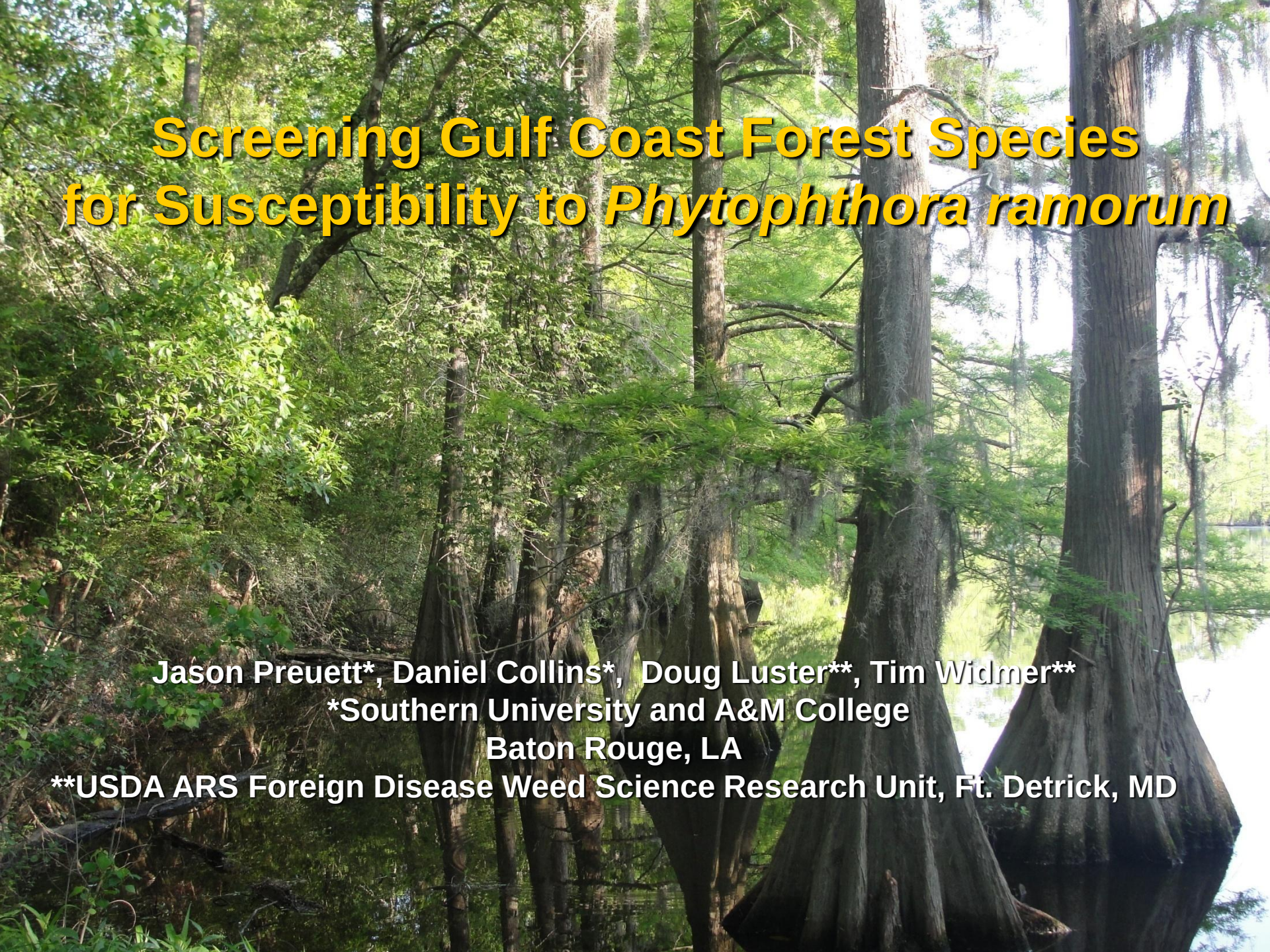

Screening Gulf Coast Forest Species for Susceptibility to *Phytophthora ramorum*

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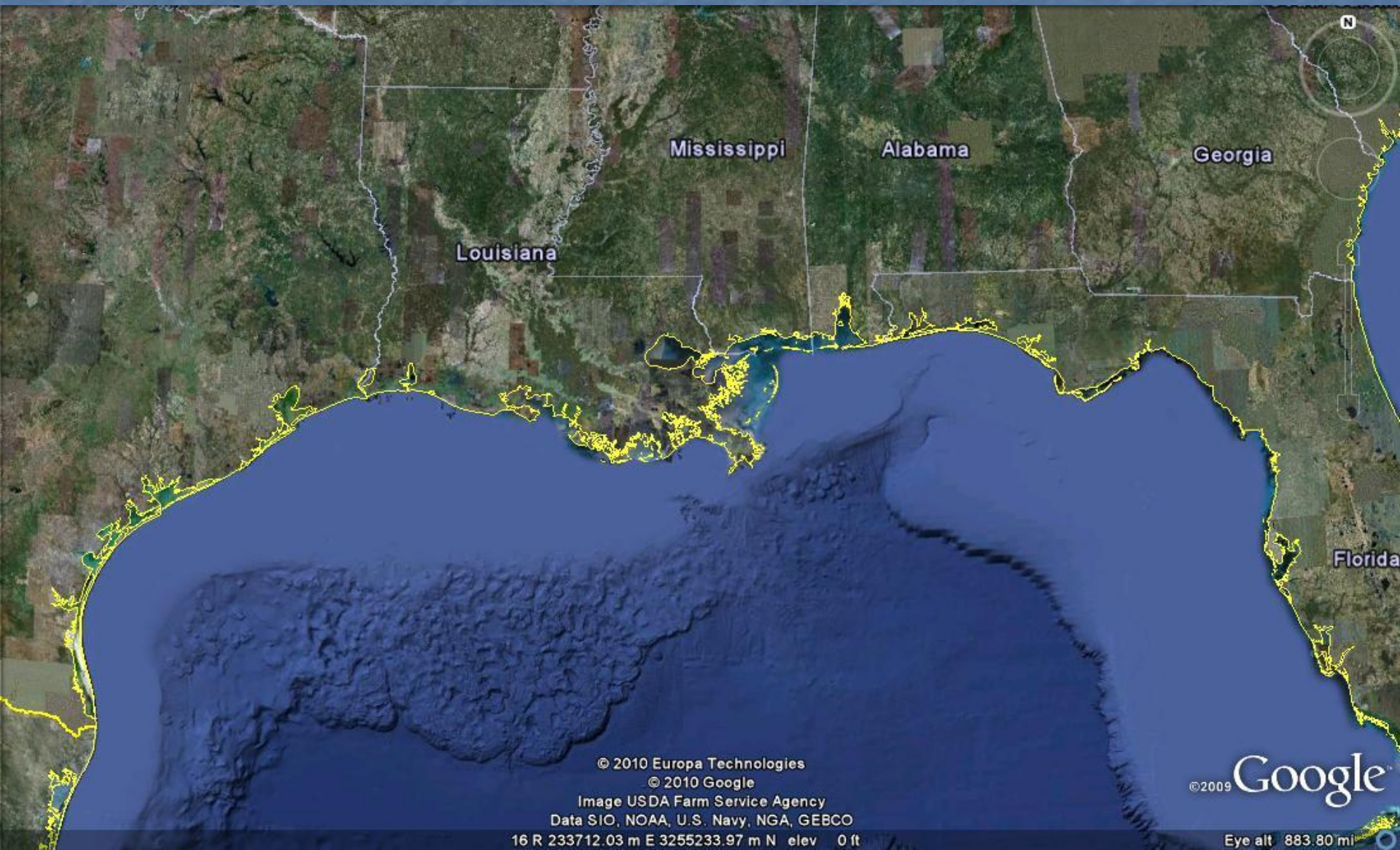
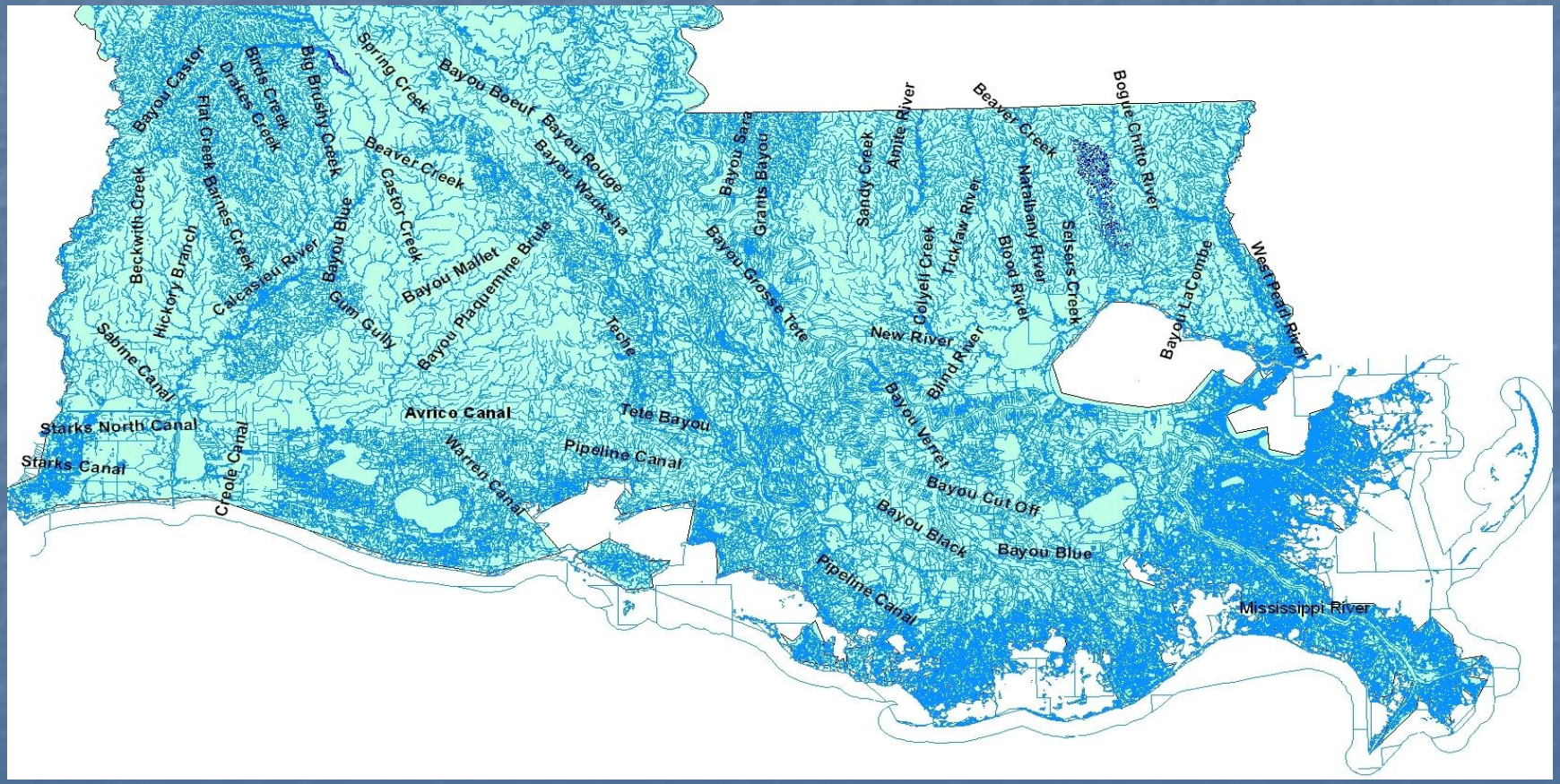
Potential Impacts to Gulf Coast Region

- Eastward movement can threaten the Gulf Coast ecosystem
- Gulf Coast forest species could possibly serve as an inoculum reservoirs and spread the disease
- Information is needed on the susceptibility of these species
- Laboratory studies have shown *P. ramorum* has the ability to grow and sporulate over a wide range of temperatures
- Knowledge of relative susceptibility of individual forest species and families to *P. ramorum* could be used to focus future surveys.

US Gulf Coast Region



GIS Map of South Louisiana Waterways



Objective

- Screen native Gulf Coast forest species for susceptibility to *P. ramorum*

Significance of the Study

- The potential significance and purpose of the study is to gain a better understanding of the potential impact of *P. ramorum* on the Gulf Coast region on forest species

Species Used in Study

- **Yaupon (*Ilex vomitoria*)**
  Family: *Aquifoliaceae*
- **Spicebush (*Lindera benzoin*)**
  Family: *Lauraceae*
- **Southern Magnolia (*Magnolia grandiflora*)**
  Sweetbay Magnolia *(Magnolia virginiana)*
  Family: *Magnoliaceae*
- **Eastern Baccharis (*Baccharis halmifolia*)**
  Family: *Asteraceae*
- **Baldcypress (*Taxodium distichum*)**
  Family: Cupressaceae

Species Used in Study

- **Black willow (*Salix nigra*)**

  Family: Salicaceae

- **Virginia creeper (*Parthenocissus quinquefolia)***

  Two Genotypes: Louisiana and Maryland

  Family: Vitaceae

- **Rhododendron 'Cunningham's White' (*Rhododendron catawbiense*) (Positive control)**

  Family: *Ericaceae*

Materials and Methods

- Research was conducted in a BL-3 containment greenhouse facility at the USDA ARS Foreign Disease-Weed Science Research Unit in Ft. Detrick, MD
- Procedure was based on

  Phytophthora. In: *Methods for Research on Soilborne Phytopathogenic Fungi*. (Mitchell et al. 1992)
- Pathogen isolate (5-C) recovered from plant *Camellia sasanqua* 'Bonanza'
- Three two week old cultures in V8 broth was used for zoospore production for inoculation procedure

Inoculation Procedure

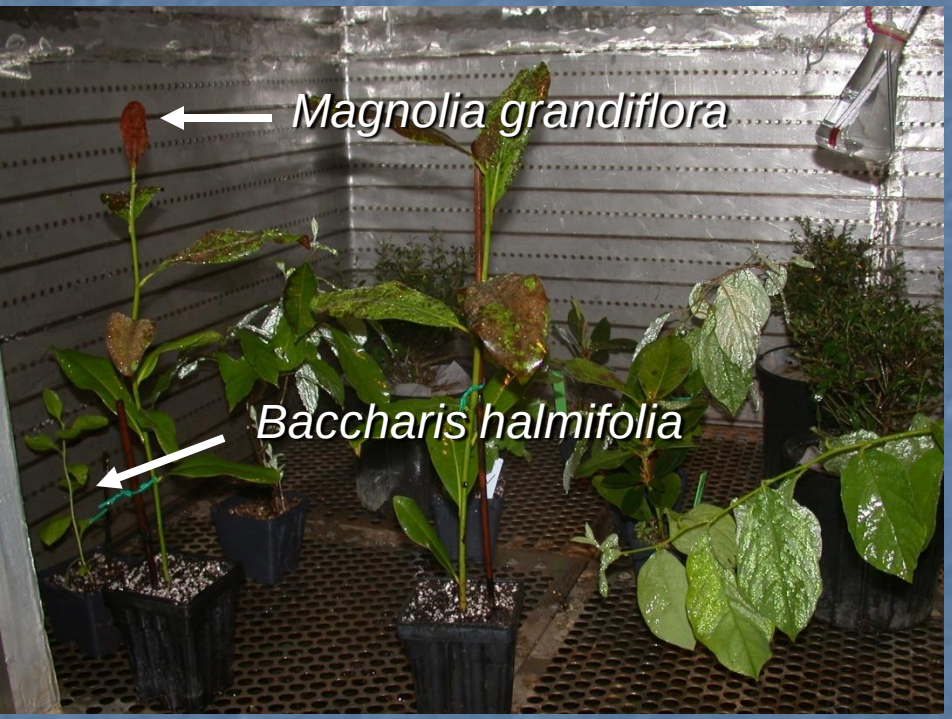
- Foliage of four test plants was inoculated with 50,000 zoospores per ml until the foliage was completely wet.
- The test was repeated with three repetition for each plant species.
- Inoculated plants were placed in a dew chamber at 20 C for 4 days.

Leaf Scanning and Data Analysis

- After incubation period, the leaves were detached and scanned.
- The leaf lesion areas were assessed using APS ASSESS 2.0 software measured in centimeters squared
- Leaf and lesion area were summarized in Microsoft Excel and statistically analyzed with SAS 9.1


Results
CAM VIEW REC
TOOL SETUP
Lev.
Advn.
Easy
DF FL
BF
DIC PH
c1 c2 c3 c4 c5 c6 c7
CMP. +1.0 WB AE_L
CAPT
default
Focus
0097
DELL
OLYMPUS
SZH10
OLYMPUS

Dew Chamber Placement and Results after 4 days



Picture taken for Rep 2 results for Spice Bush, E. baccharis, and Yaupon and Rep. 1 for S. Magnolia

Average Lesion Percentage Area

Average Percentage	Yaupon	Spice bush	Southern magnolia	Eastern baccharis	
Control (Negative)	0.13	1.16	0.56	0.36	
Inoculated (Positive)	28.27	4.92	32.06	0.25	

Control (Yaupon)

Inoculated (Yaupon)

Average Lesion Percentage Area continue

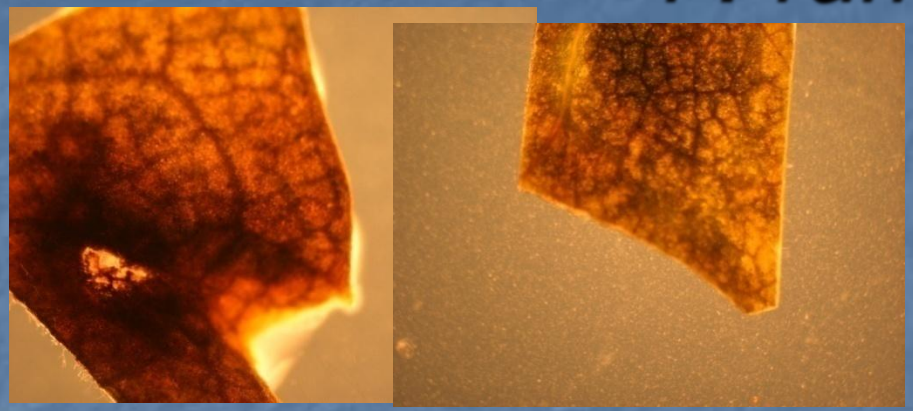
Average Percentage	Baldcypress	Black willow	Sweetbay magnolia	Virginia creeper (Louisiana)	Virginia creeper (Maryland)
Control (Negative)	4.24	0.35	0.33	3.10	1.08
Inoculated (Positive)	4.95	0.15	8.63	1.48	1.14

Sweetbay Magnolia

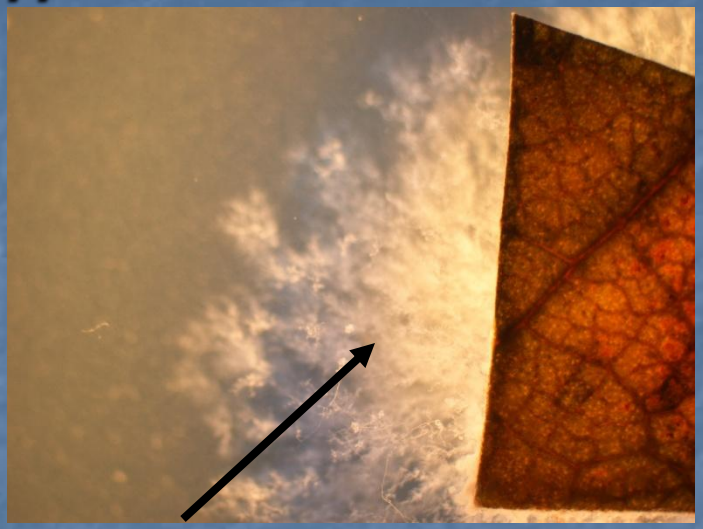
Control

Inoculated

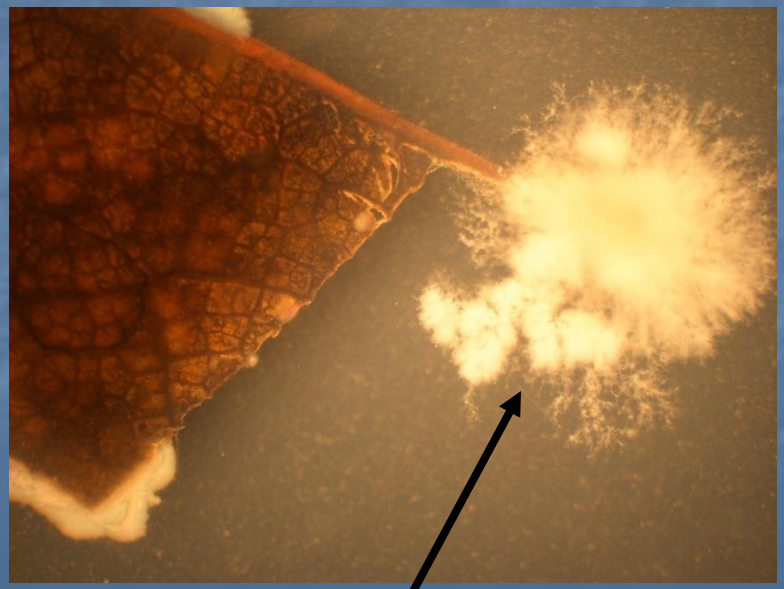
Leaf Plating Growth Results for *P. ramorum*



Eastern baccharis (no growth)



Spice Bush (growth)



Southern Magnolia (growth)

Yaupon (growth)

Leaf Plating Growth Continue

Virginia creeper (growth)

Sweetbay Magnolia (growth)

Baldcypress (growth)

Virginia Creeper Necrosis Study

Virginia Creeper (Louisiana and Maryland) Genotypes Comparison

	Number of Plants	Average Positive Infection Percentage	Average Percentage of Necrosis Positive Leaf based on Total Number of Infected Leaves after Plating
Louisiana	4	10.0%	75%
Maryland	2	13.6%	66.7%

Virginia Creeper Necrosis Study

Non-necrosis infection after leaf plating

Necrosis infection after leaf plating

Virginia Creeper Necrosis Study (Louisiana and Maryland)

- Virginia creeper needs further study.
- The species in the study shown no symptoms during the initial screening after being inoculated using zoospores
- *P. ramorum* was recovered after being leaf plated.

Statistical Analysis

- The average percentage of lesion area was compared for the control and inoculated plant species using SAS 9.1
- The control plants did have some areas that be found as lesions using APS ASSESS 2.0 software using Arcsine transformation.
- Individual plants in each repetition used was considered a subsample for statistical analyses and not part of a true repetition.

GLM Model Results

Type III SS - The GLM model Results using ArcSine Transformation

Species	Pr > F
Baldcypress	0.4446
Black willow	0.3013
Eastern baccharis	0.5696
Spicebush	0.2692
Southern magnolia	0.001
Sweetbay magnolia	0.0009

GLM Model Results

Type III SS - The GLM model Results using ArcSine Transformation

Virginia Creeper (Louisiana)	**0.4105**
Virginia Creeper (Maryland)	**0.6494**
Yaupon	**0.0008**
Southern and Sweetbay Magnolia Cross Comparison	**<0.0001**
Virginia Creeper (Louisiana and Maryland) Comparison	0.5364

Conclusions

- Preliminary findings show yaupon (*Ilex vomitoria*) may be a new species susceptible to *P. ramorum.*
- Virginia creeper (*Parthenocissus quinquefolia)* needs further study
- Gulf Coast forest species could possibly serve as inoculum reservoirs and spread the disease.

Conclusions

- Southern and sweetbay magnolia and yaupon had a significant difference statistically.
- It is unknown if the Gulf Coast environmental conditions can support *P. ramorum* at this time.
- Many factors can affect the spread of *P. ramorum* such as local climate conditions, location and range of specific plant species, and human mediated factors. Further study is needed.

Acknowledgement for this Study

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* USDA/ARS Foreign Disease-Weed Science Research Unit, Fort Detrick, MD
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Thank you