Mitigating Needle Blight: A Growing Economic Threat to Pine Forests – Project Overview

Lori Eckhardt, PhD

Brown Spot Needle Blight Assessment Workshop

Auburn University

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Introduction

Pine forests and industrial wood plantations in the southeastern U.S.

- More than $11 billion
- Sustainability and profitability
- Non-native insect pests and pathogens
- Movement of native forest pests
- Damage approximately $4.2 billion annually

The Research Team

Dr. Lori Eckhardt (Auburn University, Integrated Forest Pathology and Entomology)

Dr. Lana Narine (Auburn University, Remote Sensing and Modeling)

Dr. Janna Willoughby (Auburn University, Genetics)

Dr. Joseph Fan (Auburn University, Statistician)

J. Ryan Mitchell (Auburn University, Alabama Cooperative Extension System)

Rabiu Olatinwo (USFS, SRS, Research Plant Pathologist)

Current Partners

- Dr. Annakay Newell (Auburn University, Plant Pathologist)
- Dr. Brian Via (Auburn University, Wood Products)
- Dr. Iris Erramuspe (Auburn University, Wood Chemistry)
- Dr. Emily Carter (USFS-R, Soil Scientist)
- Dr. Jon Cale (University of Northern British Columbia, Forest Pathologist)
- Drew Metzler (Alabama Forestry Commission, Forest Health Coordinator)
- Clarissa Balbalian (Mississippi State University Extension Diagnostics Lab, Plant Pathologist)
- Alan Wilson (Rayonier, R&D Coordinator)
- Dr. David Wilkinson (Manulife Investment Management, Silviculture Program Manager)
- Kristopher Bradley (Regions, Vice President & Forester)
- Jenny Leblanc (Weyerhaeuser, Forester)
- Ryan Nadel (Weyerhaeuser, Research Silviculturist)
- Michael Westbrook (The Westervelt Company, Forest Improvement Manager)
- Kozma Naka (Alabama A&M, Coordinator of Forestry, Ecology and Wildlife Program)

Long-Term Goals

(1) To determine the distribution and movement of the needle pathogen(s)

(2) To understand the disease cycle and the environmental factors that drive the emergence and distribution of the needle pathogen(s)

(3) To determine if the appearance in loblolly is due to more aggressive strains of the pathogen(s)

(4) To determine the origins of the pathogen(s)

Predicted Outcomes

1. A collection of factors to account for losses (tree death as well as predicted growth losses) from brown spot needle blight in loblolly in productivity models.
2. An improved understanding of the interactive effect of fungal infection, stand environment, and tree physiology on loblolly pine sustainability which is required for developing remedial actions and productivity models for trees and stands already affected.
3. The levels of infection that are acceptable (minimal growth loss and low probability of mortality) and those that fall above the damage thresholds.
4. An understanding of tree-level infection levels.
5. An understanding of the genetic variability of the fungus and how it is related to infection level and severity.
6. A screening protocol for testing seedlings to find families tolerant to the pathogen.
7. Distribution and movement of the pathogen across the southeast.

Project Components

Component 1: Inoculation protocol development for *Lecanosticta acicola* to develop a screening method to complete Koch's postulates, determine strain aggressiveness and seedling tolerance (Dr. Lori Eckhardt)

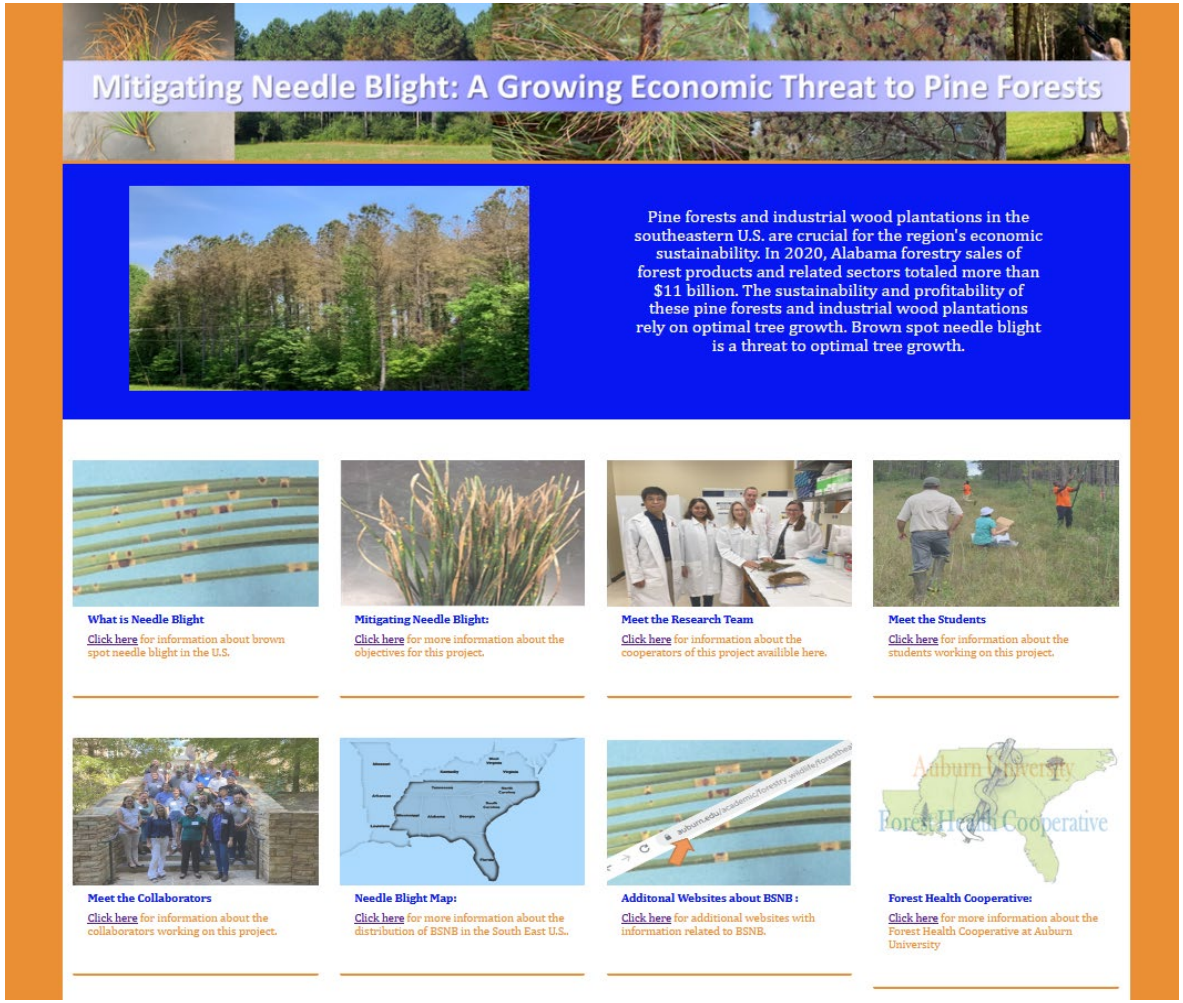
Component 2: Environmental factors that drive the emergence and severity of infection from *Lecanosticta acicola* across Alabama (Drs. Lori Eckhardt & Joseph Fan) & Environmental triggers and seasonal changes in the mycobiome on systematic and asymptomatic loblolly pine needles (Dr. Rabiu Olatinwo)

Component 3: Detection and movement of *Lecanosticta acicola* with remote sensing (Dr. Lana Narine)

Component 4: Genetic diversity of *Lecanosticta acicola*, pathogen origins, and invasion history (Dr. Janna Willoughby)

Component 5: Extension and Outreach Activities (Dr. Lori Eckhardt & J. Ryan Mitchell)

Project Webpage



Film Stars

Acknowledgements

Collaborators

Dr. Lori Eckhardt
Dr. Brian Via
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Dr. Lana Narine
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Dr. Timothy Shearman
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Graduate Students

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Landowners

Stallworth Land Company
Longleaf Land & Timber Co.
Osco Forest – Glover Family
US Forest Service

Facilities

Forest Health Dynamics Lab
Molecular Mycology Lab
Conservation and Genomics Lab
Geospatial Analytics Lab
Forest Products Lab

Undergraduates

Angel Cagle
Maddox Golden
Andrew Howard
Drew Conway
Joseph Anglin
Gavin Kerr
Jaquie Parker
Nathan Kurtz
Garrett Gaar
Brea Thomas
Skyler Alvarez
Caleb McCrory
Lillian Avis
Blake Johnson
Solana Hendrickson
Alexandra Foreman

Forest Products Development Center

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

w i l l o u g h b y
conservation and genomics lab

REGIONS

Forest Health Cooperative

AUBURN
College of Forestry, Wildlife and Environment

WORKING TO KEEP TREES HEALTHY

Forest Health Dynamics Laboratory

College of Forestry, Wildlife and Environment – Auburn University