An Overview of Forest Health Research at the Forest Health Dynamics Laboratory Auburn University

Scott Enebak and Lori Eckhardt

Forest Health Dynamics Laboratory

Dr. Lori Eckhardt
Co-director

Dr. Scott Enebak
Co-director

Sudden Oak Death State Laboratory for Alabama & Mississippi

Dr. Lori Eckhardt - Co-director
Dr. Scott Enebak - Co-director

Mission Statement

To provide for watershed sampling and laboratory detection of Sudden Oak Death causing pathogen in waterways outside of nurseries which have had infected nursery stock in Alabama and Mississippi

Staff

Alyssa Rosenblum

Forest Health Cooperative

Dr. Lori Eckhardt - Director

Mission Statement

To address important, current and pertinent forest health issues (disease, insect, invasive species) in a way that addresses real world management problems in the southern United States

Staff

Dr. Nancy Loewenstein
Alyssa Rosenblum

Southern Forest Nursery Management Cooperative

Dr. Scott Enebak - Director

Mission Statement

To develop and disseminate available cultural, biological and chemical technologies using an integrated system for the economical production and utilization of forest tree seedlings in the southern United States

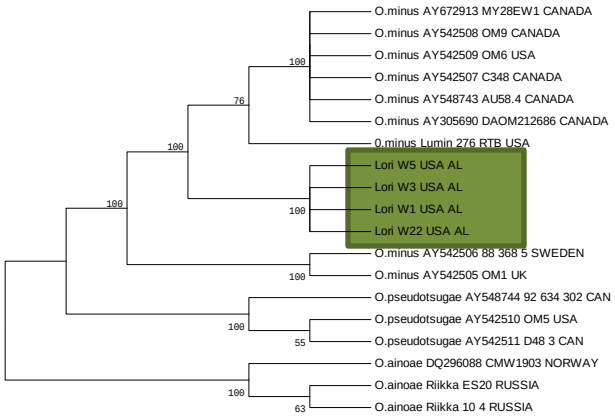
Staff

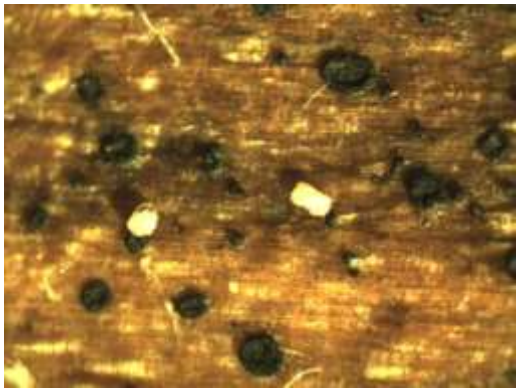
Dr. Tom Starkey
Ben Whitaker
Barry Brooks

FOREST HEALTH DYNAMICS LABORATORY

New Ophiostoma's (GA and AL)

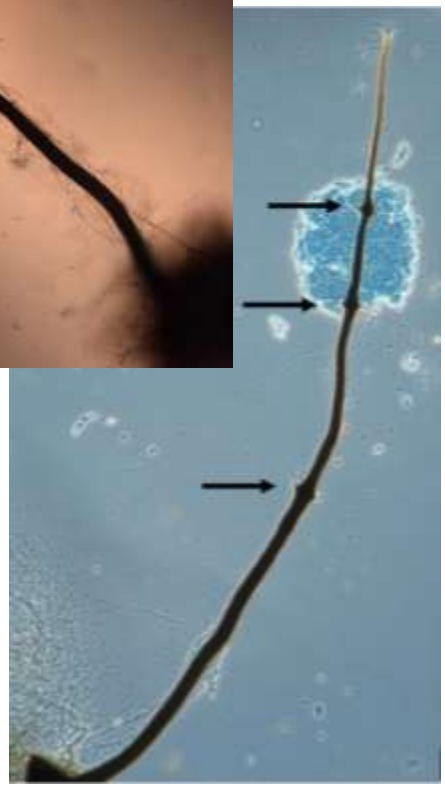
Hylastes galleries infested with *Ophiostoma* in loblolly and longleaf pine





Wild Pigs & Ophiostomatoid Fungi

100 wild pigs sampled
2006, 2008, 2010



L. procerum	*O. sparsiannulatum*	*O. culverii*
48%	51%	67%

Cogongrass: Does it affect pine health, root-feeding bark beetle populations and pine decline susceptibility?

Cogongrass

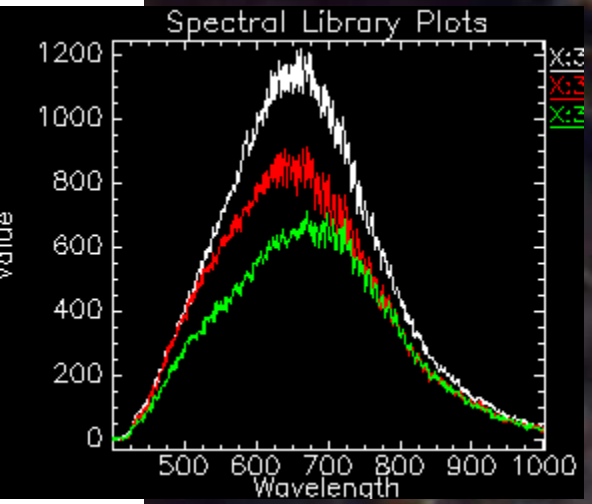
Non-Cogongrass

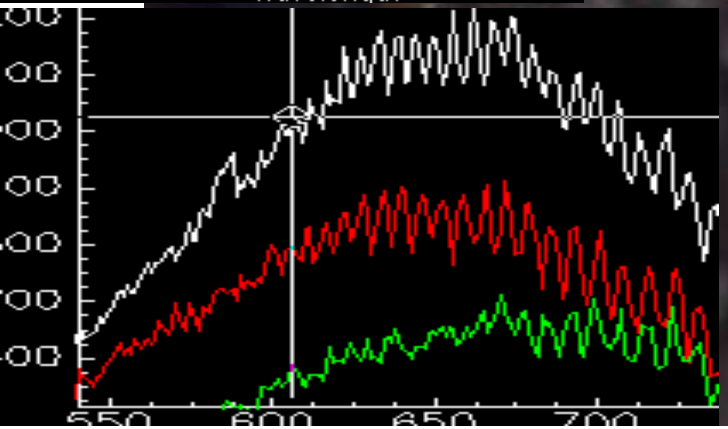
Pinus oocarpa Decline in Nicaragua

Using NIR to map and identify fungal spores on intact insects

File: Tube 3 - etalon Class Th 04

Class Name	Npts	Pct
Unclassified	[348563]	99.962%
X:339 Y:310	[133]	0.038%





Hs: G. alacris map

Hs: G. alacris SL

FOREST HEALTH COOPERATIVE PROJECTS

Pine Decline

Monoterpenes released

Insects respond

Abiotic Stressors

Topographic position

Fire

Edaphic

Weather

Insects Attack

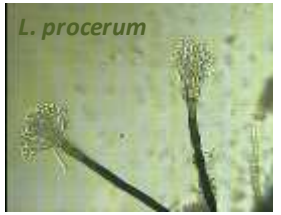
Biotic Stressors

?

Mutualistic

?

Fungi Colonize



Death

Decline

SPB Attack

Pathogenicity & Virulence

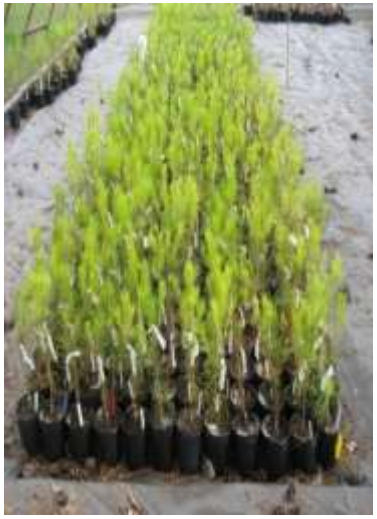
Fungi

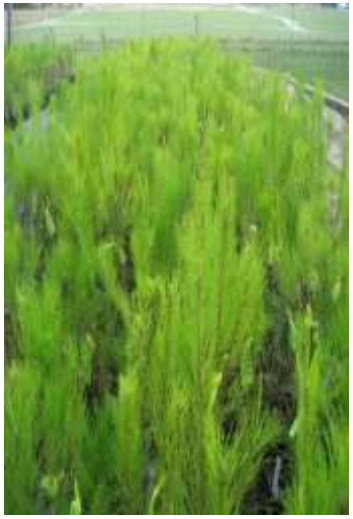
L. procerum
L. terebrantis

G. alacris
G. huntii

10 new undescribed species of Leptographium. Grosmannia and Ophiostoma

Pinus taeda Family Resistance





Insect-Fungal Interactions

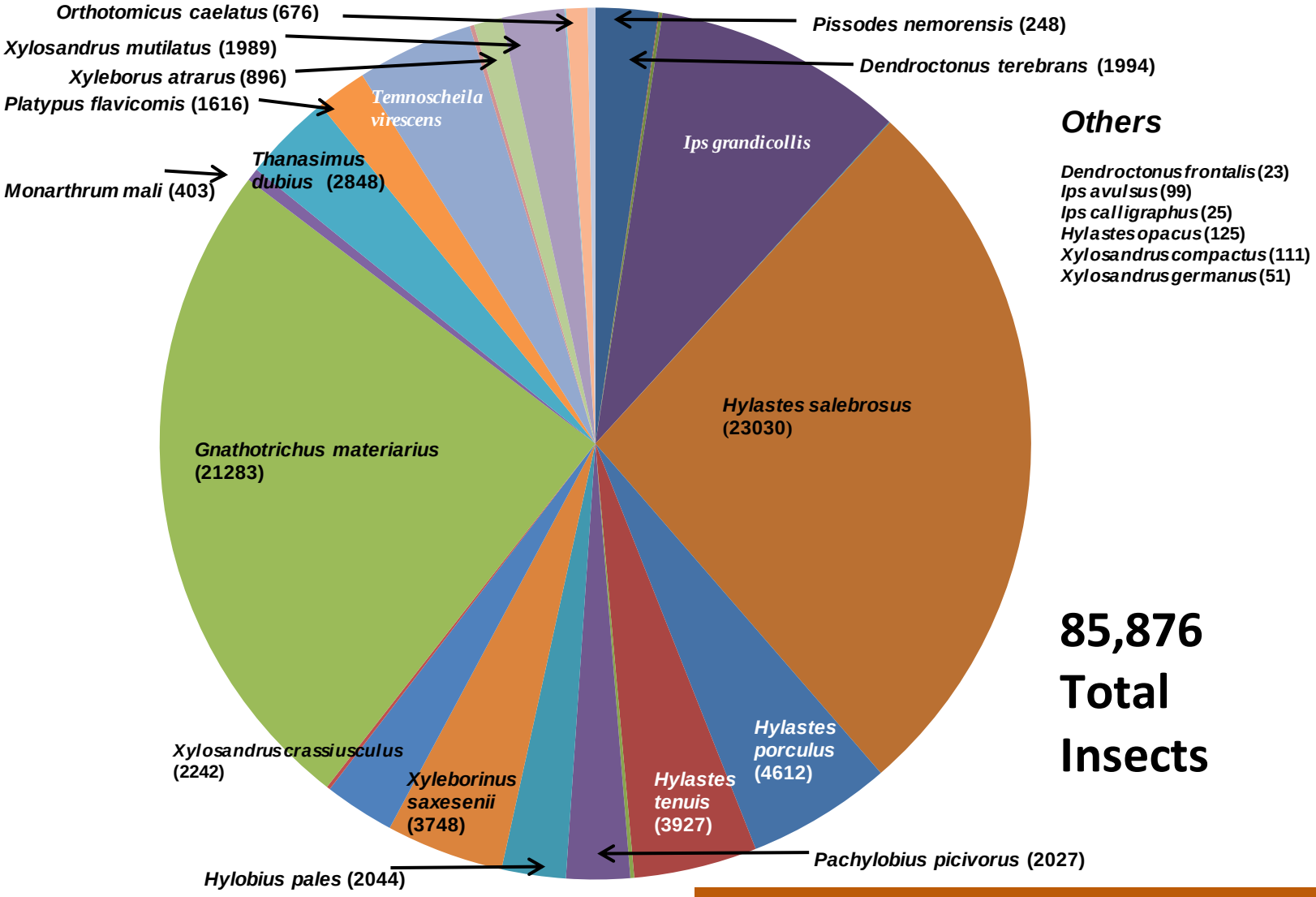
Hylastes salebrosus

Hylastes tenuis

Hylobius pales

Dendroctonus terebrans

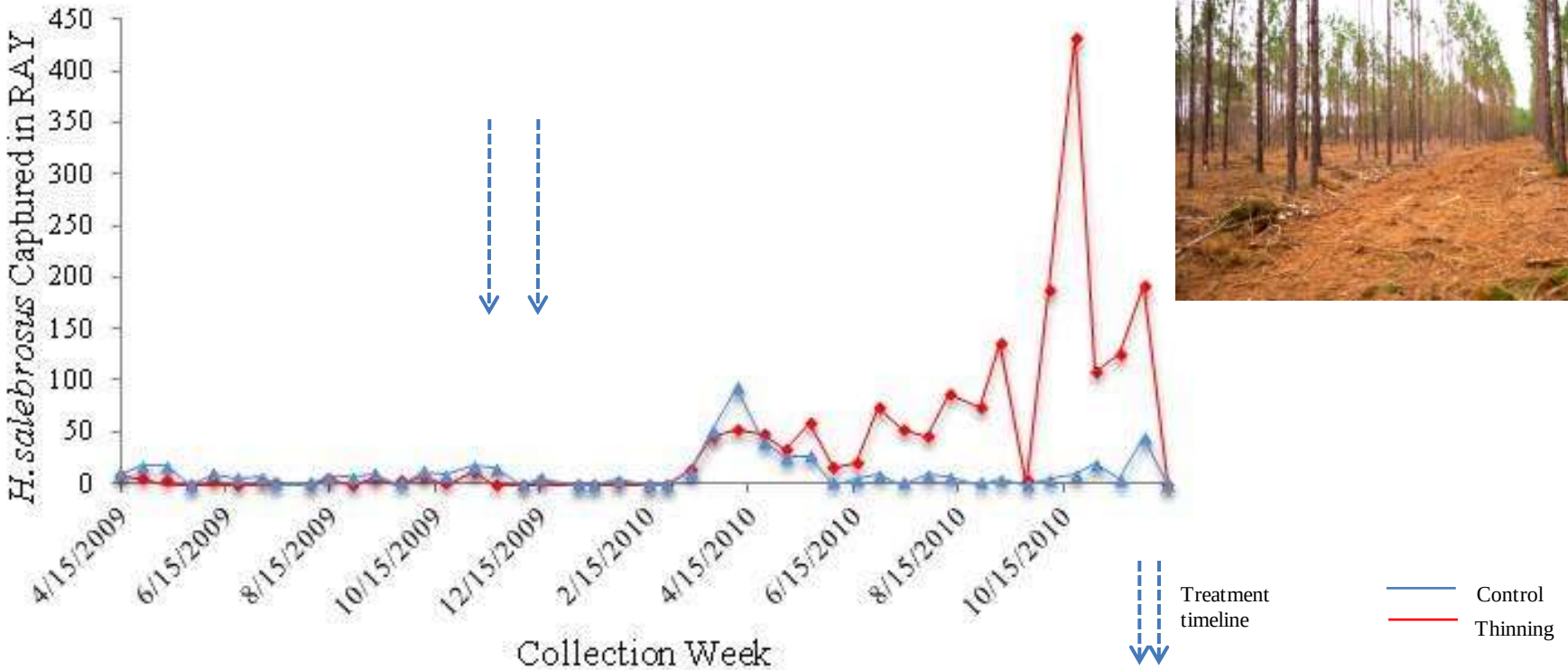
Bark Beetle Populations & Dynamics



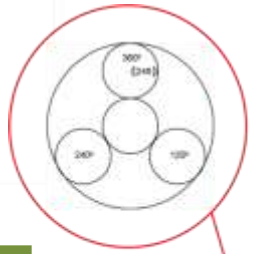
85,876 Total Insects

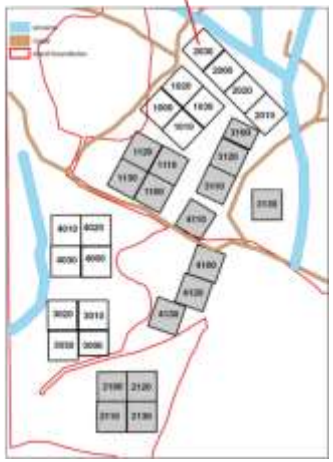
Bark Beetle Response to Silviculture (Thinning and Clearcut)

Hylastes salebrosus Response to Thinning



Insect Populations associated with Fertilization and Thinning (RW-19)





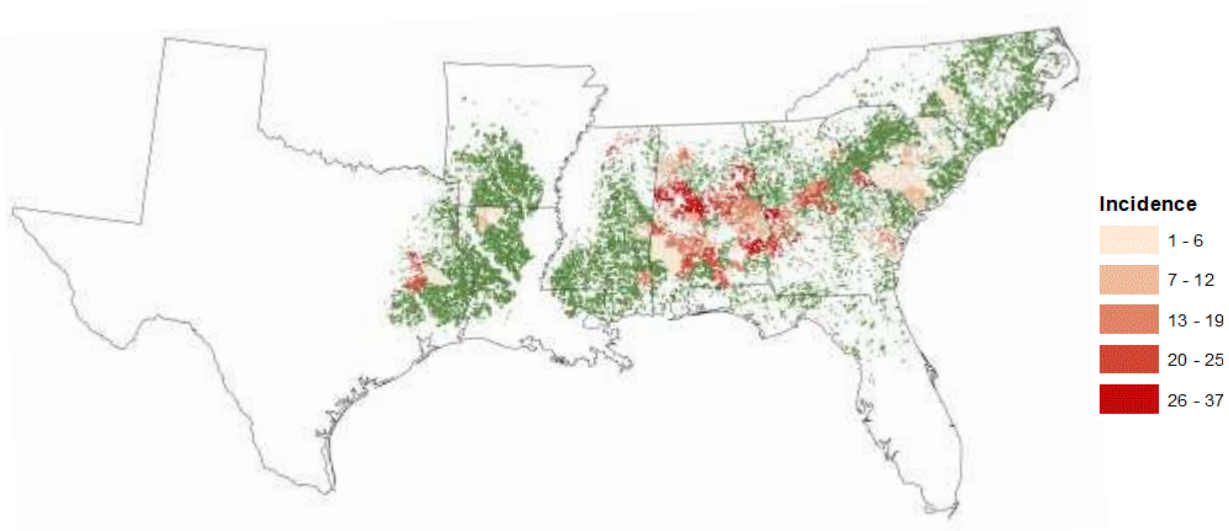
	BTB	Hpo	Hs	Ht	Pp	Hp
Fertilization						
Fertilizer	36 a	117 a	1481 a	272 a	6 a	35 a
No Fertilizer	35 a	82 b	1123 b	221 b	3 b	28 a
Thinning						
100	41 a	65 b	1389 a	260 a	6 a	35 a
200	38 a	99 b	1464 a	279 a	4 ab	32 a
300	46 a	128 a	1425 a	265 a	5 ab	32 a
500	18 b	108 a	931 b	183 b	2 b	27 a

BTB = Black Turpentine Beetle; Hpo = *Hylastes porculus*; Hs = *Hylastes salebrosus;* Ht = *Hylastes tenuis*; Pp = *Pachylobius picivorus*; Hp = *Hylobius pales.*

Predisposing Factors

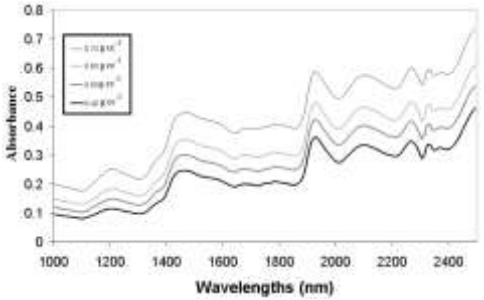
Southeast LPD Risk and Incidence Map

Southeast Loblolly Pine Risk Area				
Low	Medium	High	Severe	
13,234,784	6,848,629	9,012,887	2,009,020	Hectares
32,702,699	16,922,730	22,270,539	4,964,218	Acres



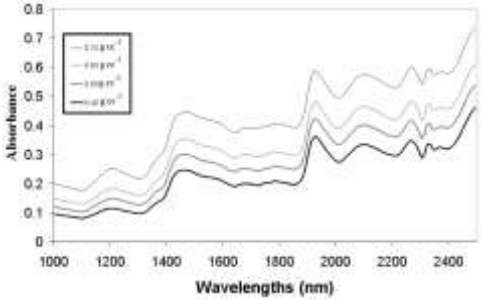
Predicting Disease Susceptibility through Wood Chemistry and Characterization using Vibration Spectroscopy

Family A →



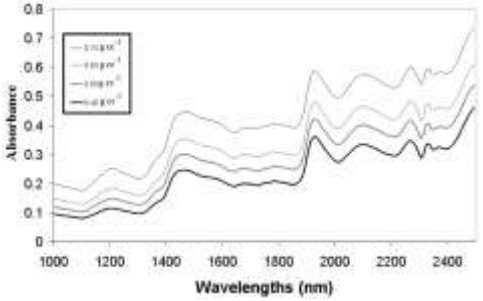
Chemistry Model → High ????? Family

Family B →



→ Low ????? Family

Family C →

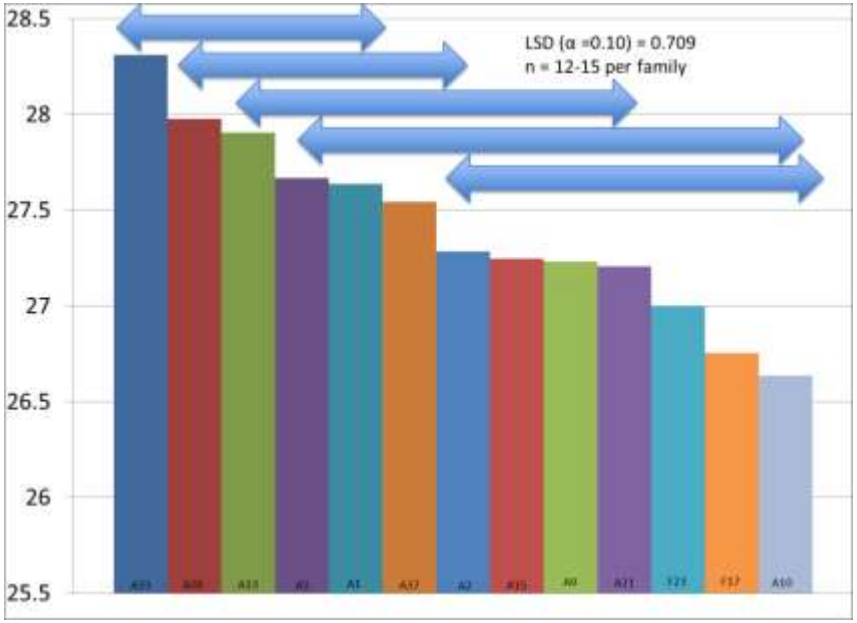


→ Medium ????? Family

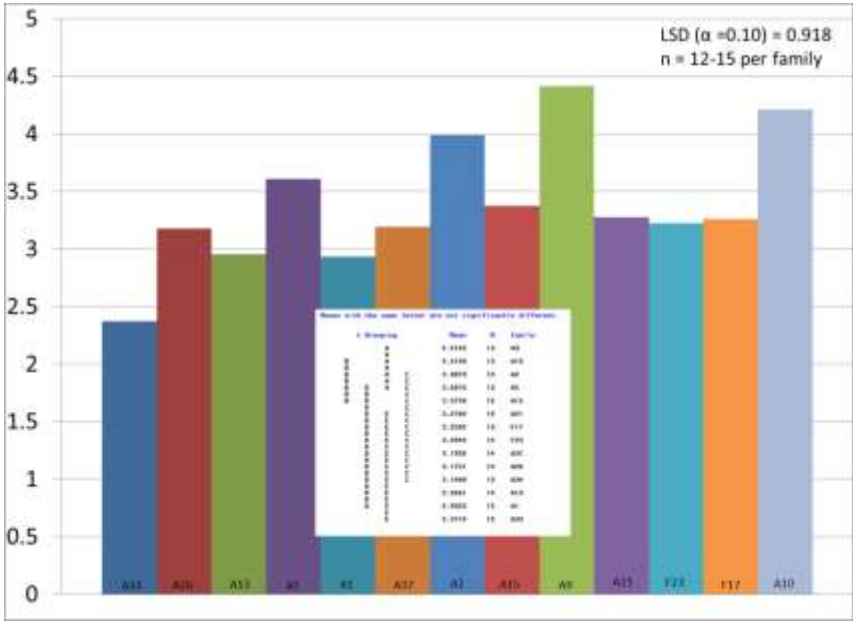
In cooperation with the Forest Products Development Center

Wood Chemistry & Disease Resistance

Lignin



Extractives



Surveys and Timber Dogs

SOUTHERN FOREST NURSERY MANAGEMENT COOPERATIVE

Main Areas of Research

- Herbicide testing and labeling
- Seedling quality and survival
- Fungicide testing and labeling
- Soil fumigant testing

Fungicide Testing and Labeling

The Nursery Cooperatives' research efforts lead to the identification of a new fungicide, prothioconazole (Proline) for the control of three important forest-nursery fungal diseases.

Fusiform Rust

Pitch Canker

Rhizoctonia Foliage Blight

Rhizoctonia Foliar Blight Results

TRMT	Seedling Density sq / ft	Disease Incidence	Disease Severity	Seedling loss per sq. ft.	Loss per Acre
Control	22.9	0.354	0.182	3.0	$4,400
Heritage®	23.6	0.162	0.083	1.2	$1,700
Proline®	23.7	0.003	0.001	0.01	

Control ←

Proline® →

Pitch Canker Control

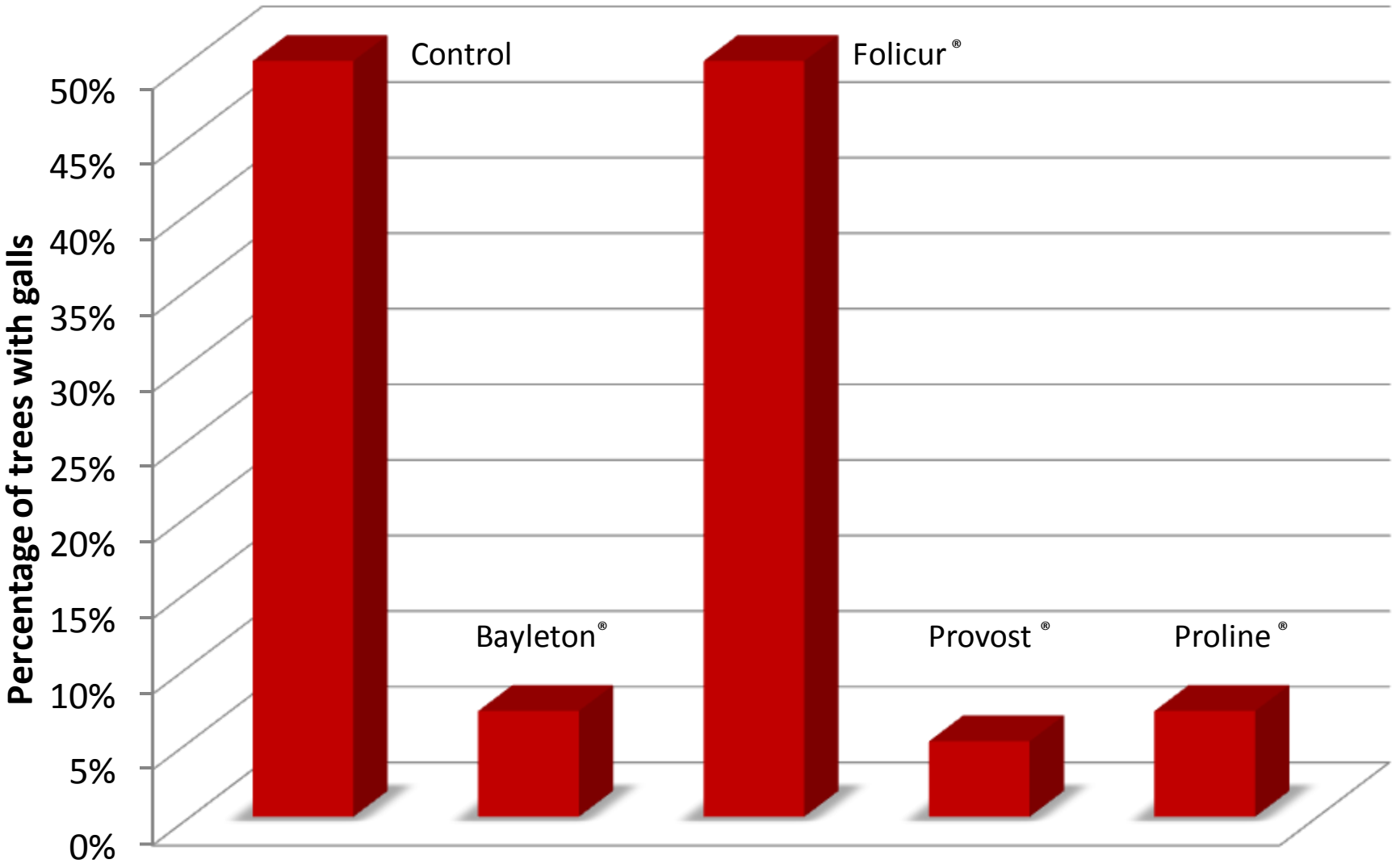
	Longleaf	Loblolly	Slash	Shortleaf
No Proline®	77.2 a	95.3 a	85.8 a	89.2 a
Proline®	86.1 b	96.9 a	93.1 b	95.6 b

Seedling Numbers	Longleaf	Loblolly	Slash	Shortleaf
Increase / linear foot	9	1	8	6
Increase/ acre	64,680	7,200	57,500	43,200
Increase $ per acre	$5200	$350	$2850	$2150
Increase $ to a 25 acre nursery	$130,000	$8,750	$71,250	$53,750

Pitch Canker Control

Untreated Seed/Seedlings **Treated Seed/Seedlings**

Fusiform Rust Control




The rumors are true…there are still chain gangs in Alabama. The best way to get roots dug!!


QUESTIONS?