Forest Health Diagnostics Laboratory Update

Jessica Baldwin and Dr. Lori Eckhardt

Forest Health Dynamics Laboratory

College of Forestry, Wildlife and Environment

Auburn University, Auburn AL

Forest Health Coop Diagnostic Laboratory Services - Overview

History

Diagnostics

History

Forest Health Cooperative began in 2008

Bring together parties interested in maintaining forest health, productivity, and sustainability

Membership for those managing for or purchasing forest products, wildlife and endangered species

Address important and current forest health issues with real world management as a focus

http://www.auburn.edu/academic/forestry_wildlife/foresthealthcooperative

AUBURN UNIVERSITY

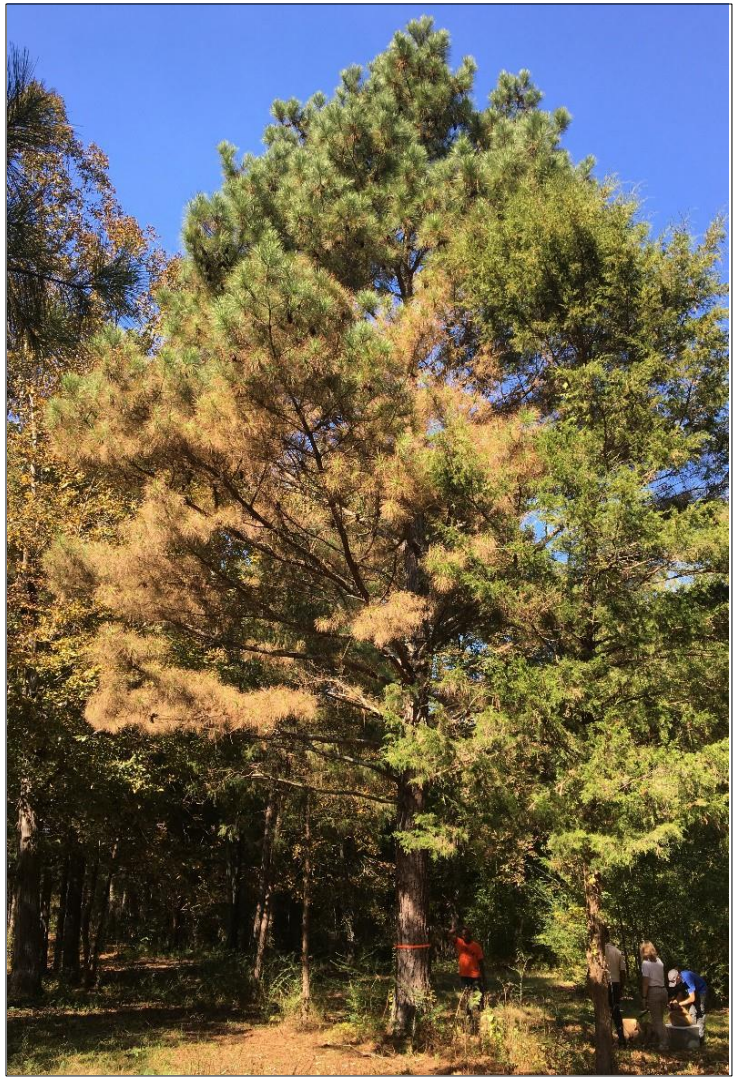
FOREST HEALTH COOPERATIVE

Home

- Member Reports
- Meetings
- Publications & Documents
- Diagnostics Clinic
- Quantifying Pine Decline
- Weather Data
- Decline Distribution Map
- Loblolly Pine Decline Hazard Map Files
- Brown-spot Needle Blight Information

Forest Health Cooperative | 3301 Forestry and Wildlife Sciences Building
Auburn University, Alabama 36849-5418 | Phone: (334) 844-1012 | E-mail: bowerep@auburn.edu

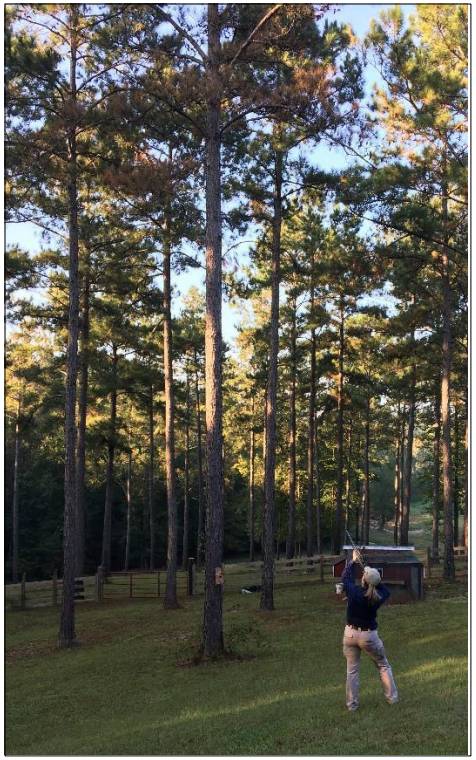
Field Consulting



Travel to member's location

Provide onsite diagnostic information

Collect samples for laboratory analysis



Diagnostics Clinic

Members Only page – Diagnostics Clinic

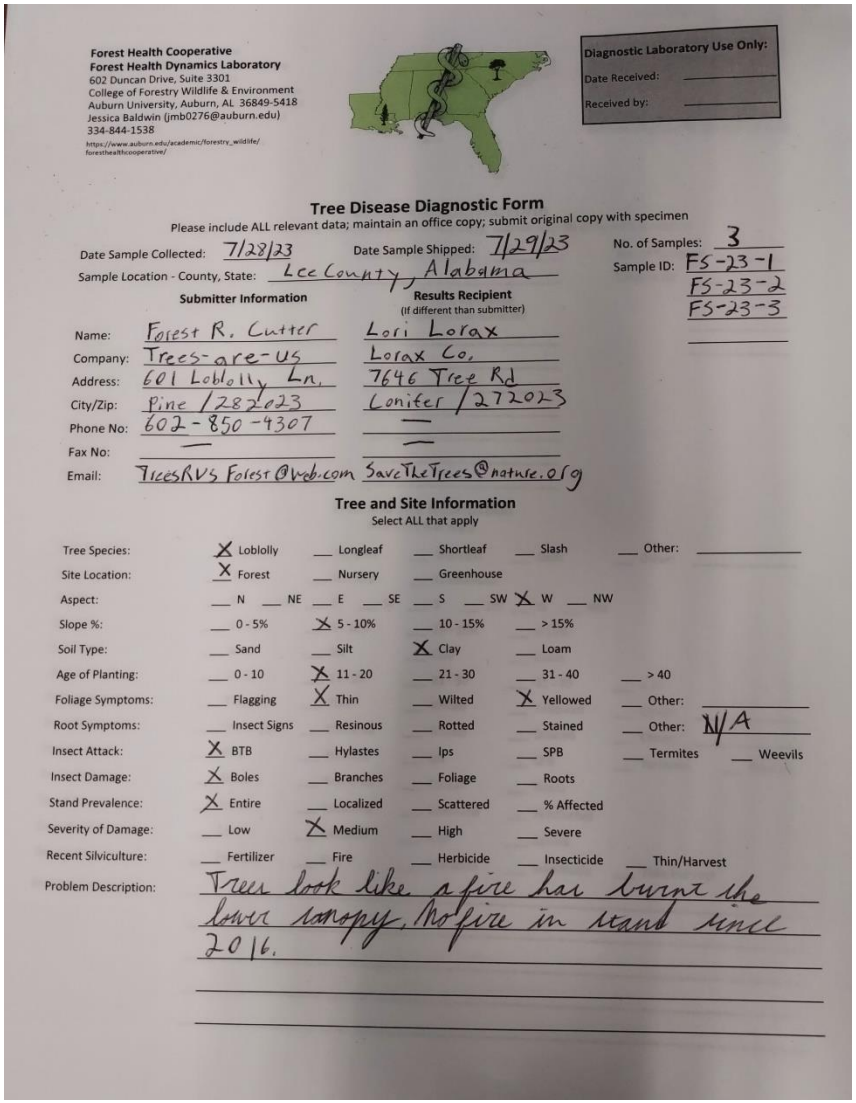
Sample Collection and Submission Guide

- Provide an instruction set for collecting "good" samples for laboratory analysis

Tree Diagnostics Form

- Provide a detailed sample/site history to aid in diagnosis accuracy

Sudden Oak Death (SOD)



Forest Health Cooperative
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College of Forestry Wildlife & Environment
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334-844-1538
https://www.auburn.edu/academic/forestry_wildlife/foresthealthcooperative/

Diagnostic Laboratory Use Only:
Date Received:
Received by:

Tree Disease Diagnostic Form

Please include ALL relevant data; maintain an office copy; submit original copy with specimen

Date Sample Collected: 7/28/23
Date Sample Shipped: 7/29/23
No. of Samples: 3
Sample Location - County, State: Lee County, Alabama
Sample ID: FS-23-1, FS-23-2, FS-23-3

	Submitter Information	Results Recipient (if different than submitter)
Name:	Forest R. Cutter	Lori Lorax
Company:	Trees-are-US	Lorax Co.
Address:	601 Loblolly Ln.	7646 Tree Rd
City/Zip:	Pine / 28202 3	Conifer / 27202 3
Phone No:	602-850-4307	—
Fax No:	—	—
Email:	TreesRUs Forest@web.com	SaveTheTrees@nature.org

Tree and Site Information

Select ALL that apply

Tree Species:	X Loblolly	Longleaf	Shortleaf	Slash	Other:
Site Location:	X Forest	Nursery	Greenhouse		
Aspect:	N NE E SE S SW X W NW				
Slope %:	0 - 5%	X 5 - 10%	10 - 15%	> 15%	
Soil Type:	Sand	Silt	X Clay	Loam	
Age of Planting:	0 - 10	X 11 - 20	21 - 30	31 - 40	> 40
Foliage Symptoms:	Flagging	X Thin	Wilted	X Yellowed	Other:
Root Symptoms:	Insect Signs	Resinous	Rotted	Stained	Other: N/A
Insect Attack:	X BTB	Hylastes	Ips	SPB	Termites Weevils
Insect Damage:	X Boles	Branches	Foliage	Roots	
Stand Prevalence:	X Entire	Localized	Scattered	% Affected	
Severity of Damage:	Low	X Medium	High	Severe	
Recent Silviculture:	Fertilizer	Fire	Herbicide	Insecticide	Thin/Harvest

Problem Description: Trees look like a fire has burnt the lower canopy. No fire in stand since 2016.

http://www.auburn.edu/academic/forestry_wildlife/foresthealthcooperative/

Needle Samples

Needle Sampling Protocol 2023
FHDL Auburn University
----------SUBMISSION INSTRUCTIONS----------

Samples are recorded and processed routinely by the date and time in which they are received. All samples will be initially processed within five days of receipt with results available one to six weeks after processing, depending on requested diagnostics. Some laboratory diagnostic techniques take longer than others, which may affect result punctuality. Each tree should be individually bagged and labeled.

Sample Collection

Tree disease diagnosis is largely dependent on the quality of the sample and on the relevant information provided by the submitter. Samples must be of sufficient quality and quantity to allow for proper laboratory testing and pertinent information, such as sample tree identification, is essential.

1. Samples should be collected from symptomatic **(NOT DEAD)** trees showing thinning/transparent crowns, and foliage discoloration.

2. Samples should NOT be collected from dead trees; determining the casual agent from such trees is highly unlikely.

3. Submit a generous amount of sample material to allow for all required laboratory processes. Remove needles from the branch. Sterilize all tools between trees with alcohol or hand sanitizer.

4. Keep all samples separated and cool until ready to be shipped, do not expose collected needles to high temperatures. Place samples in an envelope or paper bag **(NOT PLASTIC)**.

5. Complete a "Tree Disease Diagnostic Form" for each sample, available on the Forest Health Cooperative webpage (https://fp.auburn.edu/ForestHealthCooperative/default.htm).

6. Samples may be delivered in person or mailed (between Monday-Wednesday) to the Forest Health Dynamics Laboratory, 602 Duncan Drive, Ste 3301, Auburn University, AL 36849.

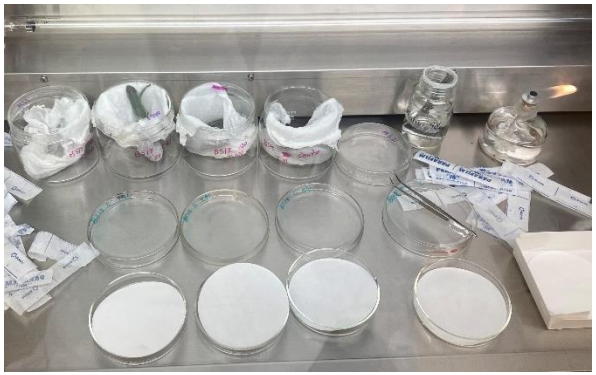
7. When submitting samples by mail, have the samples overnighted through either Fedex or UPS, then send us an email letting us know that you have sent us some samples, include pictures of the damage in the email. Dr. Lori Eckhardt (eckhalg@auburn.edu) and/or Jessica Baldwin (jmb0276@auburn.edu) **Do not use USPS, as they do not deliver directly to our building. Only ship samples between Monday- Wednesday**

8. Samples should be mailed in an appropriate sized box, with padding, or in a padded envelop. Please write on the outside **"Refrigerate Upon Arrival"**.

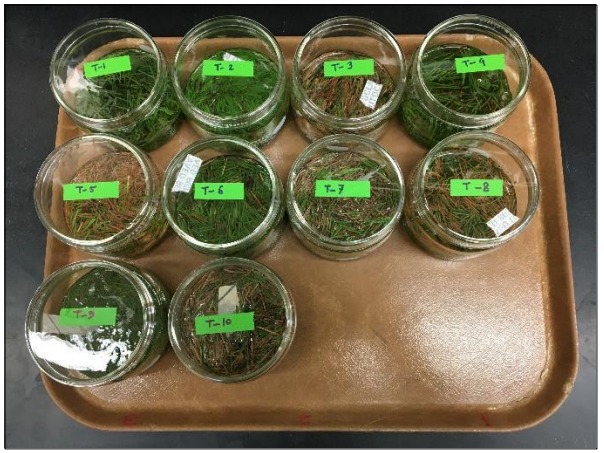
Needle Samples

Laboratory Sample Analysis

Laboratory Sample Analysis



Laboratory Sample Analysis



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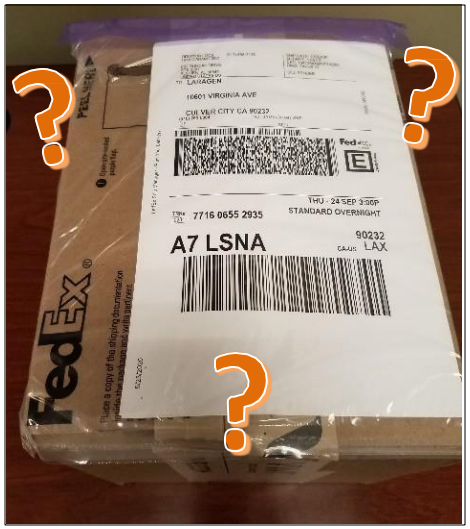
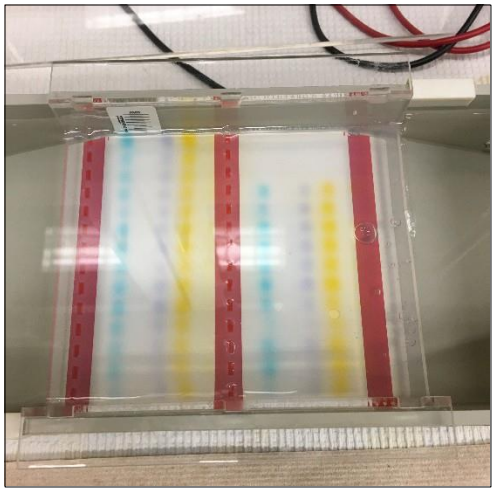
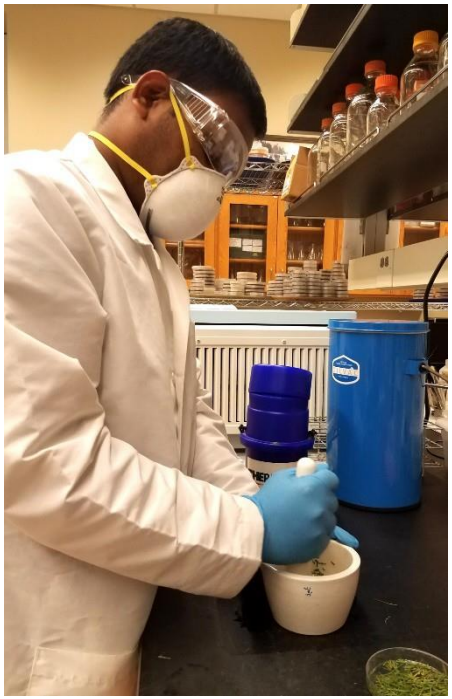
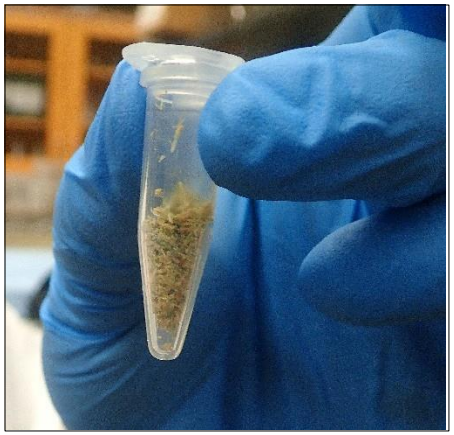
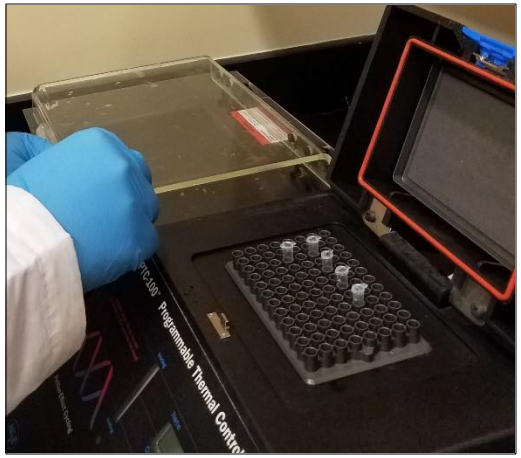










Root Samples

Root Sampling Protocol 2023
FHDL Auburn University

----------SUBMISSION INSTRUCTIONS----------

Samples are recorded and processed routinely by the date and time in which they are received. All samples will be initially processed within seven days of receipt with results available twenty-one days after processing. Some laboratory diagnostic techniques take longer than others, which may affect result punctuality. Each tree should be individually bagged and labeled.

Sample Collection

Tree disease diagnosis is largely dependent on the quality of the sample and on the relevant information provided by the submitter. Samples must be of sufficient quality and quantity to allow for proper laboratory testing and pertinent information, such as sample tree identification, is essential.

1. Collect samples before the application of pesticides in order to increase the probability of recovering the causal pathogens.
2. Samples should be collected from symptomatic trees showing tinning/transparent crowns, foliage discoloration, and/or excessive cone production.
3. Samples should not be collected from dead or severely declined trees; determining the causal agent from such trees is highly unlikely. Samples should not be collected from dead roots for the same reason.
4. Two lateral roots on opposite sides of the tree should be sampled from the butt to the dripline.
5. Submit a generous amount of sample material to allow for all required laboratory processes: collect 12 to 18 inches of first order lateral roots that are ¾ to 4 inches in diameter from each lateral root.
6. Carefully excavate to avoid unnecessary damage to the sample.
7. Excess soil should be removed from root samples. Samples should retain just enough soil to maintain moisture levels.
8. Do not add water or pack a sample in water.
9. Wrap samples in a dry paper towel and seal in a zip-top bag.
10. Keep samples refrigerated from collection to submission and do not expose them to high heat situations, such as baking in the sun or in the back of a vehicle.
11. Keep all samples in separate bags and label appropriately.
12. Complete a "Tree Disease Diagnostic Form" for each sample, available on the Forest Health Cooperative webpage (https://fp.auburn.edu/ForestHealthCooperative/default.htm).

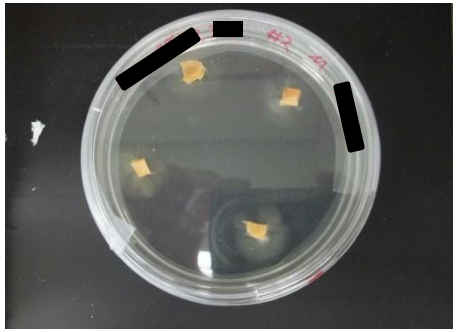
Sample submission

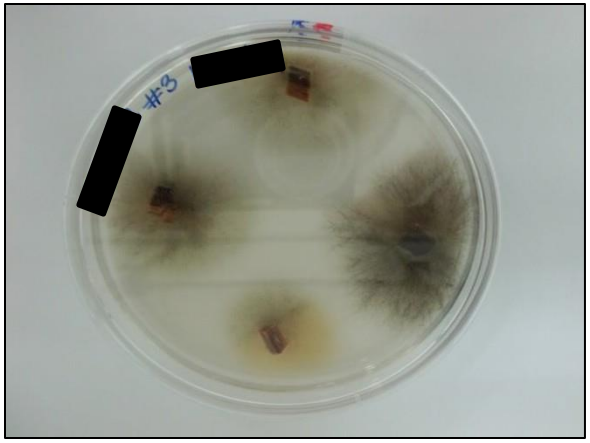
Samples may be mailed to the Forest Health Cooperative Diagnostic Laboratory or delivered in person to Dr. Lori Eckhardt at 3301 Forestry and Wildlife Sciences Building, Auburn University, Alabama 36849-5418.

1. All samples must be submitted with a completed "Tree Disease Diagnostic Form."
2. When submitting samples by mail, have the samples overnighted through either Fedex or UPS, then send us an email letting us know that you have sent us some samples, include pictures of the damage in the email. Dr. Lori Eckhardt (eckhalg@auburn.edu) and/or Jessica Baldwin (jmb0276@auburn.edu) **Do not use USPS, as they do not deliver directly to our building. Only ship samples between Monday- Wednesday. Samples should be mailed in an appropriately sized box, with padding, or in a padded envelope.**
3. If sample is a suspected high-risk pathogen, contact Diagnostic Laboratory personnel for appropriate packaging and mailing instructions.

Root Samples

Laboratory Sample Analysis





Results

Results

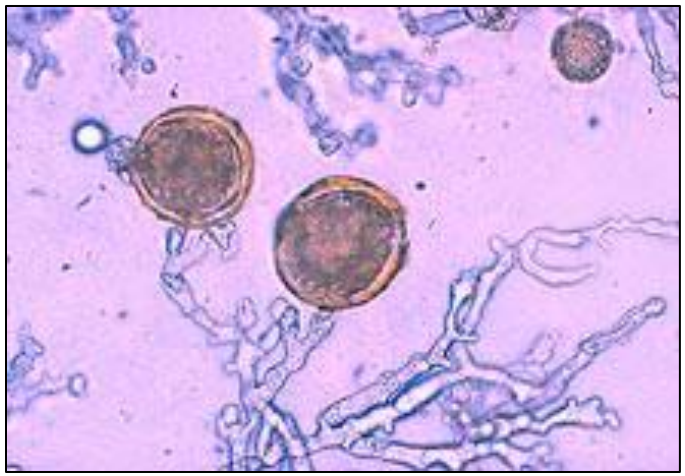
- Roots: 3-4 weeks
- Needles: 1-6 weeks

Results letter sent to member with description and relevant species information

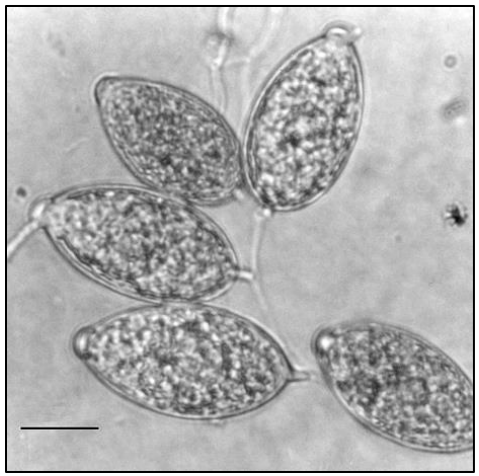
Sudden Oak Death

- First reported 1995 coastal region of central California with *Phytophthora ramorum* positively linked to the disease in 2001
- Fungus-like water mold (Oomycete)
- Spreads aerially and aquatically
- Pathogen has a wide host range
- Three expressions of the disease

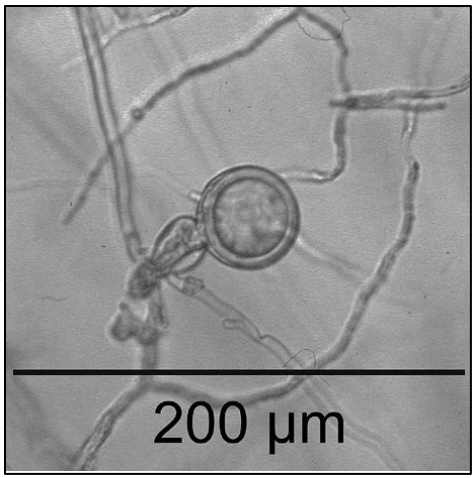
Phytophthora ramorum



Chlamydospores



Sporangia



Oospore

- *P. ramorum* thrives in wet conditions
- Chlamydospores can persist in soil and leaf litter
- Sporangia contain flagellated zoospores
- Oospores are resistant to damage

Source: Steve Oak - USDA Forest Service Forest Health Protection

Risk To Our Forests

- *Phytophthora ramorum* persists in infected nurseries even after eradication measures
- Inoculum is leaving infected nurseries via waste water
- A pathway from the water into terrestrial ecosystems is plausible
- Southeastern US climate is at least seasonally suitable for infection
- Eastern woody plants are susceptible

SOD Risk Map

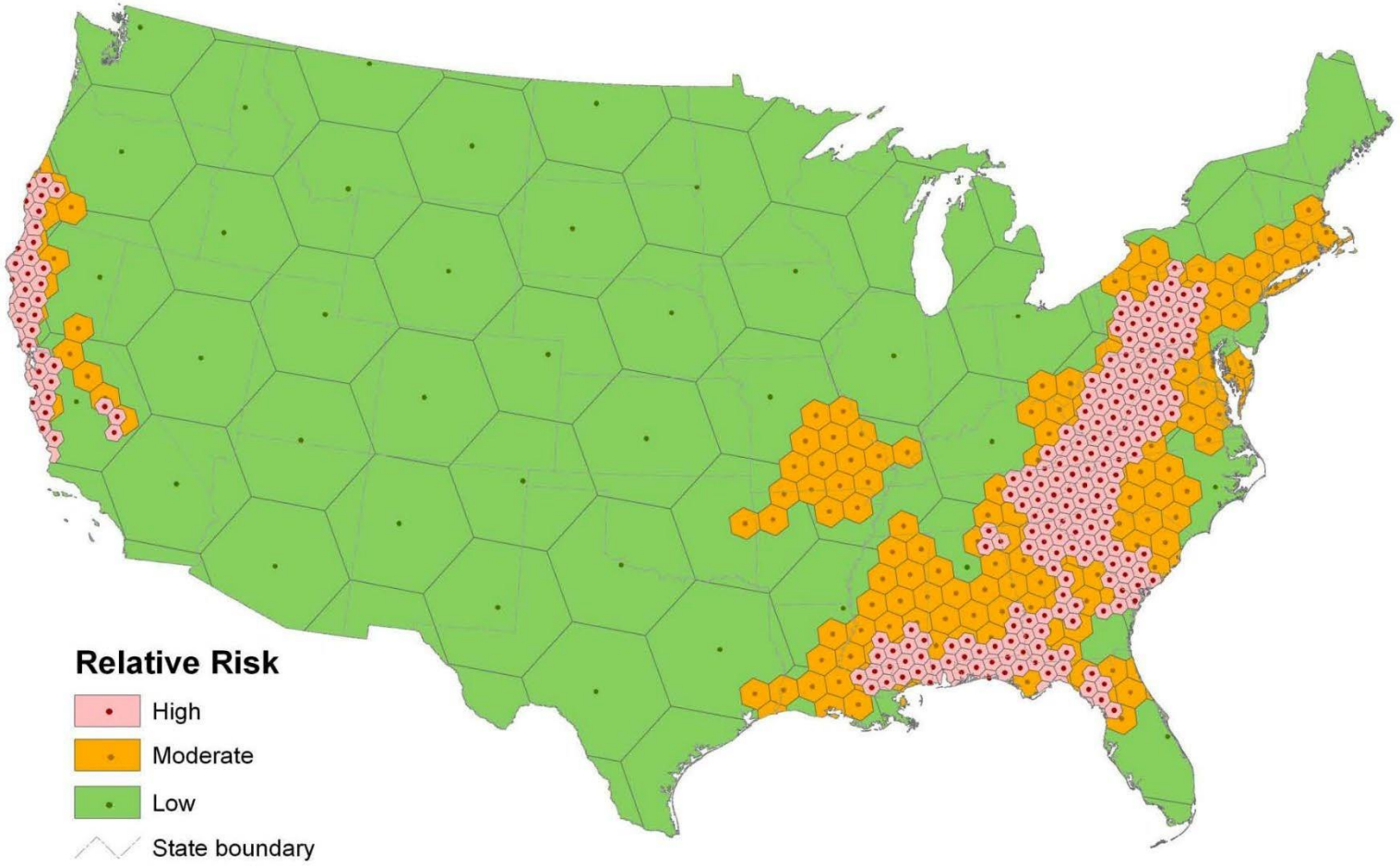
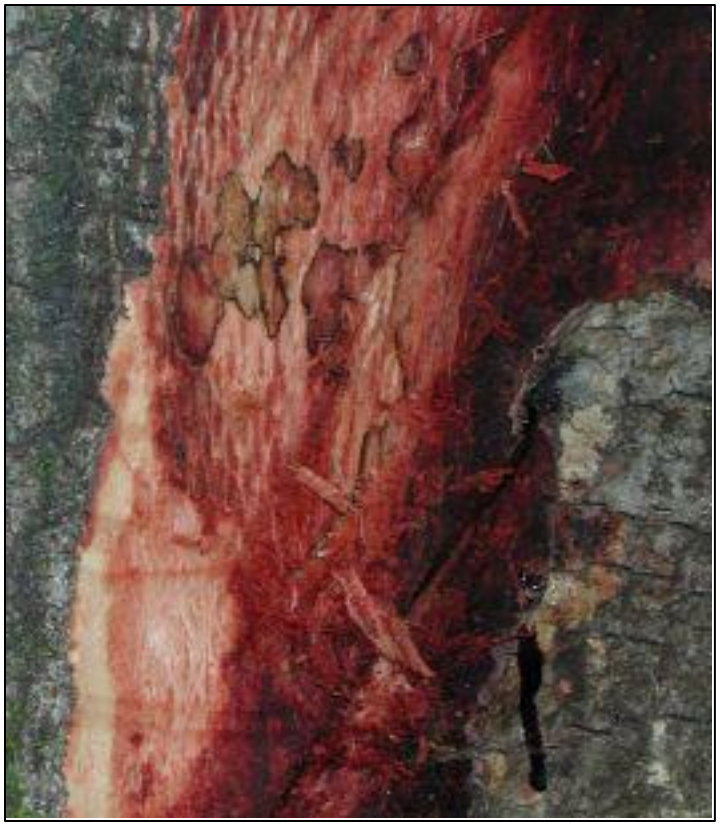


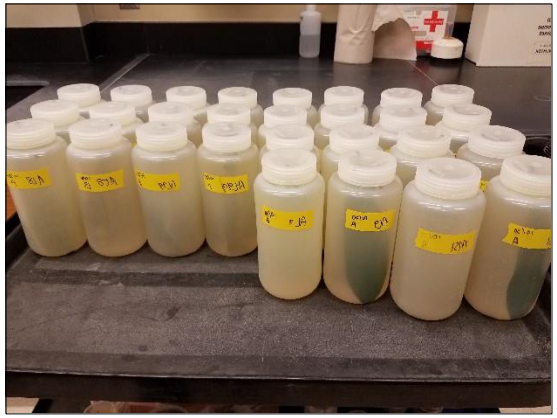
Figure 7.7 – New national risk map for sudden oak death (*Phytophthora ramorum*). State boundaries are included for reference.

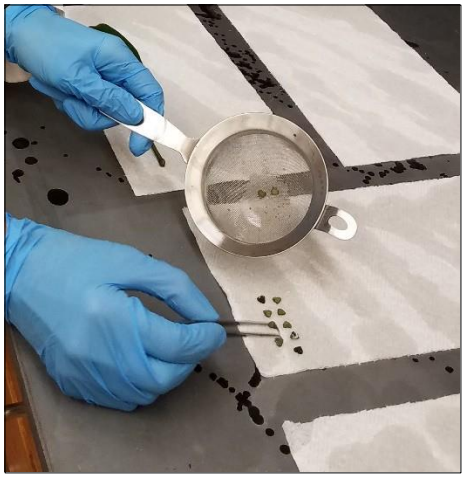
Phytophthora ramorum symptoms



Source: Steve Oak - USDA Forest Service FHP

Lab processing





PennState

Photos: FHDL

Acknowledgements

AUBURN
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