



Laurel Wilt, a deadly killer of Lauraceae in the U.S.

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Overview

- What is laurel wilt and what it looks like
- Disease biology and spread
- Management options
- Information resources

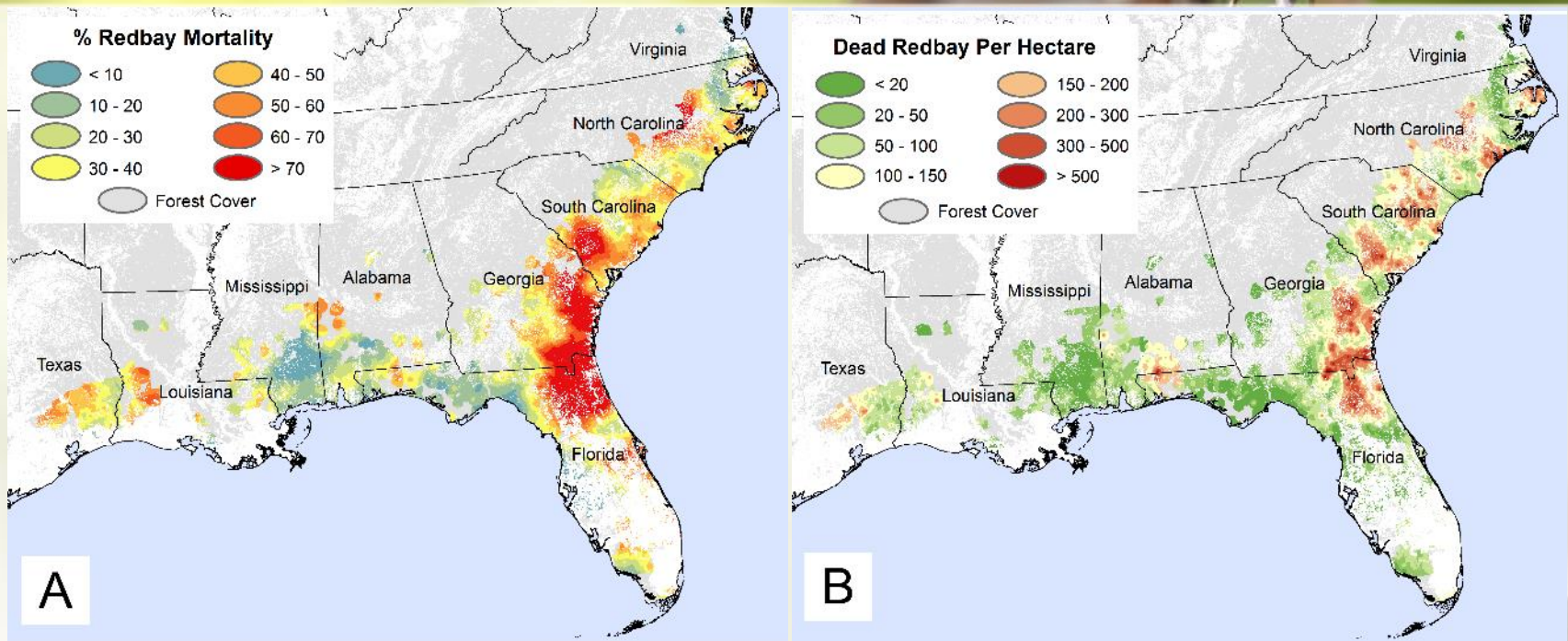
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Laurel wilt is.....

- ...an introduced **tree disease** that kills redbay and other members of the laurel family (*Lauraceae*)
- ...transmitted by an tiny exotic beetle (**redbay ambrosia beetle or RAB**)
- that beetle carries a **fungal pathogen**
- led to the death of **millions of trees**

Impacts to Redbay



Data and Maps: Frank Koch – US Forest Service

What does laurel wilt look like?

Tree canopy

- Transition from green to brown foliage
- Wilt
- Keep wilted leaves or drop them

Wood

- Accumulated boring dust
- Black/brown streaks
- Small circular holes (all ambrosia beetles)
- Redbay ambrosia beetle

Foliar Symptoms



Photo: Chip Bates, Georgia Forestry Commission

- ← Green to olive drab to crispy brown
- Purplish mid-vein



Photo: Marc Hughes, University of Florida

- Drooping foliage



Crown Wilt



A. Preliminary wilt in upper crown



B. Complete wilt of canopy

****Appears in “chunks” of canopy vs. sporadically throughout crown****

Photo: Hughes et al. 2015

Complete Wilt with Leaves Attached



Photo: Don Spence

Laurel Wilt or Not??



Photo: Walterreeves.com



Photo: James Johnson, Georgia Forestry Commission,
Bugwood.org

laurel wilt !!

Not laurel wilt !! Black Twig Borer damage

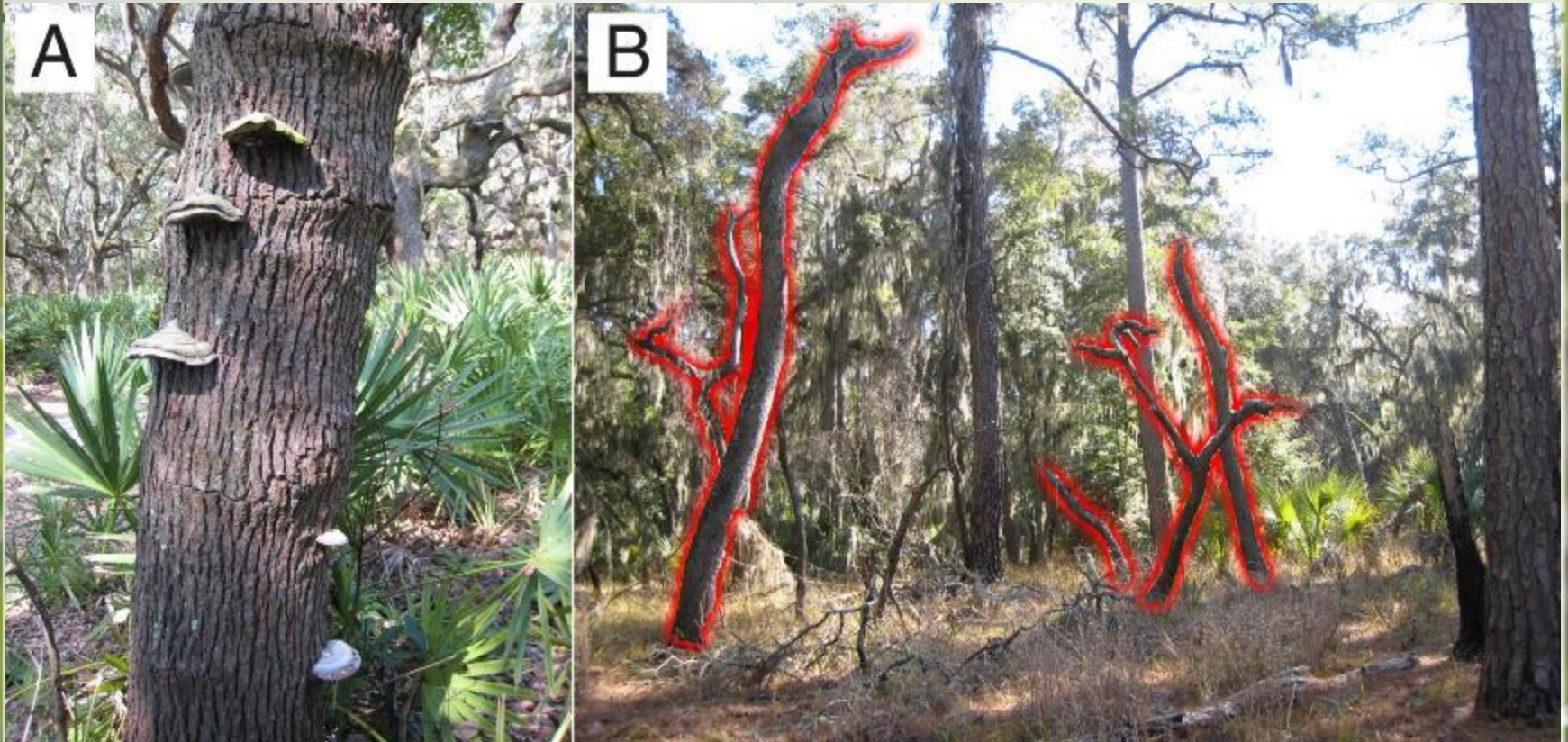
Black Twig Borer (BTB) Damage

- BTB damage often misdiagnosed as laurel wilt
- Infects single twigs
- Localized damage
- Hole in stem
- Trees can have both laurel wilt and BTB damage



Photo: Hughes et al. 2015

Finally, Decay and Stem Snap



- Various decay fungi readily colonize dead trees
- Conks and mushrooms are **NOT** the laurel wilt fungus

Photo: Hughes et al. 2015

Stained Wood

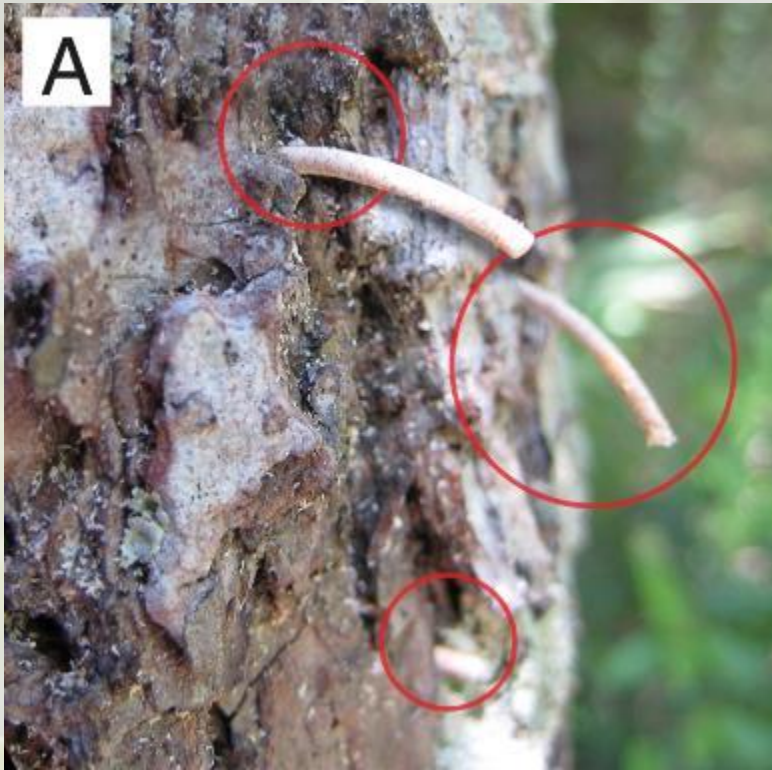
Infected Tree



Healthy Tree



Ambrosia Beetle Boring



A. Frass “toothpicks” or “tubes”



B. Accumulated frass at tree base

Photo: Hughes et al. 2015

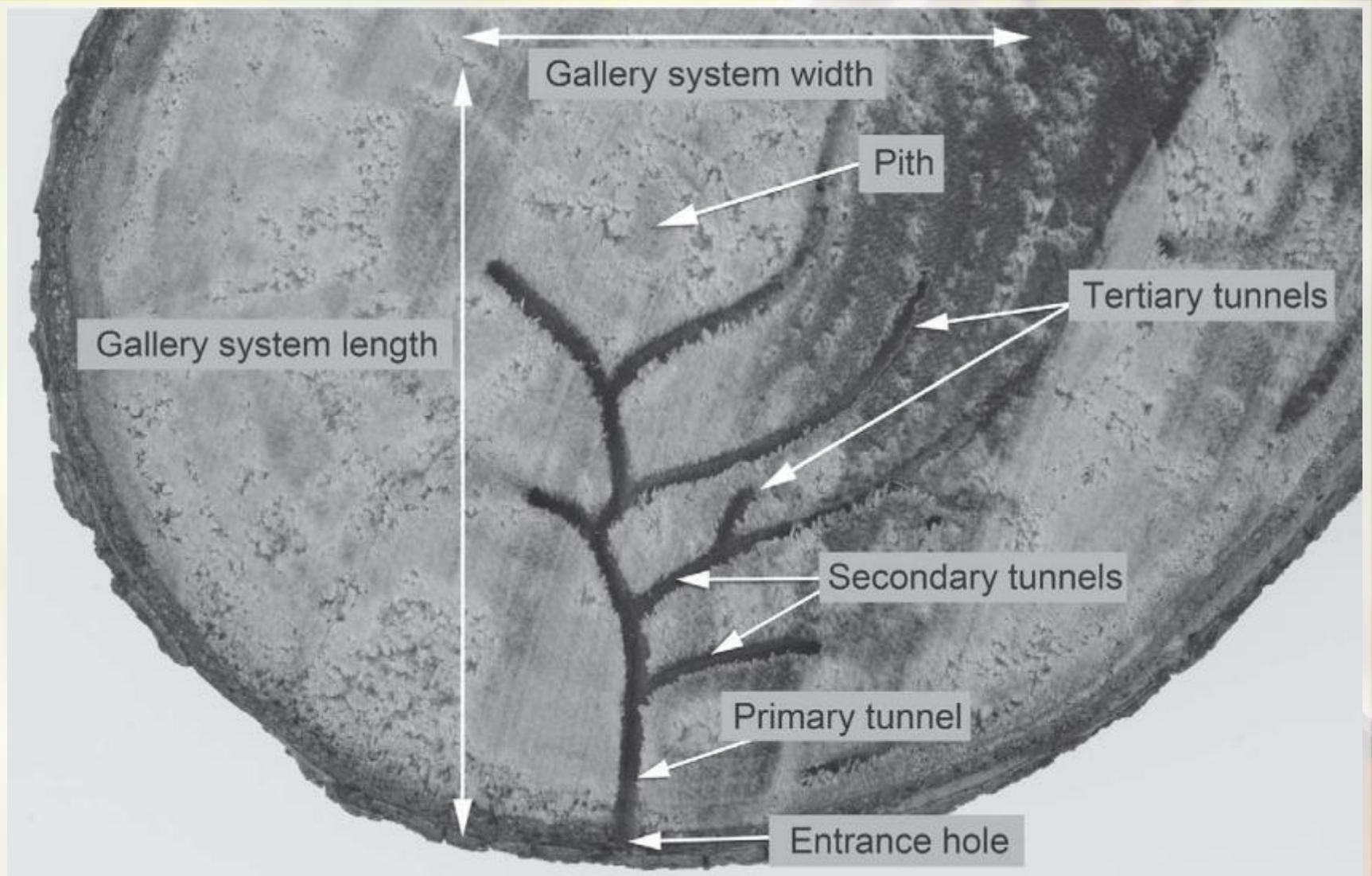
Redbay ambrosia beetle (*Xyleborus glabratus*)



A. RAB gallery system



B. RAB larvae grazing on symbiotic fungi (Photo: Lyle Buss-UF)

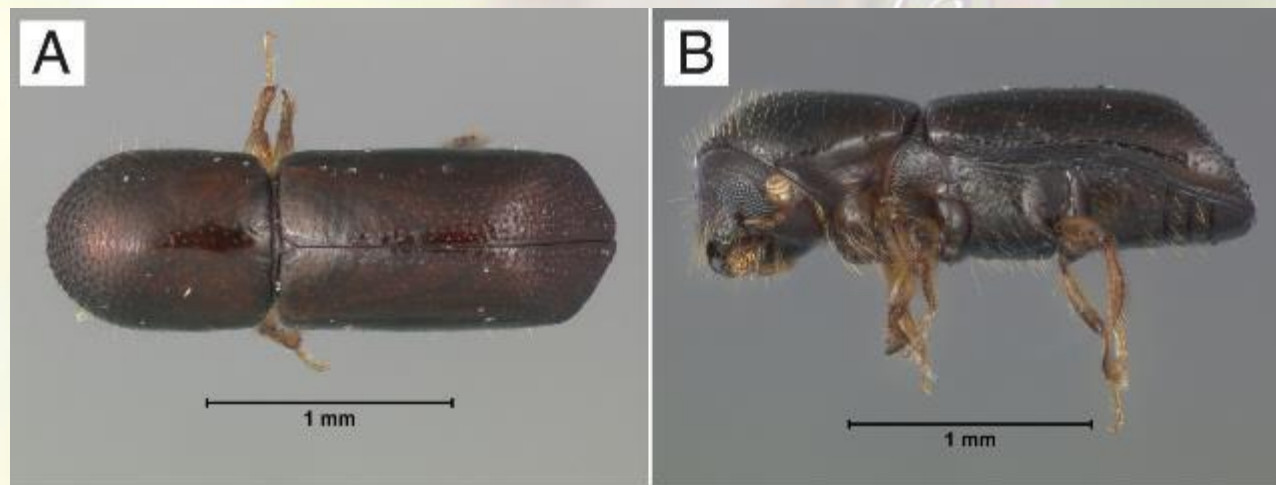


Redbay ambrosia beetle tunnels in wood's interior

Redbay ambrosia beetle (*Xyleborus glabratus*)

A-B = female

- mycangia
- flight
- epidemic driver
- abundant



Photos: Lyle Buss- University of Florida



Photo: Florida Division of Plant Industry

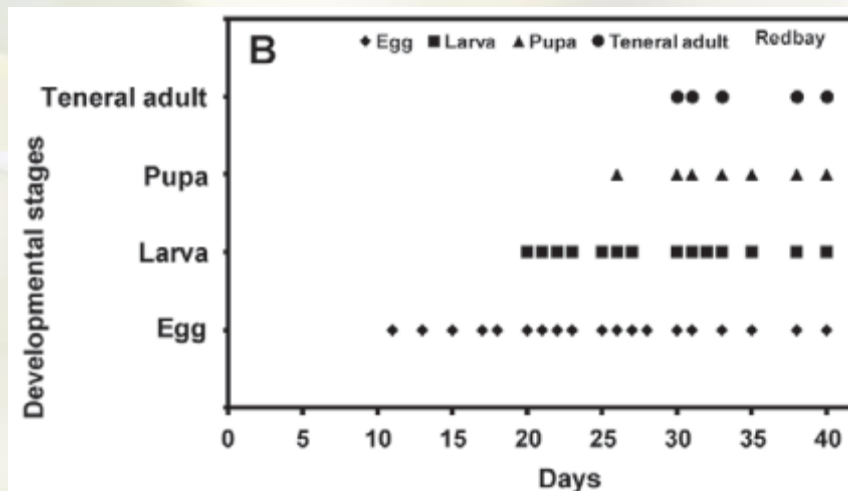


Photos: Lyle Buss and Gurpreet Brar- University of Florida

Redbay ambrosia beetle development

Stage Duration

- All stages found concurrently after 30 days
- Egg laying fairly continuous
- **Thousands** of beetles can emerge from an infested tree
- **Infested tree = beetle factory**



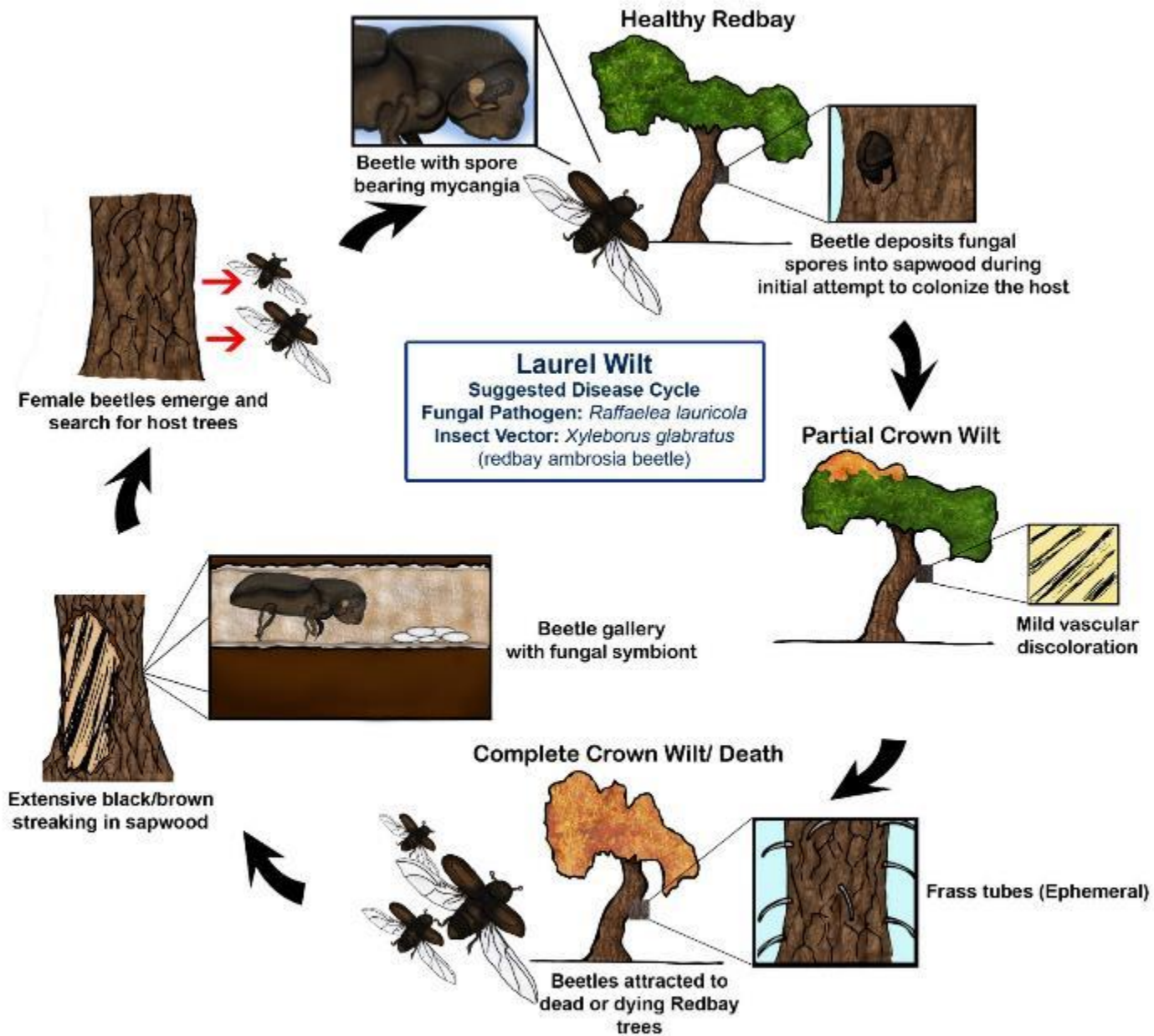
Reared on swamp bay logs 25 ± 2 °C



Photo: Lyle Buss- University of Florida

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Last Revised 10/2014

What attracts the redbay ambrosia beetle?

Odors

- Wood odors
- Exposed wood = more attractive
- Leaf odors
- Laurel wilt fungus

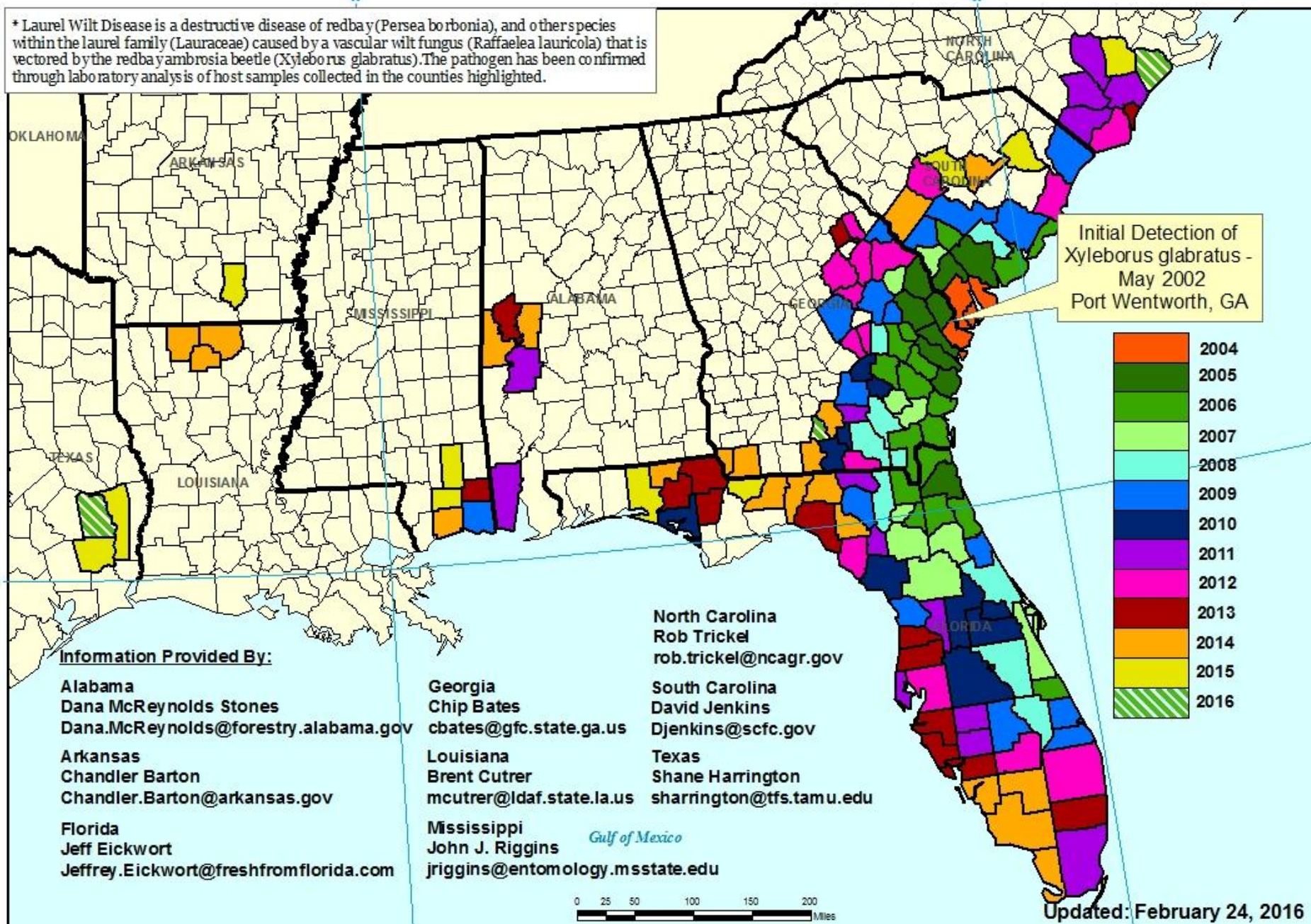
Visuals

- Stem silhouette
- Largest trees most attractive (odor + visual)



Distribution of Counties with Laurel Wilt Disease* by year of Initial Detection

* Laurel Wilt Disease is a destructive disease of redbay (*Persea borbonia*), and other species within the laurel family (*Lauraceae*) caused by a vascular wilt fungus (*Raffaelea lauricola*) that is vectored by the redbay ambrosia beetle (*Xyleborus glabratus*). The pathogen has been confirmed through laboratory analysis of host samples collected in the counties highlighted.



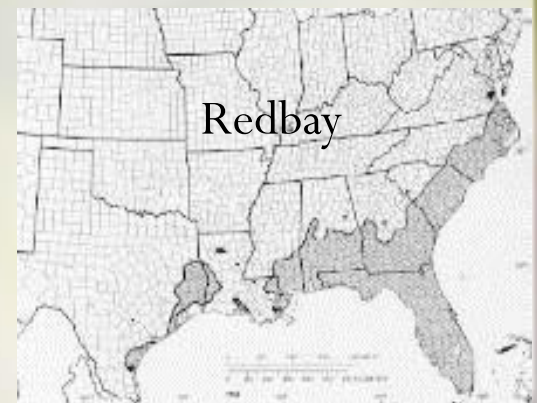
Disease Spread

Methods of movement

- **Natural beetle Flight**
 - Likely short flights to new trees
 - Contiguous
 - Long distance flight possible
- **Infested wood and forest products**
 - Human-assisted
 - Jumps
 - Difficult to predict



Photos: US Forest Service



Hosts = Laurel Family

- **Redbay** (*Persea borbonia*)
- **Swamp bay** (*P. palustris*) All commonly called “redbay”
- **Silk bay** (*P. humilis*)
- Avocado (*P. americana*)
- Persea indica*
- **Camphortree** (*Camphora cinnamomum*)
- **Sassafras** (*Sassafras albidum*)
- California laurel (*Umbellularia californica*)*
- **Bay laurel** (*Laurus nobilis*)
- **Pondspice** (*Litsea aestivalis*)^T
- **Pondberry** (*Lindera melissifolia*)^T
- **Northern spicebush** (*Lindera benzoin*)*
- **Gulf Licaria** (*Licaria triandra*)*^T

Oaks, Pines, Magnolias are NOT HOSTS

* = artificial inoculation experiments

^T = threatened or endangered

Redbays (redbay, swamp bay & silk bay)

Why 3 different species?

- Slight anatomical differences
- Slightly different habitats
- Symptoms the same across all 3 bays



Photos: Hughes et al. 2012, Marc Hughes

Camphortree (*Cinnamomum camphora*)



Xishan Moon Bay: 1200 years old Camphor tree



- Introduced Asian tree
- Common to urban landscape
- Mostly branch dieback



Camphortree (*Cinnamomum camphora*)

- More resistant to laurel wilt
 - Co-evolved host?
- Branch dieback
- Extensive attack increases symptoms
- Squirrels chewing on bark can lead to same dieback



5383225

Photos: Chip Bates, Georgia Forestry Commission, Bugwood.org

Sassafras (*Sassafras albidum*)

- Medium sized shrubby tree
- Deciduous
- Often share a common root system
 - Underground transmission
- Other main host of concern
 - Huge geographic range



Sassafras albidum

Photos: (top) Marc Hughes, (bottom) Larry Korhnak, University of Florida

Sassafras (*Sassafras albidum*)



Photos: R. Scott Cameron, Georgia Forestry Commission

Sassafras (*Sassafras albidum*)



Photos: R. Scott Cameron and Chip Bates, Georgia Forestry Commission

May 2009



Photos: R. Scott Cameron, Georgia Forestry Commission

August 2009



September 2009



Photos: R. Scott Cameron, Georgia Forestry Commission

Bay Laurel (*Laurus nobilis*)

- Bay leaf spice
- Ornamental tree/shrub



Photo: pfaf.org

Photo: Hughes et al. 2014.

Pondspice (*Litsea aestivalis*)

- Highly rare shrub (often multi-stem)
- Deciduous (drops leaves in winter)



Photos: James Johnson, Georgia Forestry Commission, Bugwood.org



Photo: Hughes et al. 2011.

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Physical Tree Protection

- **Screen barriers around trunk**
 - will attack higher locations
 - bore through screens
 - Few needed for disease
- **Not a suggested management option**



Maner et al. 2013

Sanitation (aka remove dead trees)

- Effective way to lower beetle populations
- However, unlikely to completely eradicate disease from an area

Goals

- Physically destroy beetles and galleries
- Wood drying
- Encourage other decay fungi
- Stop emerging beetles

Sanitation Recommendations

- Cut and leave onsite
- Cut and section (increase drying & fungal competition)
- Cut and section and cover
- Cut and chip
- **Cut and chip and cover**
- Municipal Dumps (if county already has laurel wilt)

Main point

- Destroy wood as much as possible
- Do not move wood around to new areas

Effectiveness of wood chipping

(10 month study)

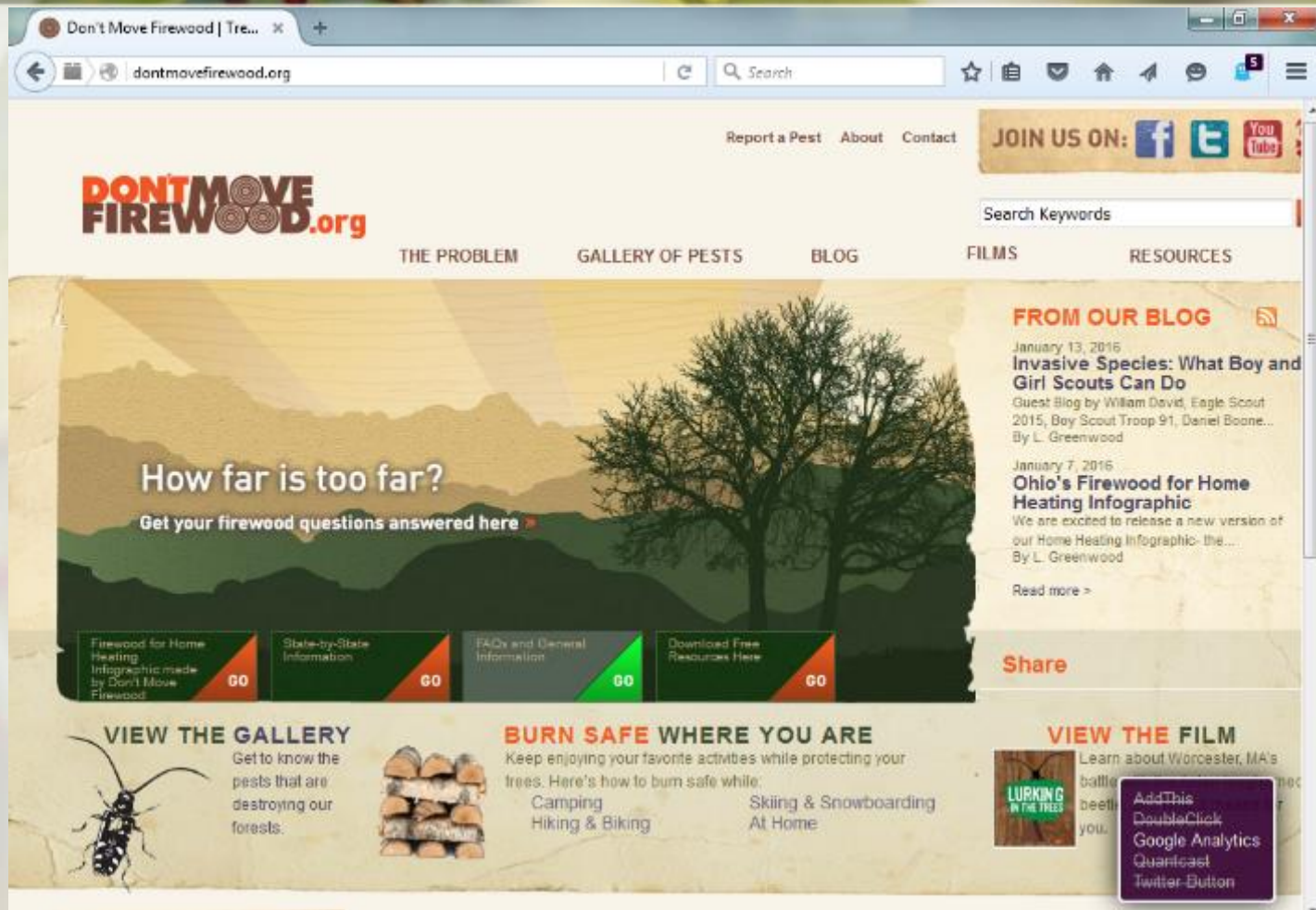
Un-Chipped Wood

- Emerged *X. glabratus*: 1,000 +
- Fungus survival: 3-15 mo.

Chipped wood

- Emerged *X. glabratus*: 10
 - Covered chip piles: 0 RAB
- Fungus survival: 2 days

Dontmovefirewood.org



Chemical Methods

Fungicides

- Alamo™ (propiconazole)
- Macro-infusion process
- Lasts around 12-18 months
- Requires professional help

Insecticides: not effective



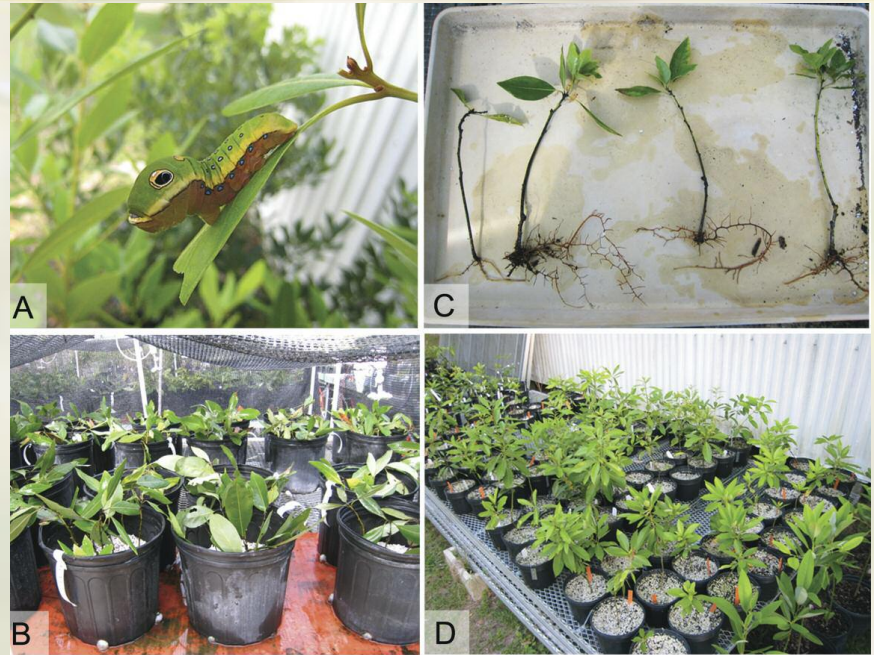
Chemical Methods

- Standard **fungicides** will not work
- Sprays and soil drenches will not work
- Macro-infusion with propiconazole is only viable method tested for LW
- Refer to extension agents for best advice



Host Resistance

- Propagation of redbay survivors from severely affected sites
- Screen for resistance to LW pathogen
- Tolerance redbays in development



Hughes and Smith 2014, Native Plants Journal

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Information resources

- Local forestry agency website
 - (Florida forest service, Georgia forestry commission, etc)
- Country Extension Agent (via university system)
- Southern Regional Extension Forestry webpage
 - Laurel wilt fact sheet on the way
- Laurel wilt recovery plan on redbay and other forest species
 - In *Plant Health Progress* online journal (free)
 - “Infrastructure and experts” section has regional contacts
- Laurelwiltresearch.com
- University of Florida EDIS database

A close-up photograph of a tree branch with a small, rectangular, light-colored research tag attached to it. The tag has the text "1 SCT-MIT" written on it. The background is a blurred green, suggesting a forest or garden setting.

Thank you for your time

For further questions about
this presentation contact:

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