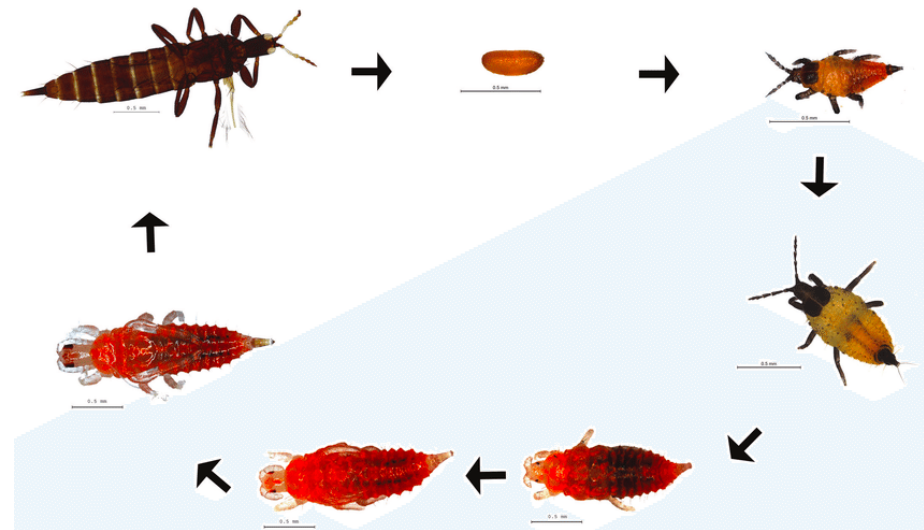
# FOLIAR

- **Triclopyr**
- **Glyphosate**
- Spray to wet, but not runoff
- Good coverage important
- Take care to avoid drift



# BRAZILIAN PEPPERTREE CONTROL BIOLOGICAL

*Pseudophilothrips ichini*



*Calophya latiforceps*

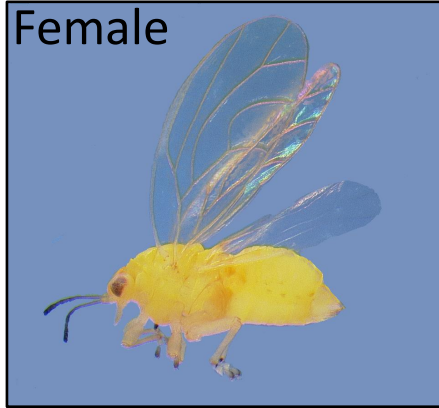


# *Calophya latiforceps* Burckhardt

Male



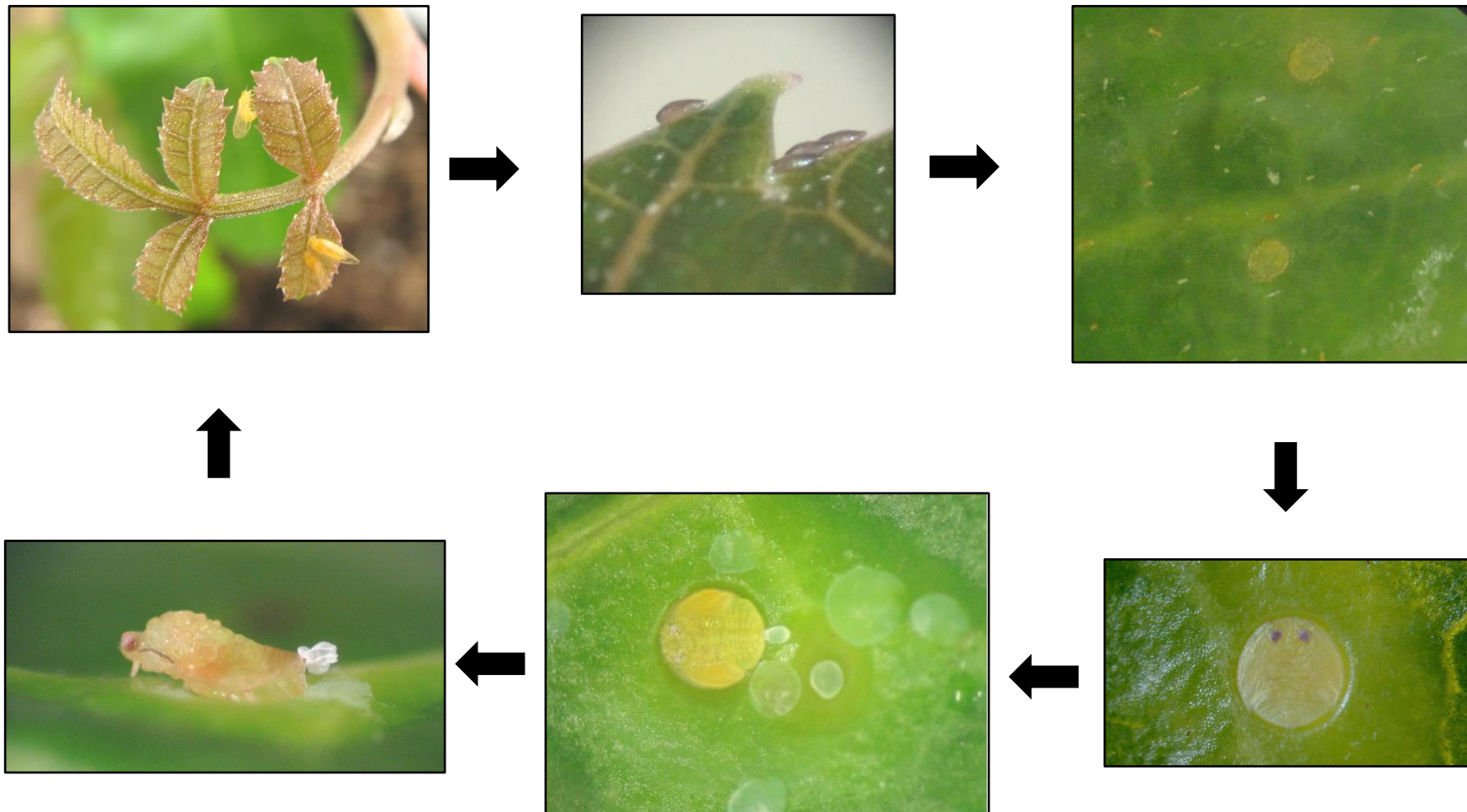
Female



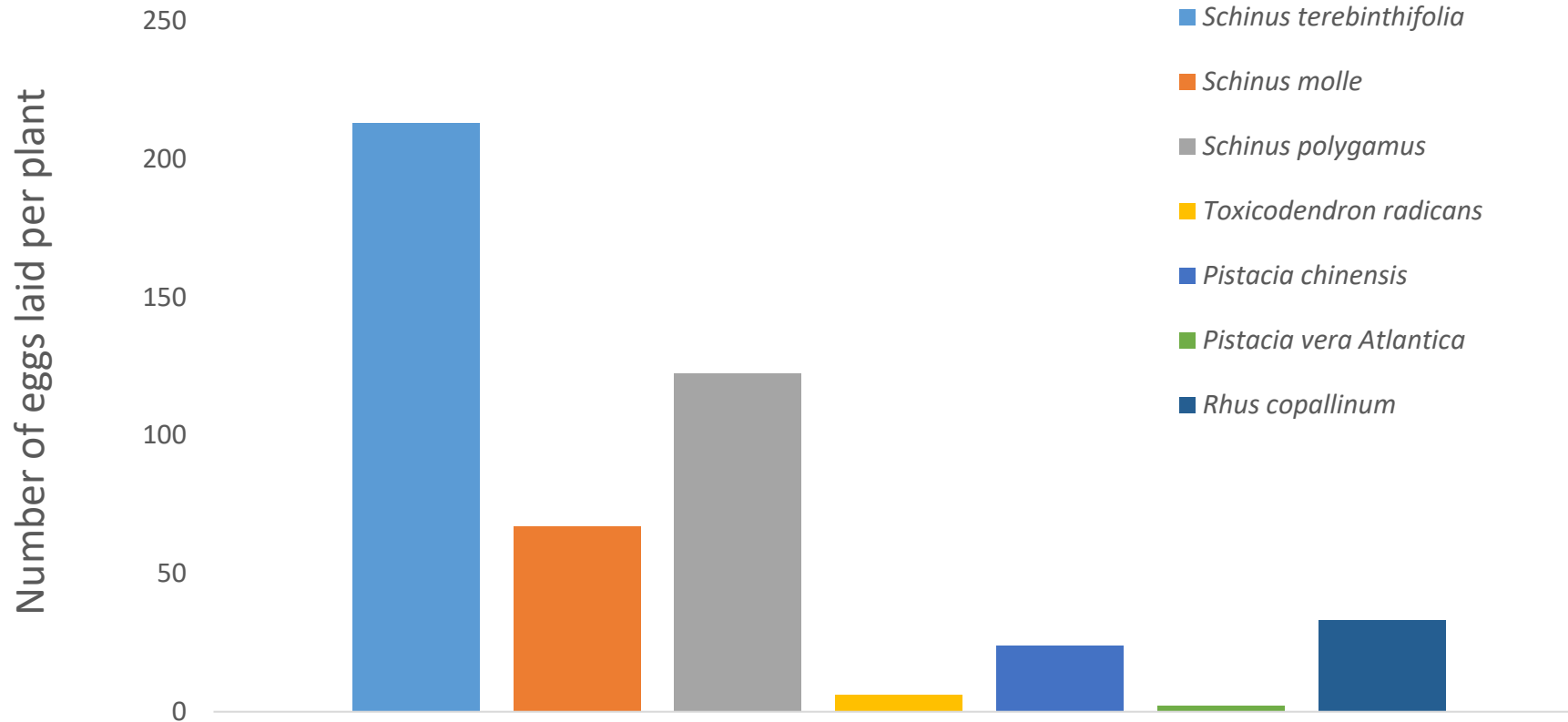
Brazil



# DEVELOPMENT TIME FROM EGG TO ADULT TAKES 40 TO 45 DAYS



# OVIPOSITION- *CALOPHYLA LATIFORCEPS*



# IN NON-TARGET SPECIES, THE NYMPH DIED OR COULD NOT COMPLETE ITS DEVELOPMENT



*Schinus molle*  
After 30 days



*Pistacia vera* Golden Hills  
After 16 days

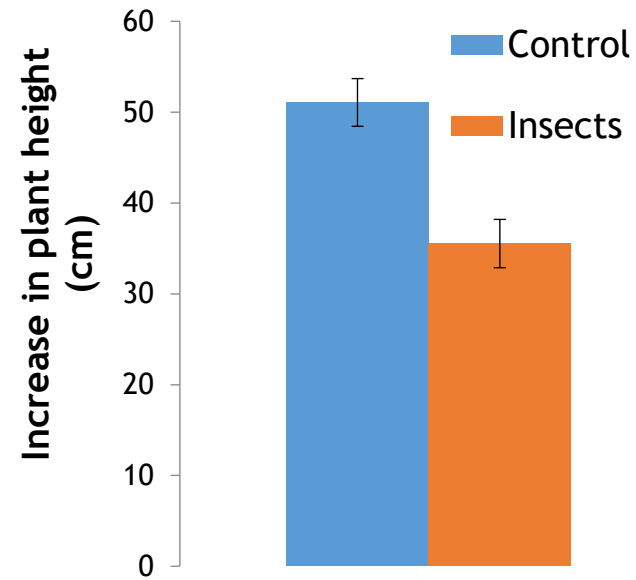
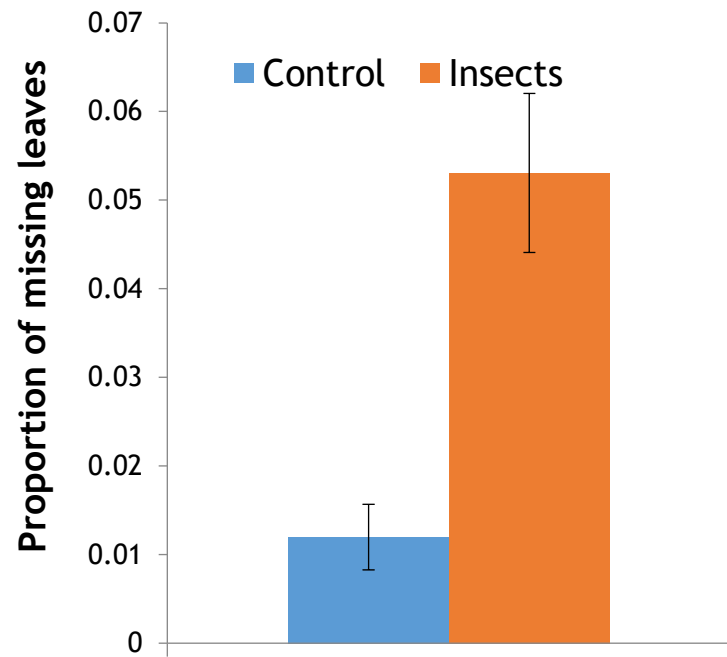


*Schinus terebinthifolia*  
After 30 days

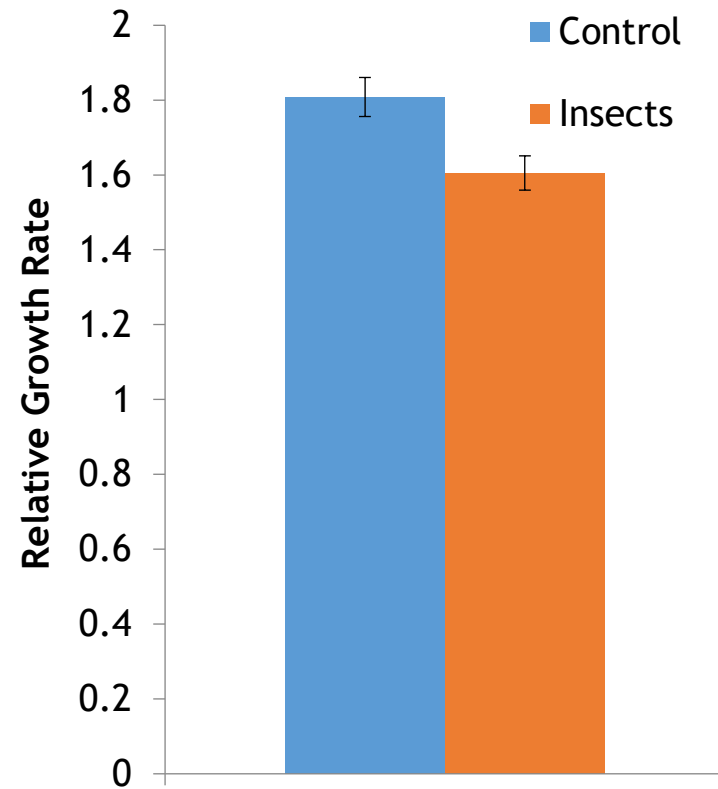
# DAMAGE ON BP INCLUDES YELLOWING, DEFORMATION AND IN SEVERE INFESTATIONS LEAF DROP



# PIT GALLS REDUCED PLANT GROWTH



# PLANTS WITH INSECTS HAD 12% LOWER RELATIVE GROWTH RATE (NS)



# THE VERDICT ON *CALOPHYA LATIFORCEPS*

- Host specific!
- Damaging to BP!
- Approved for release!!



# CALOPHYA LATIFORCEPS REARING



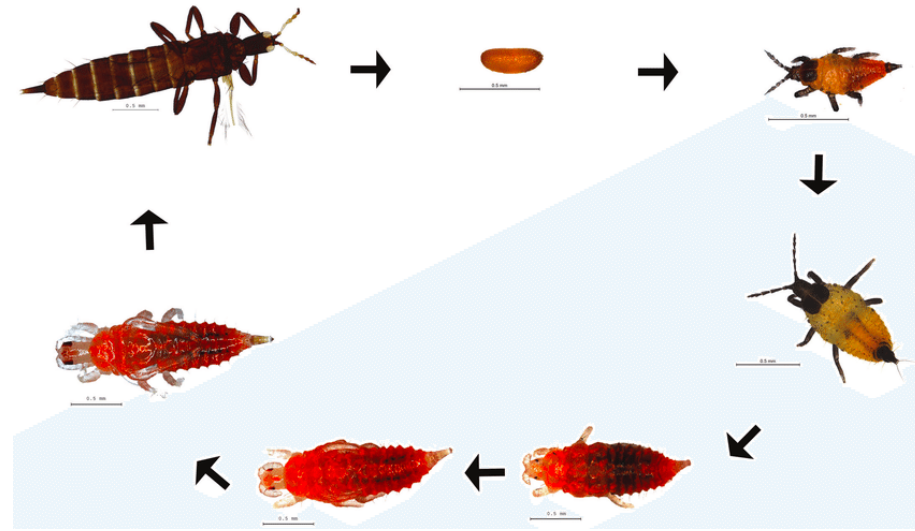
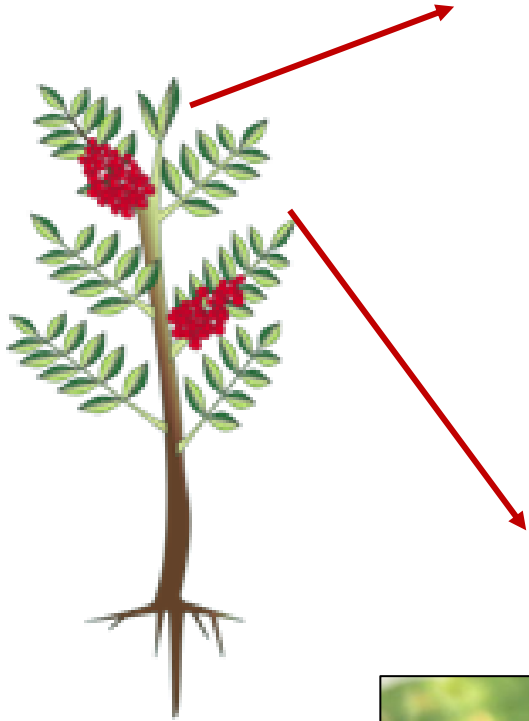
# CALOPHYA LATIFORCEPS CURRENT STATUS

- COVID-19 travel restrictions in place
- Must collect *Calophya latiforceps* in summer months
- November – January best
- Establish colony in containment (2-3 months)
- Cleared by FDACS-DPI
- Releases mid-2021 (best case)



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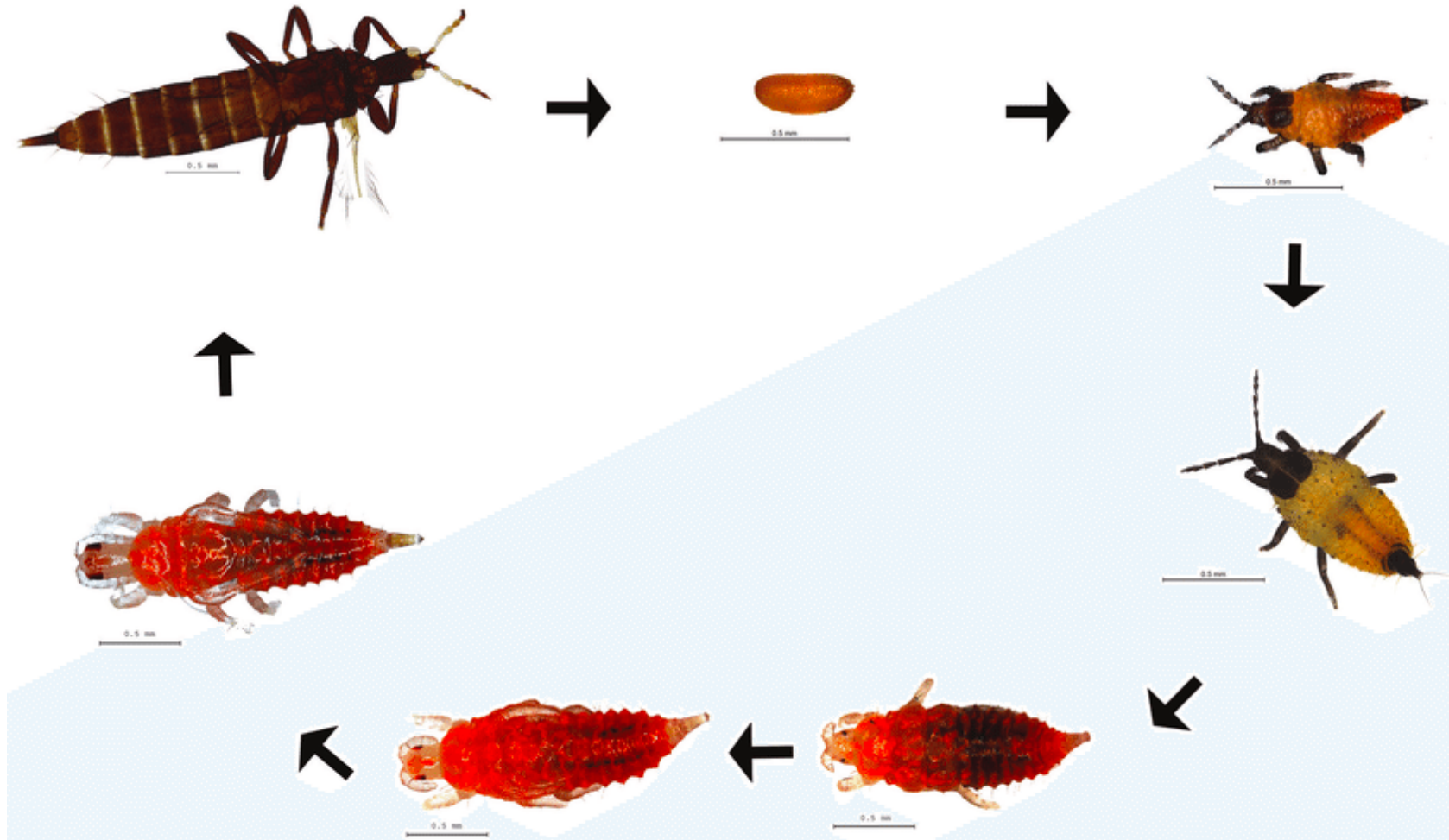
# *Pseudophilothrips ichini*



# *Calophya latiforceps*



# BP THRIPS

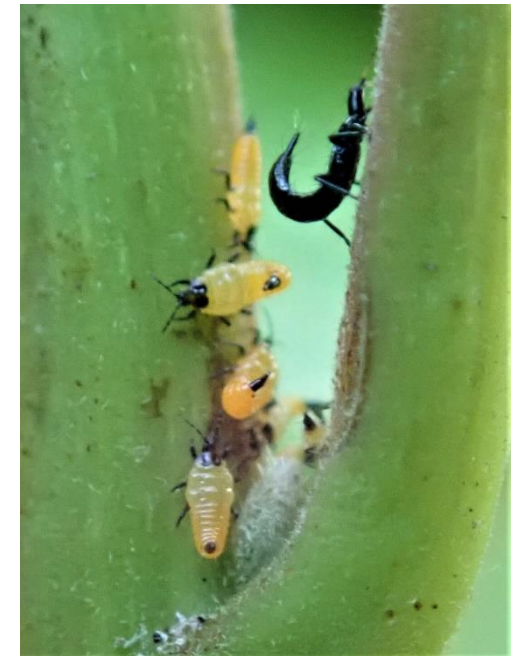


# BP THRIPS

- **Host specificity**
  - Tested 127 plant taxa
    - 45 families
    - 33 orders



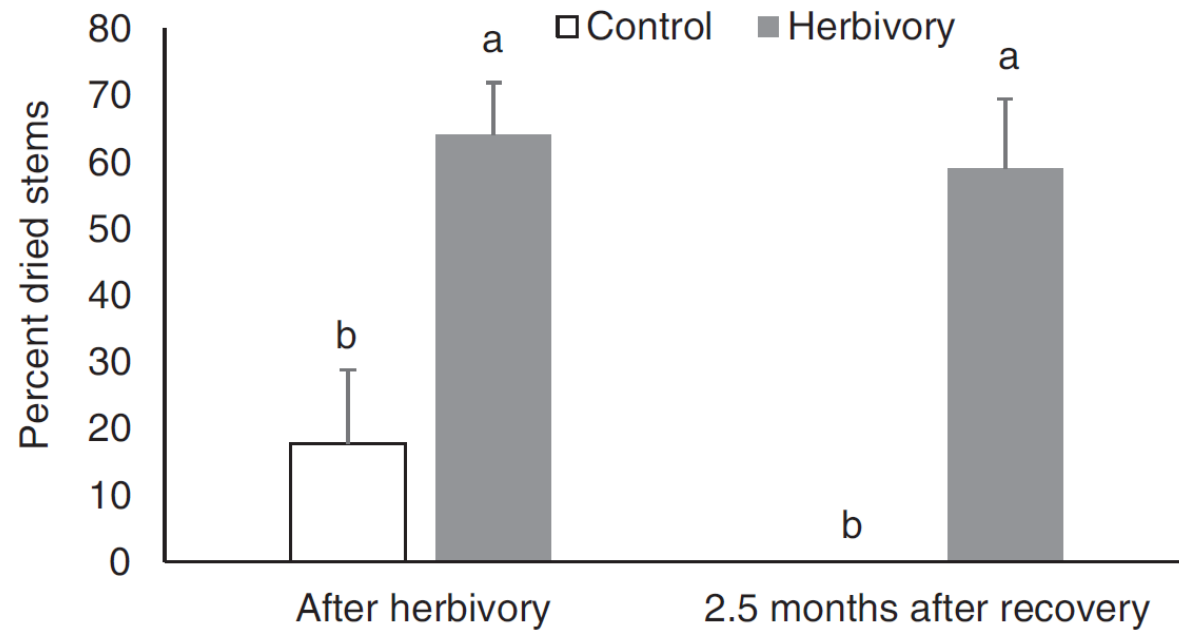
G. Wheeler



# BP THRIPS IMPACT



- After 30-day exposure to thrips



# THRIPS “VERDICT”

- Host specific
- Damaging
- Approved for release!
- Release began in Florida in June 2019





# CURRENT RELEASES

- Over 130,000 across state
- Multiple releases (uncaged)
- Caged release testing in progress



# ACKNOWLEDGMENTS

- **Minteer Lab**
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  - Brazil, Argentina
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  - UF/IFAS Extension Agents
  - Sedonia Steininger (FDACS-DPI)



# THANKS FOR YOUR ATTENTION!



Randy Westbrooks



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