Redbay and Laurel Wilt:
The search for resistant trees

Marc A. Hughes and Jason Smith

School of Forest Resources and Conservation

University of Florida

Laurel Wilt

Vector

Redbay Ambrosia Beetle

Xyleborus glabratus

(exotic)

Pathogen

Raffaelea lauricola

(exotic)

Host

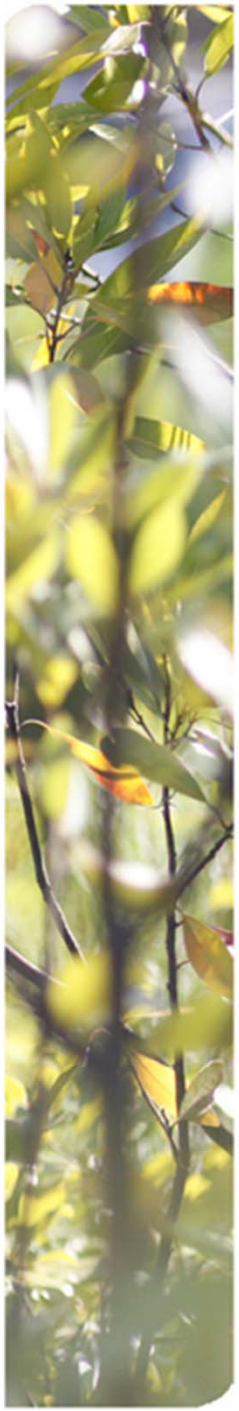
Lauraceae

Swamp bay, redbay,, silkbay, avocado, sassafras, pondspice, pondberry, spicebush, camphor, bay laurel, gulf licaria……

Redbay (*Persea borbonia*) trees with laurel wilt symptoms; wilted canopy with attached brown leaves

Daytona Beach, FL **Photo: Don Spence**

Georgia Photo: Chip Bates

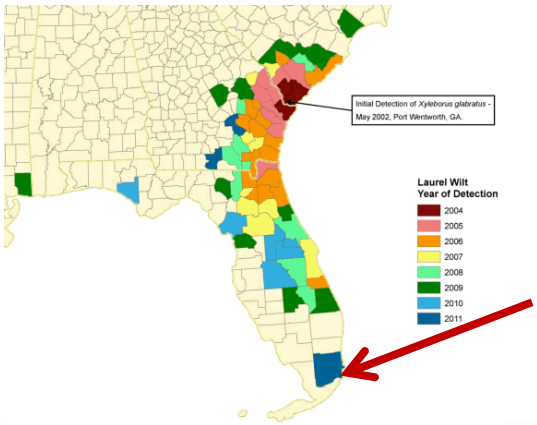


IMPACTS OF LAUREL WILT

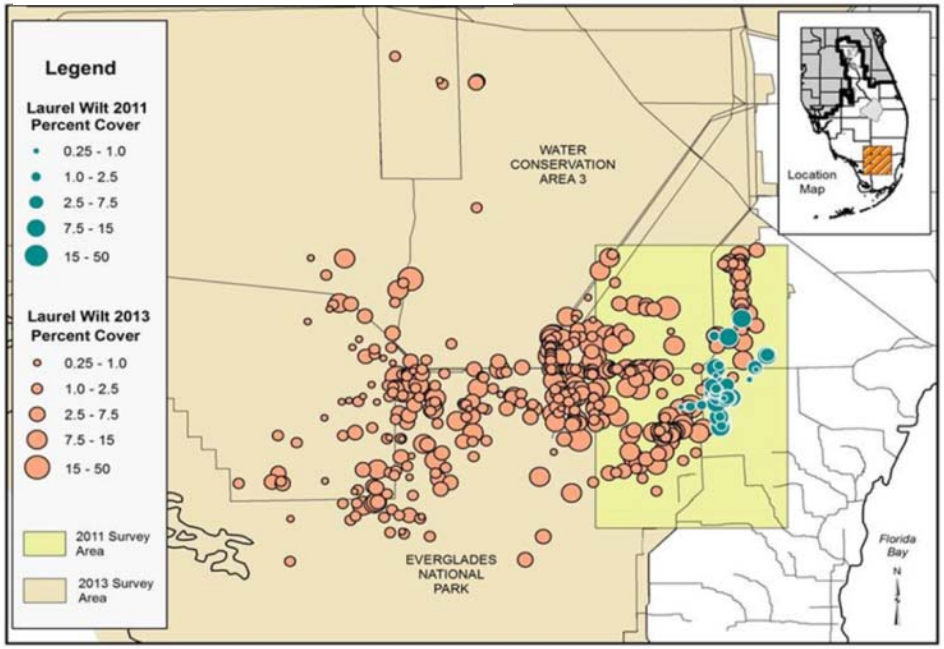
Raffaelea lauricola

A case of unprecedented damage and radiating effects for a single-strain pathogen.

Laurel Wilt in the Everglades



2011 Miami-Dade



Photos: (top) USDA Forest Service (bottom) Rodgers et al. 2014

Aerial surveys for symptomatic trees

- 2011 range: 4,925 ha
- 2013 range: 133,740 ha
- Expansion rate: 26.6 km/yr
- Maximum nearest neighbor distance: 11.8 km

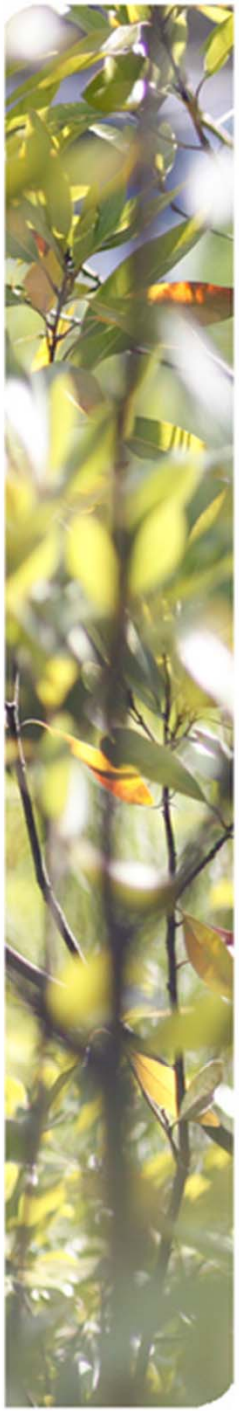
EXPANSION AND IMPACT OF LAUREL WILT IN THE FLORIDA EVERGLADES

LEROY RODGERS[1,*], ANDREW DERKSEN[2] AND TONY PERNAS[3]
[1]South Florida Water Management District. Land Resources Bureau, West Palm Beach, FL 33406, USA
[2]Florida Department of Agriculture and Consumer Services, Division of Plant Industry, Miami, FL 33158, USA
[3]National Park Service, Florida/Caribbean Exotic Plant Management Team, Palmetto Bay, FL 33157, USA
*Corresponding author; E-mail: lrodgers@sfwmd.gov

Laurel Wilt Resistance Screening Program

Objectives:

- **Identify surviving redbay germplasm**
- **Assess fungal genetic diversity**
- **Optimize inoculation procedures**
- **Resistance screening trials**



Identification and Propagation

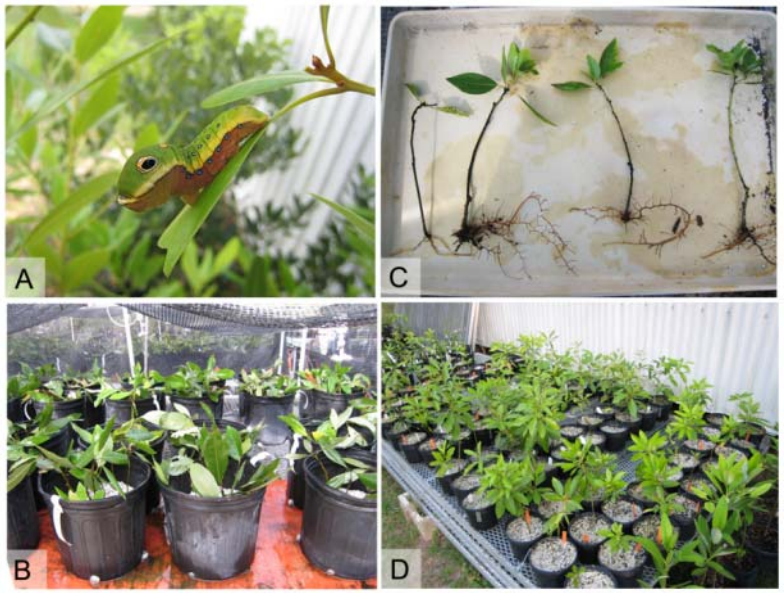
- Sites with high mortality
- Asymptomatic survivors
- Sampled ≈ 100 Trees

REFEREED RESEARCH

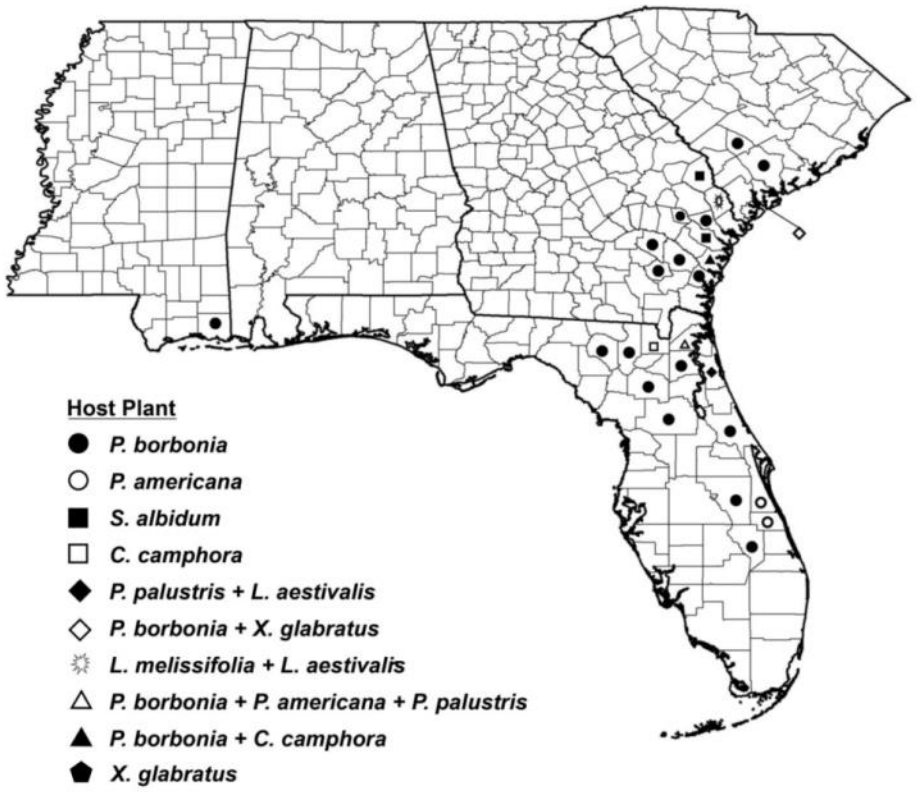
Vegetative propagation of putatively laurel wilt-resistant redbay (*Persea borbonia*)

Marc A Hughes and Jason A Smith

Native Plants Journal 2014, vol. 15, no. 1



Genetic Diversity



Local *R. lauricola* diversity

AFLP markers (218)

Results

- **Population ≈ 99% identical**
- **Likely 1 importation event**
- **Single dominant isolate (clonal in USA)**

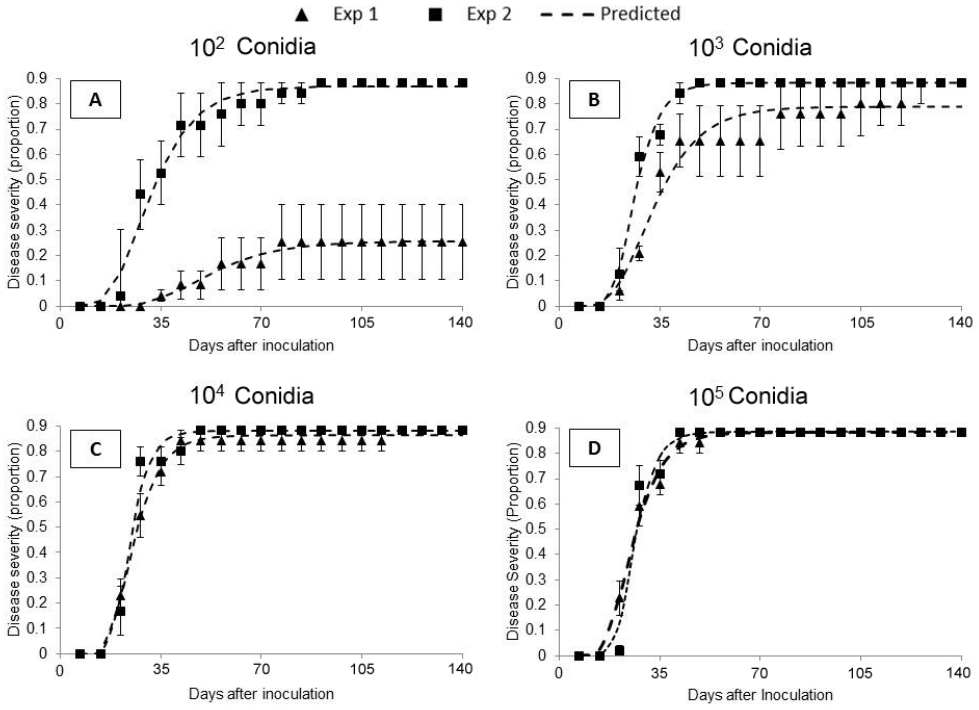
Inoculation Protocols

Forest Pathology WILEY-BLACKWELL

For. Path.
doi: 10.1111/efp.12134
© 2014 Blackwell Verlag GmbH

Responses of swamp bay, *Persea palustris*, and avocado, *Persea americana*, to various concentrations of the laurel wilt pathogen, *Raffaelea lauricola*

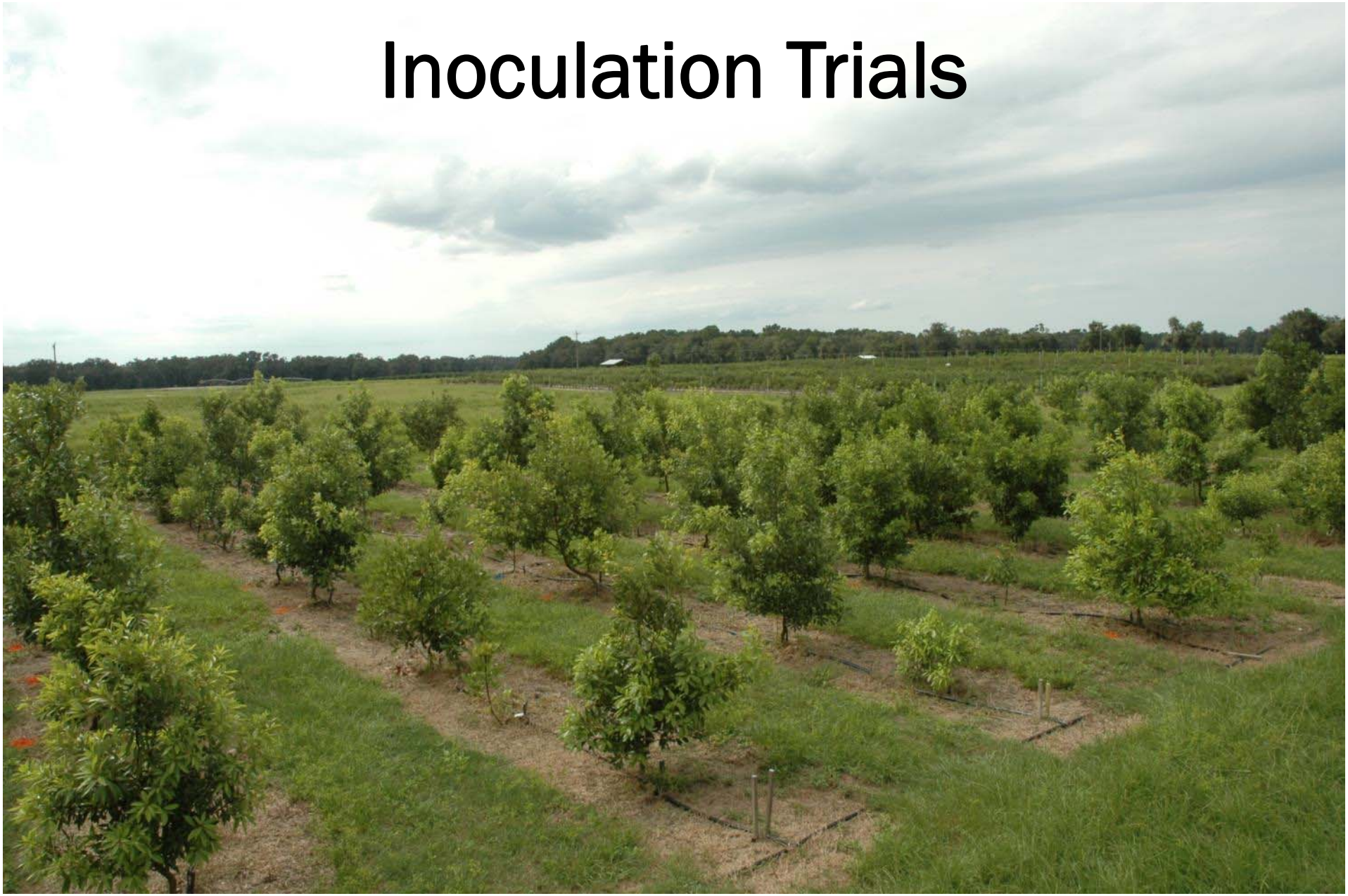
By M. A. Hughes[1,5], S. A. Inch[2], R. C. Ploetz[3], H. L. Er[4], A. H. C. van Bruggen[4] and J. A. Smith[1]



Test host response to differing inoculum concentrations

- 100 fungal spores can be lethal to swamp bay (threshold level)
- Consistent killer (10^3 – 10^5 conidia)

Inoculation Trials

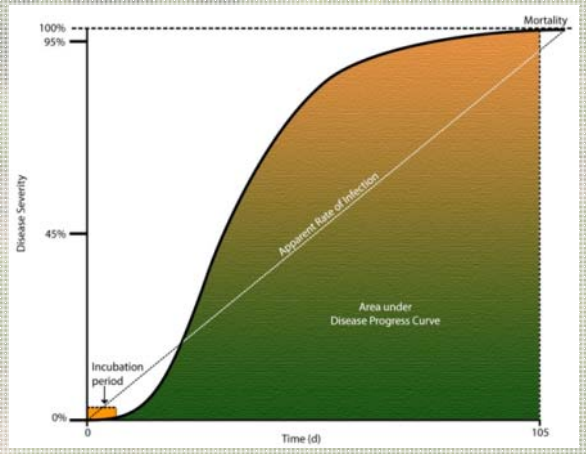


Inoculation Trials

- **Field grown plants (Citra FL)**
- **Inoculum: 3,000 *R. lauricola* spores**
- **Water inoculated controls**
- **60 genotypes screened**

Disease Parameters

- **Incubation period**
- **Rate**
- **Severity**
- **Mortality**
- **And more….**



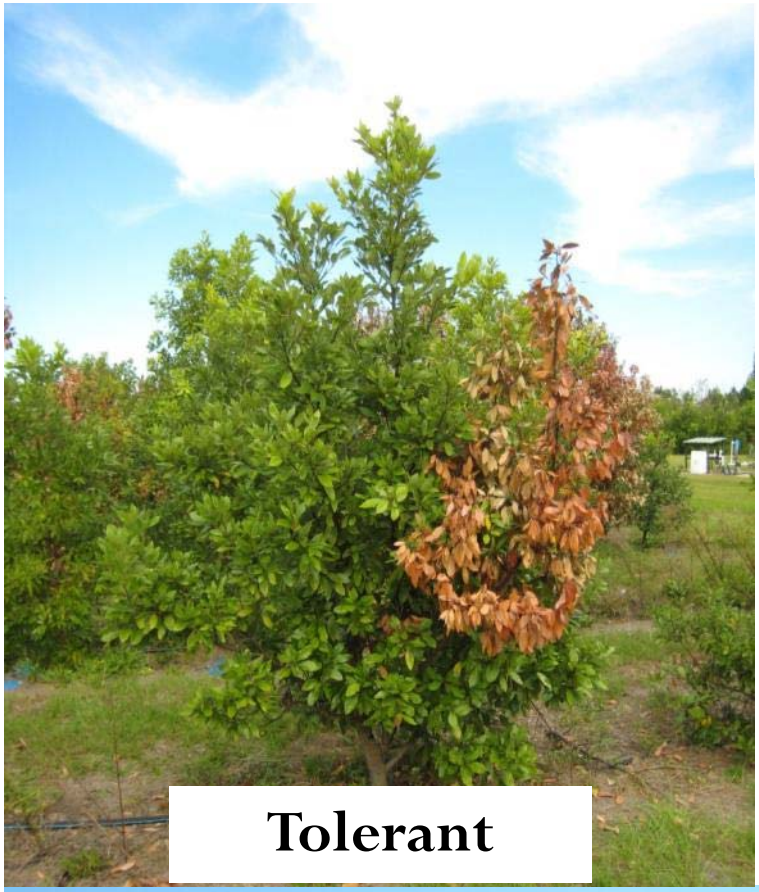
3 Weeks Post Inoculation (2012)

Results

- **Most genotypes highly susceptible (95% severity)**

- **<u>3 Tolerant genotypes!</u>**
  - **longer to show symptoms**
  - **slower rate of disease development**
  - **symptoms less severe**
  - **100% survival (2 yrs later)**

2014 Trial



Tolerant

Susceptible

Conclusions

- **Survivor trees yielded tolerant germplasm**
- **Basis for restoration plantings and breeding**
- **More genotypes to screen**
- **Potential to add Everglades swamp bay germplasm**

GEER 2015

Special Thanks to:

- **USDA Forest Service- Southern Research Station**
- **USDA/APHIS Farm Bill 2014**
- Jason Smith (UF), Randy Ploetz (UF), Albert Mayfield III (USDA Forest Service)
- Forest Pathology Lab (UF)

For questions contact:
Marc Hughes
mhughes741@ufl.edu

Please join us for a more detailed discussion