Laurel Wilt Etiology in Pondspice, Pondberry and Camphortree

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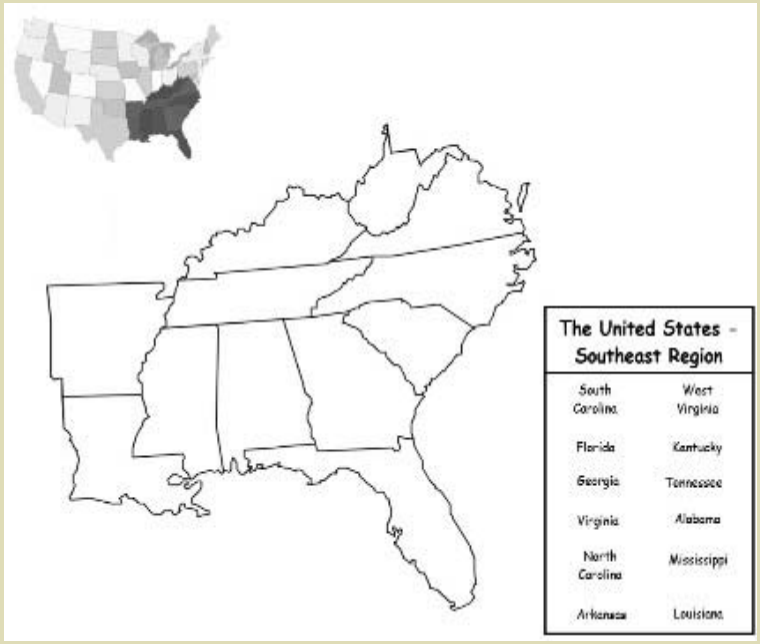
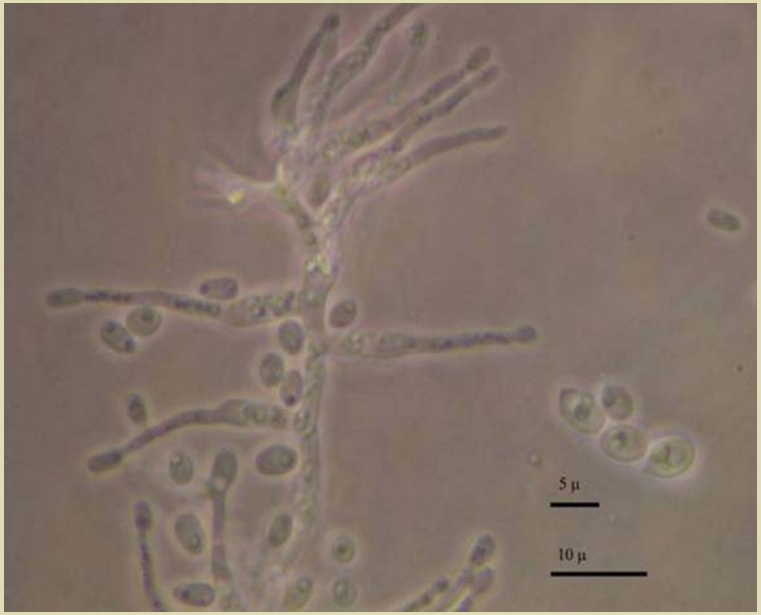
Laurel Wilt, Hunting Island State Park, SC (April, 2007)

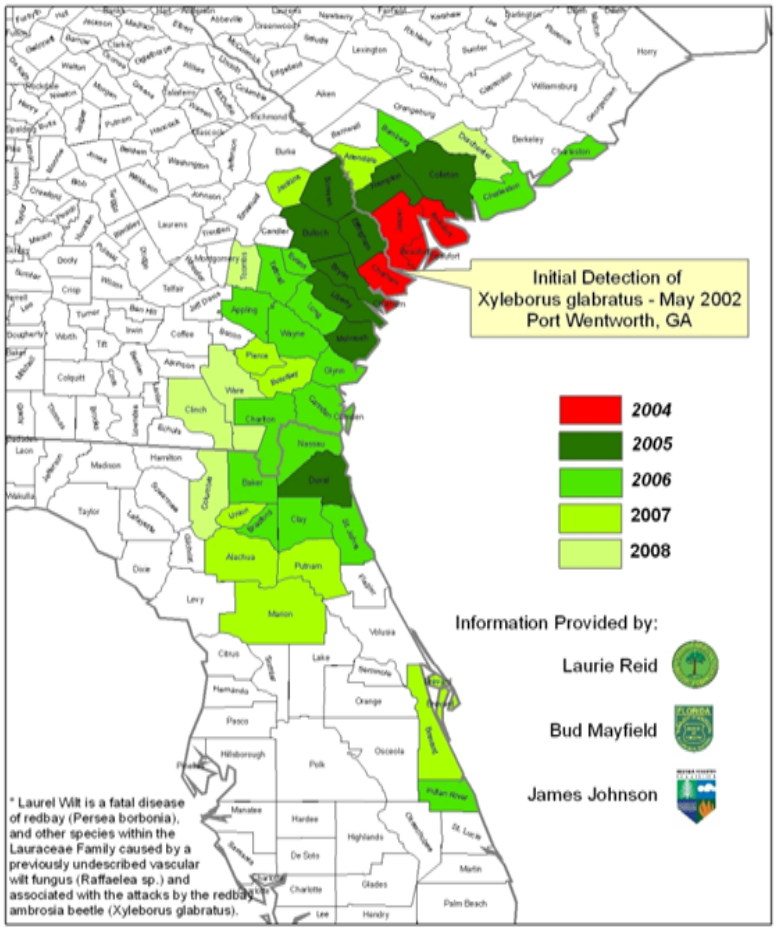

The United States - Southeast Region
South Carolina
West Virginia
Florida
Kentucky
Georgia
Tennessee
Virginia
Alabama
North Carolina
Mississippi
Arkansas
Louisiana


5 µ
10 µ

Xyleborus glabratus carries Raffaelea lauricola, its fungal symbionts, in mandibular mycangia.

Mandibular Mycangia

Distribution of Counties with Laurel Wilt Disease* Symptoms, by Year of Initial Detection



Pondspice
(*Litsea aestivalis)*

Pondspice

Pondspice, Lady's Island, SC

- Family Lauraceae
- Threatened species
- Large shrub
- Occurs in coastal plains where redbay is common.

Field Assessments

Lady’s Island in Beaufort County, SC

A site near Clyo, GA in Effingham County

Susceptibility Of Pondspice to *R. lauricola*

Pondspice

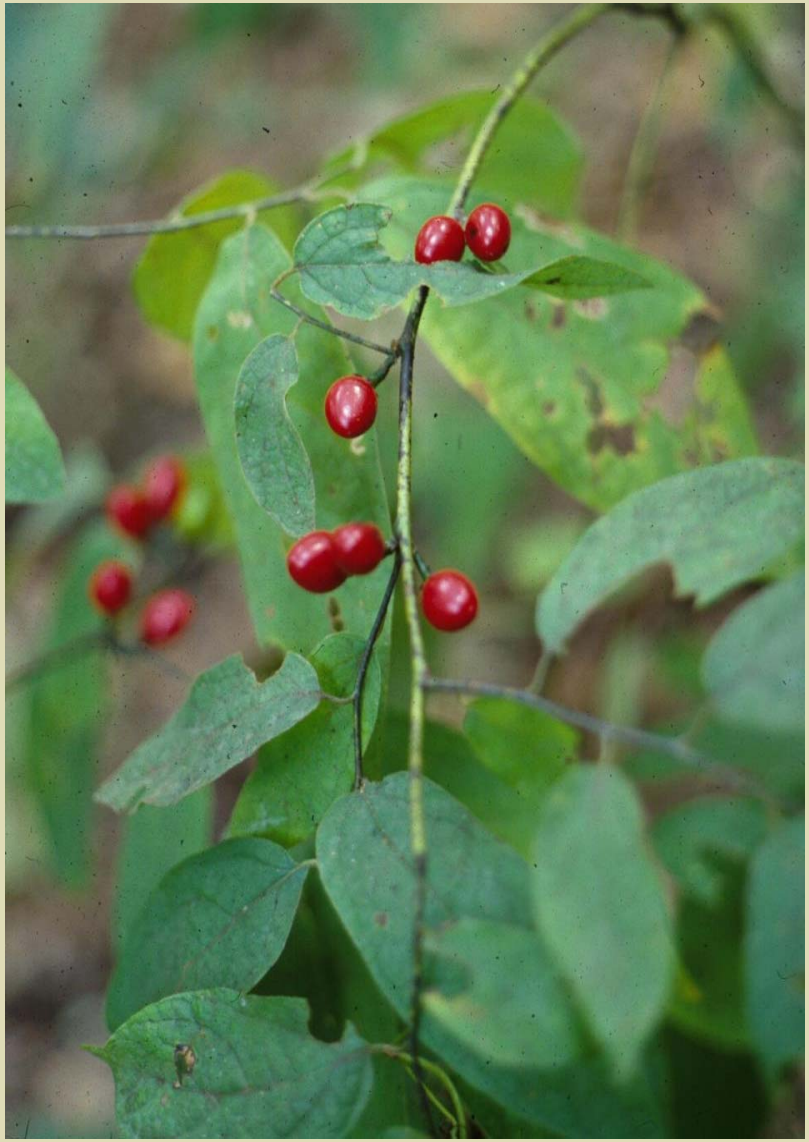
- **Highly susceptible to laurel wilt disease**
- **Disease primarily observed in natural areas where redbay is also present**
- **Probably not a good reproductive host for *Xyleborus glabratus***

Pondberry (*Lindera melissifolia*)

Pondberry in Clyo, GA

- Highly Clonal
- Lauraceae Family
- Understory Shrub
- Endangered Species

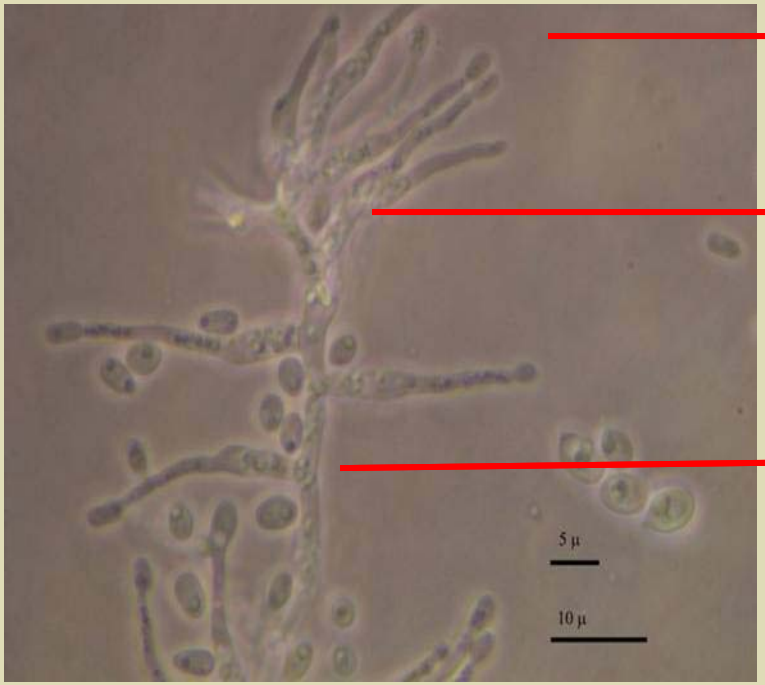
Pondberry



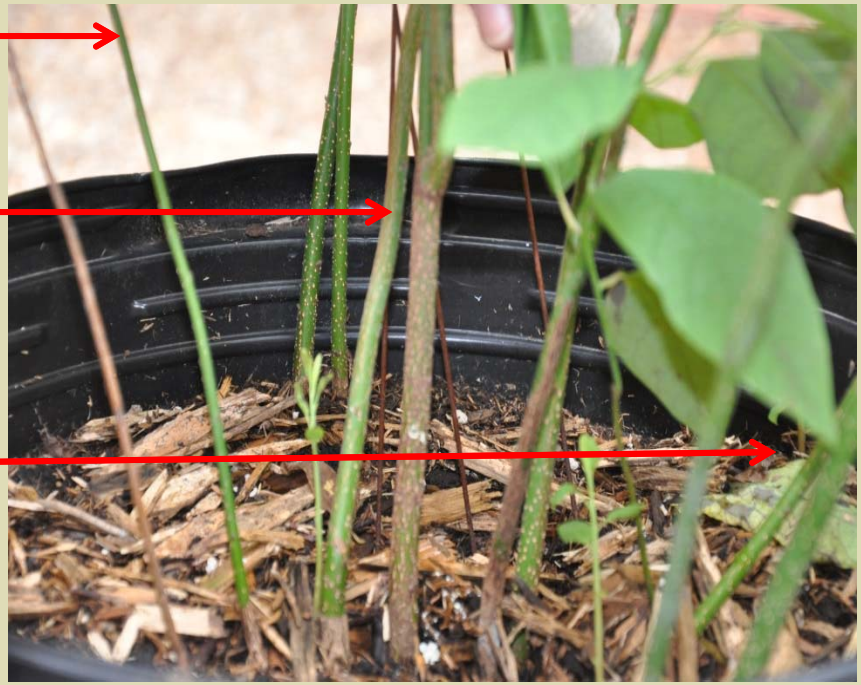
- **Rarely attacked in their natural environment because of it's small size**
- **Not a good brood host for *X. glabratus***
- **Highly susceptible to laurel wilt disease in inoculation studies**

Two inoculation studies were conducted to determine if *Raffaelea lauricola* could move systemically through rhizomes from an infected plant to other ramets.

Raffaelea lauricola



Pondberry ramets



Pondberry Fruit

Production of Pondberry Plants

- One pondberry plant was transplanted into a 15 gallon nursery pot
- 1:4 soil media ratio of coarse sand and peat
- Placed in partial shade
- Grown for three years

Growth / Sprouting of Pondberry

Early spring / Year 2

Mid-summer / Year 3

Inoculation Procedure

The stem of the original planted pondberry in each of four pots was wounded by drilling a hole one-half the diameter of the main stem, using 2.25 mm drill bit.

Inoculation Procedure (continued)

R. lauricola **isolates were obtained from wilted redbay trees on Hilton Head Island, S.C. and were used for both inoculations.**

Inoculation Procedure (continued)

Inoculation points on all seedlings were wrapped with Parafilm

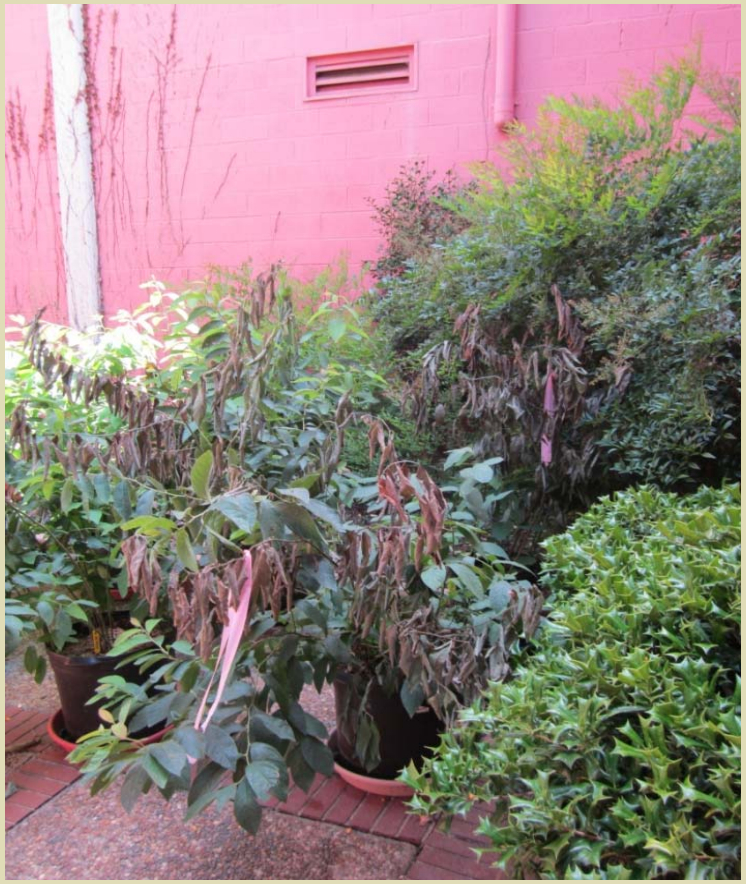
Symptom Development

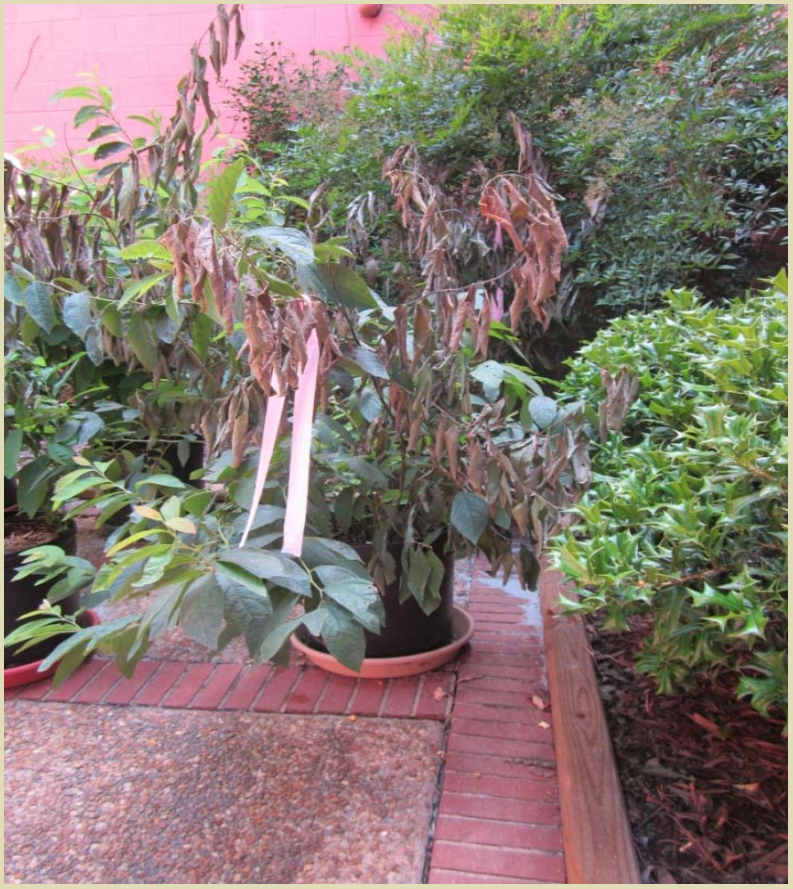
- 14 days after inoculation

Symptom Development

- 24 days after inoculation

Symptom Development





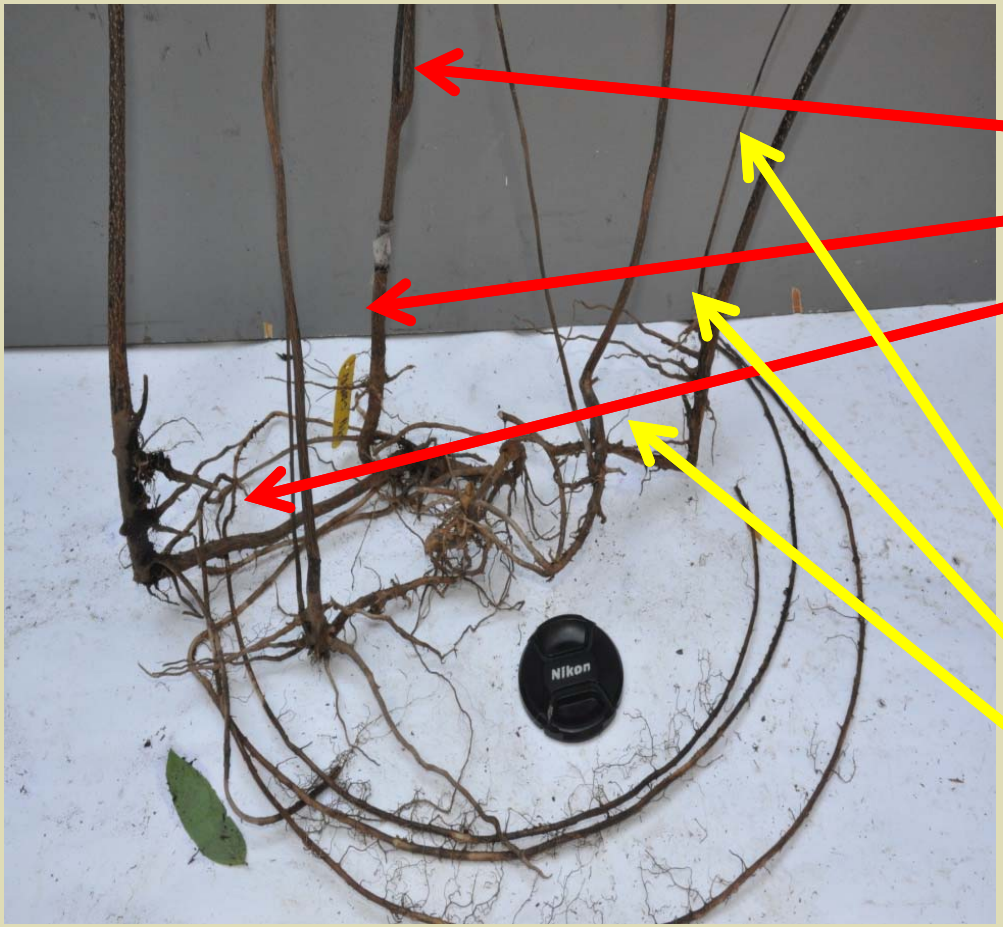
- 45 days after inoculation

Symptom Development

72 days after inoculation

Examples of rhizomes/root systems

Sampling for R. lauricola



Inoculated Main Stem

- Stem
- Root collar
- Root connections with ramets

Ramets

- Stem
- Root collar
- Root connections with other ramets

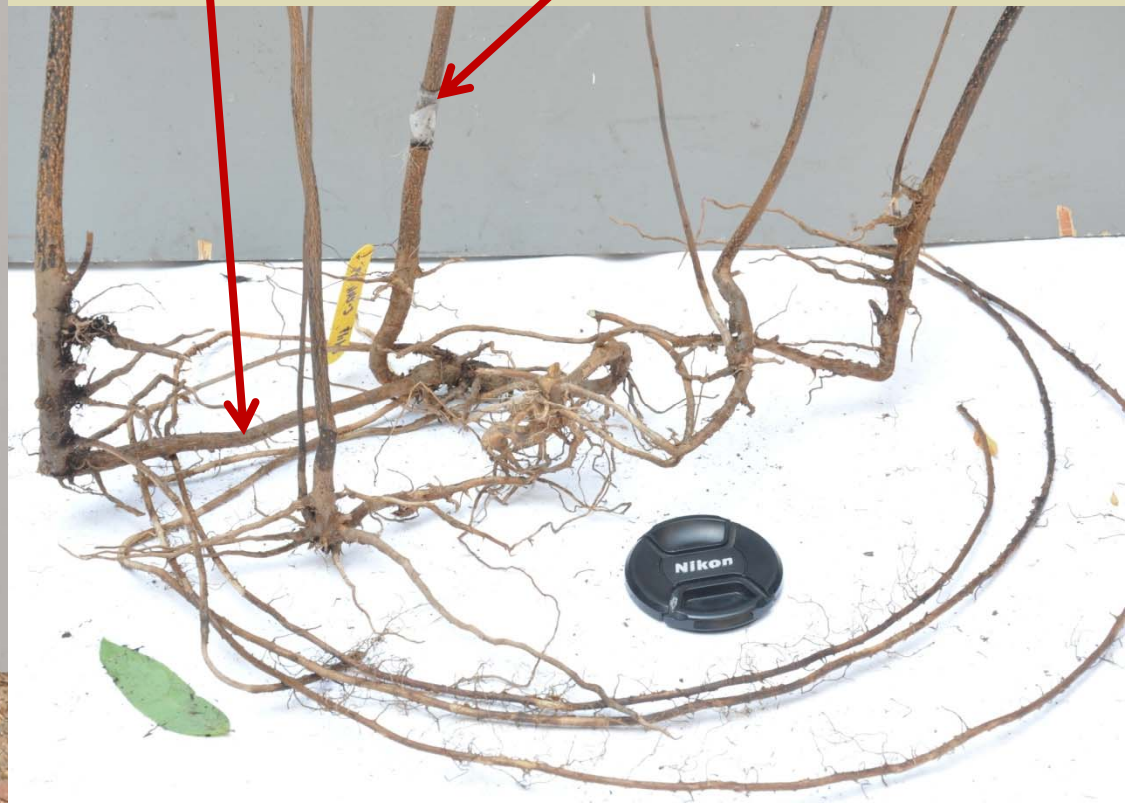
Isolation of *R. lauricola*

Samples were surface sterilized and plated on Cycloheximide-Streptomycin Malt Agar (CSMA) CSMA select media

R. lauricola **was consistently recovered from the stem, root collar and root connections of dead and dying ramets that were connected to the main inoculated stem.**

Movement of fungus through rhizomes

Inoculated main stem with *R. lauricola*



Pondberry plants in experimental test beds

Camphortrees, Jekyll Island, GA

Camphortree (*Cinnamomum camphora*)

- **Member of the Lauraceae**
- **Native to Southeast Asia**
- **At one time cultivated in the United States**
- **Regarded as an invasive species in many coastal areas of the southeastern USA**

Laurel wilt – Association of *X. glabratus* and *R. lauricola* with camphortree

Shoot dieback in camphortree caused by *R. lauricola;* Half Moon, Georgia; June, 2007

Dieback in camphortree, St. Simons Island, Georgia; July, 2014

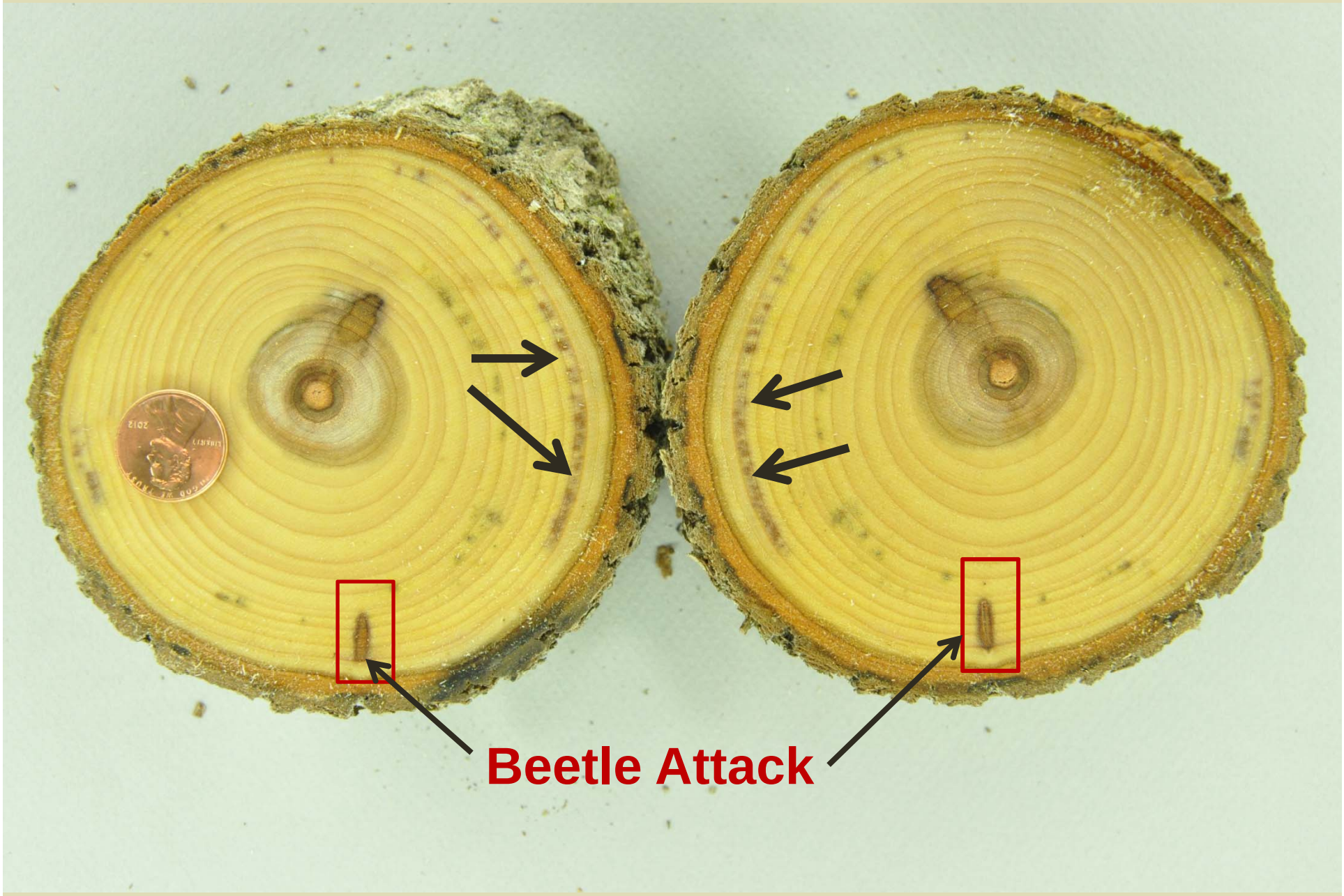
Laurel wilt – Association of *X. glabratus* and *R. lauricola* with camphortree

Discoloration associated with *R. lauricola* infection

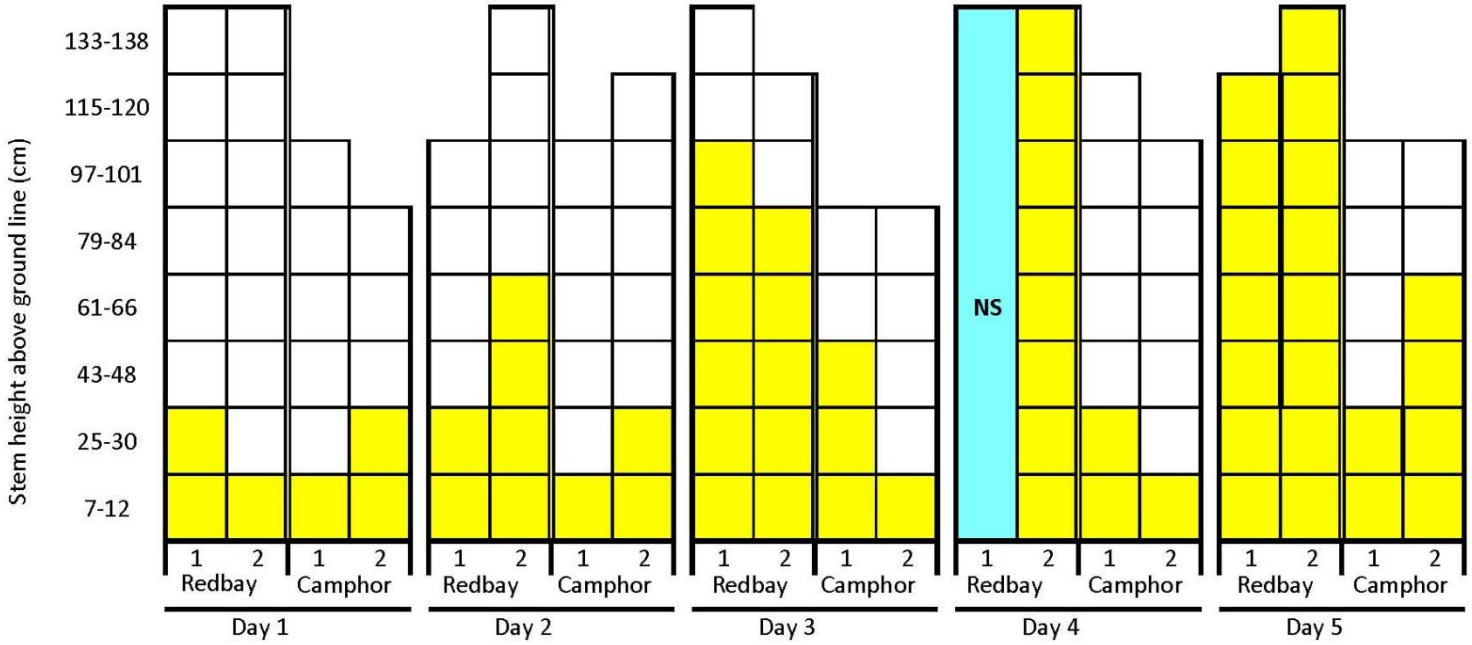
Discoloration associated *X. glabratus* attack and *R. lauricola* infection

Dead X. glabratus beetle in old, undeveloped tunnel

Fraedrich, S. W., T. C Harrington and G. S. Best. 2014. *Xyleborus glabratus* attacks and systemic infections by *Raffaelea lauricola* associated with dieback of camphortree (*Cinnamomum camphora*) in the southeastern United States. Forest Pathology 45: 60-70


Beetle Attack

Raffaelea lauricola moves rapidly in the xylem of redbay



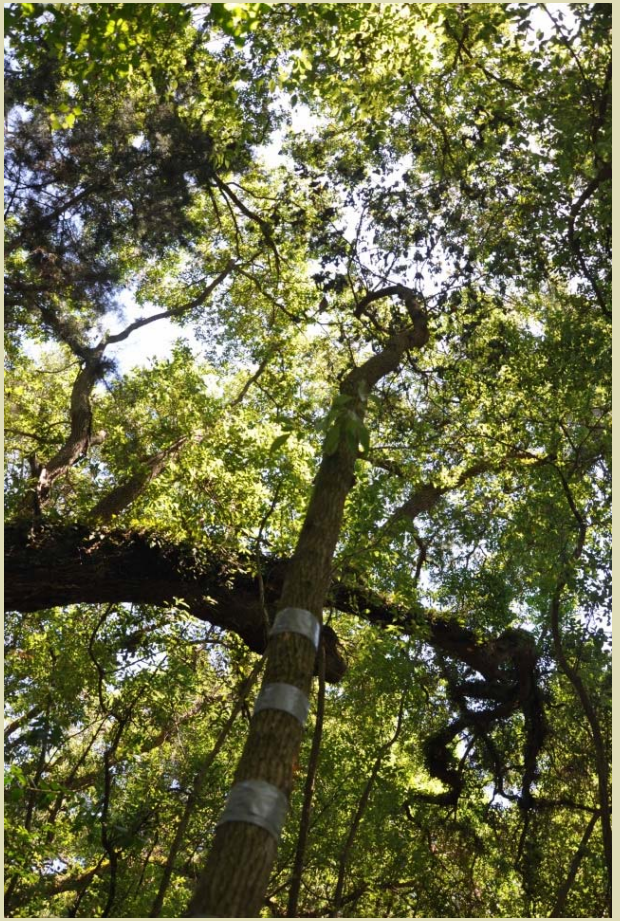
- **All saplings inoculated with *R. lauricola* at 7 cm above ground level.**
- **Areas colored yellow indicate stem sections positive for *R. lauricola***

Source: Fraedrich, S. W., T. C Harrington and G. S. Best. 2014. *Xyleborus glabratus* attacks and systemic infections by *Raffaelea lauricola* associated with dieback of camphortree (*Cinnamomum camphora*) in the southeastern United States. Forest Pathology 45:60-70

Susceptibility of camphortree to wilt/dieback caused by *R. lauricola*

Single inoculations on stem

Multiple inoculations on stem

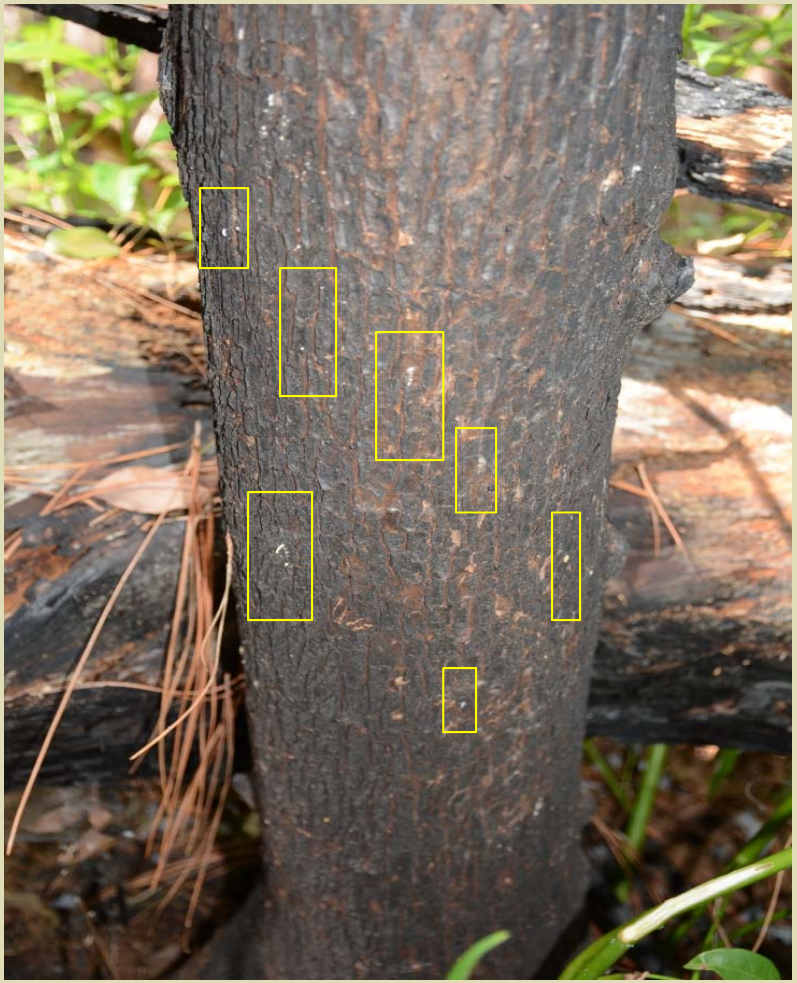


Field inoculations currently underway

Source: Fraedrich, S. W., T. C Harrington and G. S. Best. 2014. *Xyleborus glabratus* attacks and systemic infections by *Raffaelea lauricola* associated with dieback of camphortree (*Cinnamomum camphora*) in the southeastern United States. Forest Pathology 45:60-70

Camphortrees at Jekyll Island, GA

Study site



X.glabratus toothpicks on camphortree

Stem traps on camphortrees
Jekyll Island, GA

Camphortree at Jekyll with stem traps for beetles. Sample of wood taken for evaluation of R. lauricola – was positive

For more information on laurel wilt:

www.fs.fed.us/r8/foresthealth/laurelwilt
www.srs.fs.usda.gov/pubs
www.public.iastate.edu/~tcharrin/