Exploring fungal diversity and interactions with *L. acicola* in Brown Spot Needle Blight

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Background

-Loblolly pine (*Pinus taeda*) is the most abundant pine found in Alabama

-Widely planted for commercial use

-Thrives in various soil types and climatic conditions, making it ideal for reforestation and afforestation

Problem

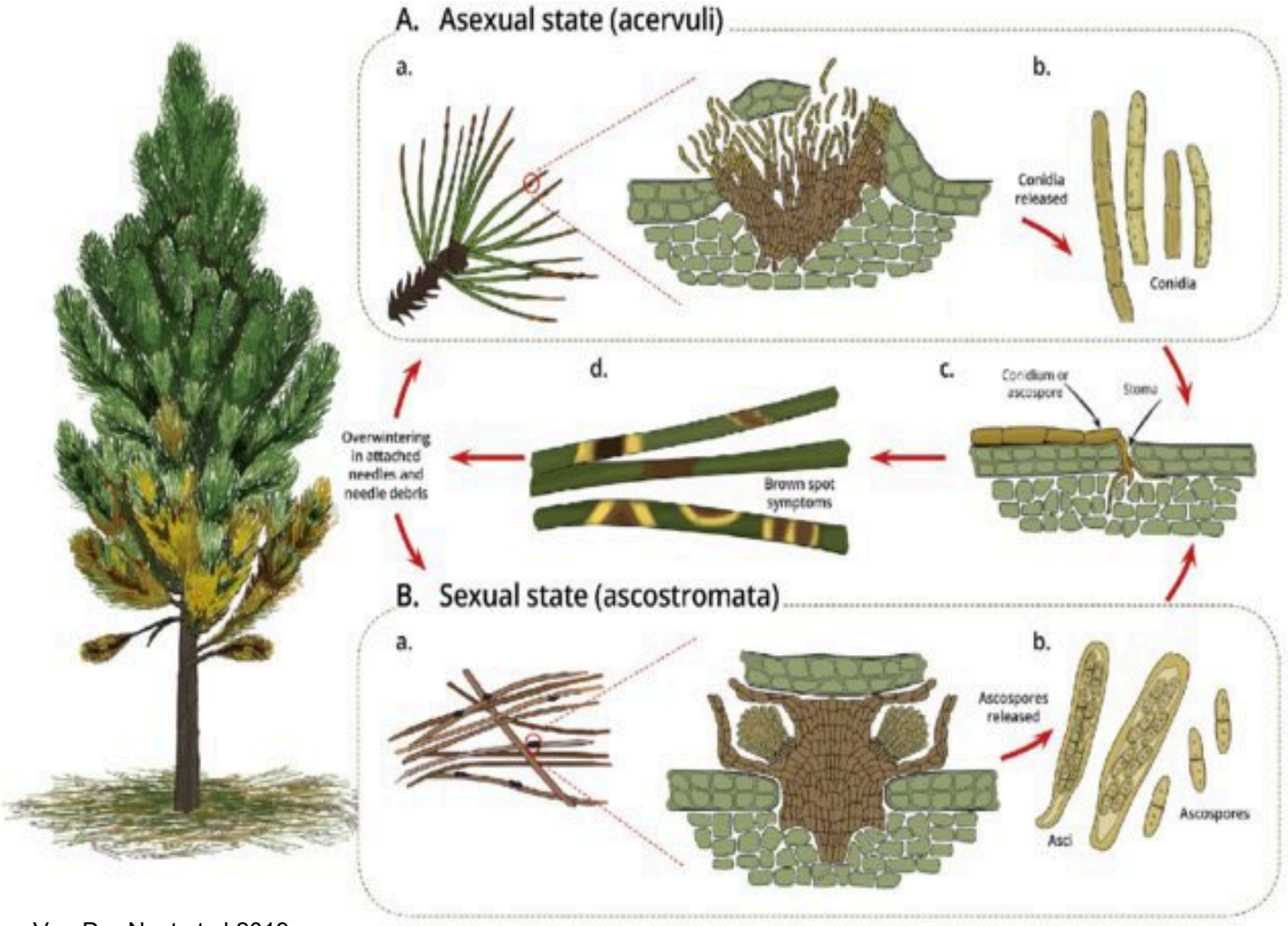
Brown spot needle blight poses a significant threat to the productivity and economic viability of loblolly pine plantations

Seedlings in nurseries and young plantations are also vulnerable

BSNB is caused by the fungus, *Lecanosticta acicola*

BSNB infected study plot in Chatom, AL

Life cycle of *L. acicola*

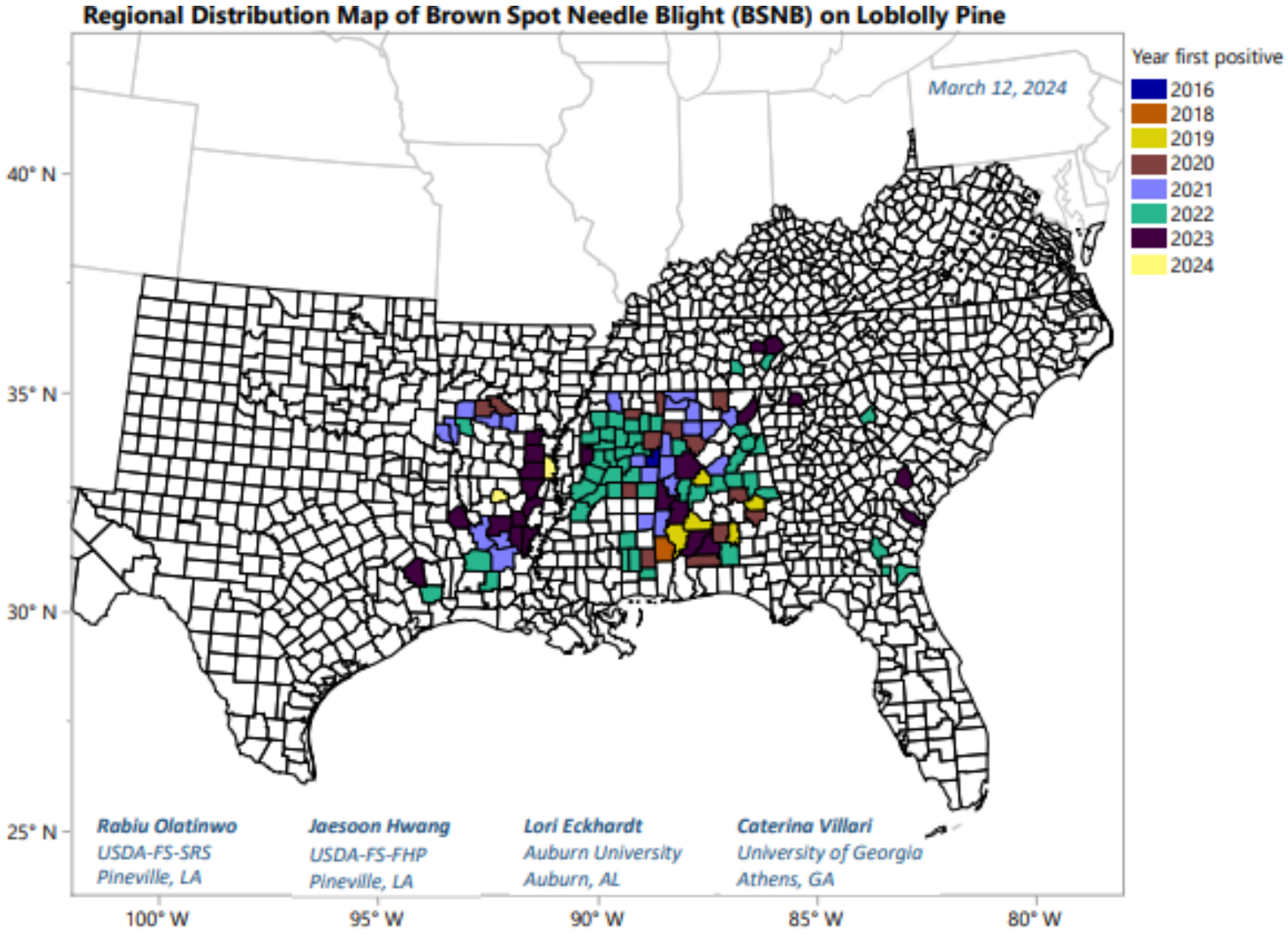


Van Der Nest et al 2019

Impact of Brown Spot Needle Blight

Datta, D. & Eckhardt L.G. 2021

- Reduced growth
- Premature shedding of needles
- Tree mortality



Contact: Rabiu Olatinwo (rabiu.a.olatinwo@usda.gov)

Objectives

Study 1
To investigate the diversity of fungi associated with *Lecanosticta acicola* in brown spot needle blight

Study 2
To assess the seedling susceptibility of different loblolly pine families to *Lecanosticta acicola*

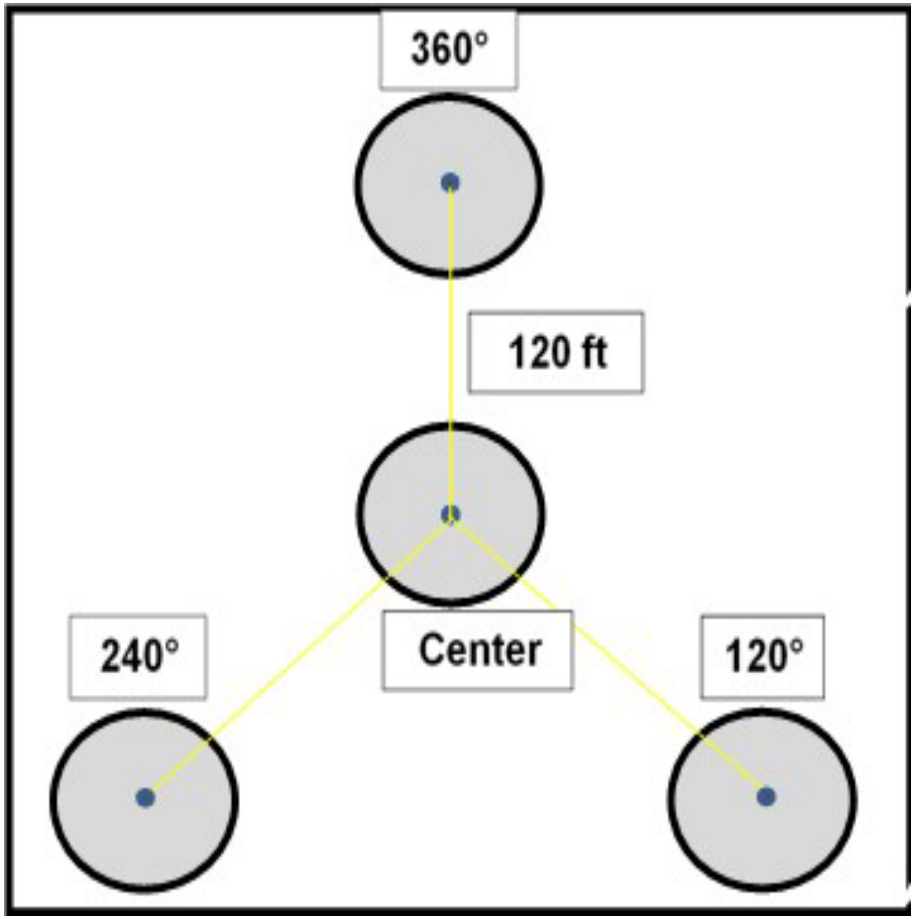
Study Areas

Research plots located in Cullman and Chatom, Alabama

14 plots in 2023

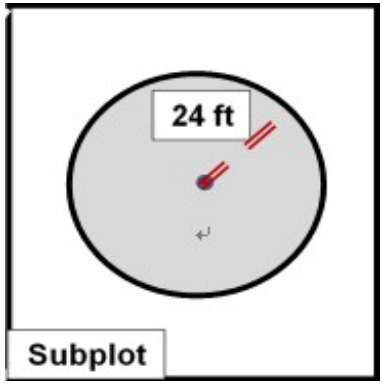
3 National Forests (8 new plots)- January 2024
Bankhead NF, Conecuh NF, Tuskegee NF

Plot layout



FIA Plot design for the Forest Health Monitoring Program, 1990

Area: ≈ 2.2 acres



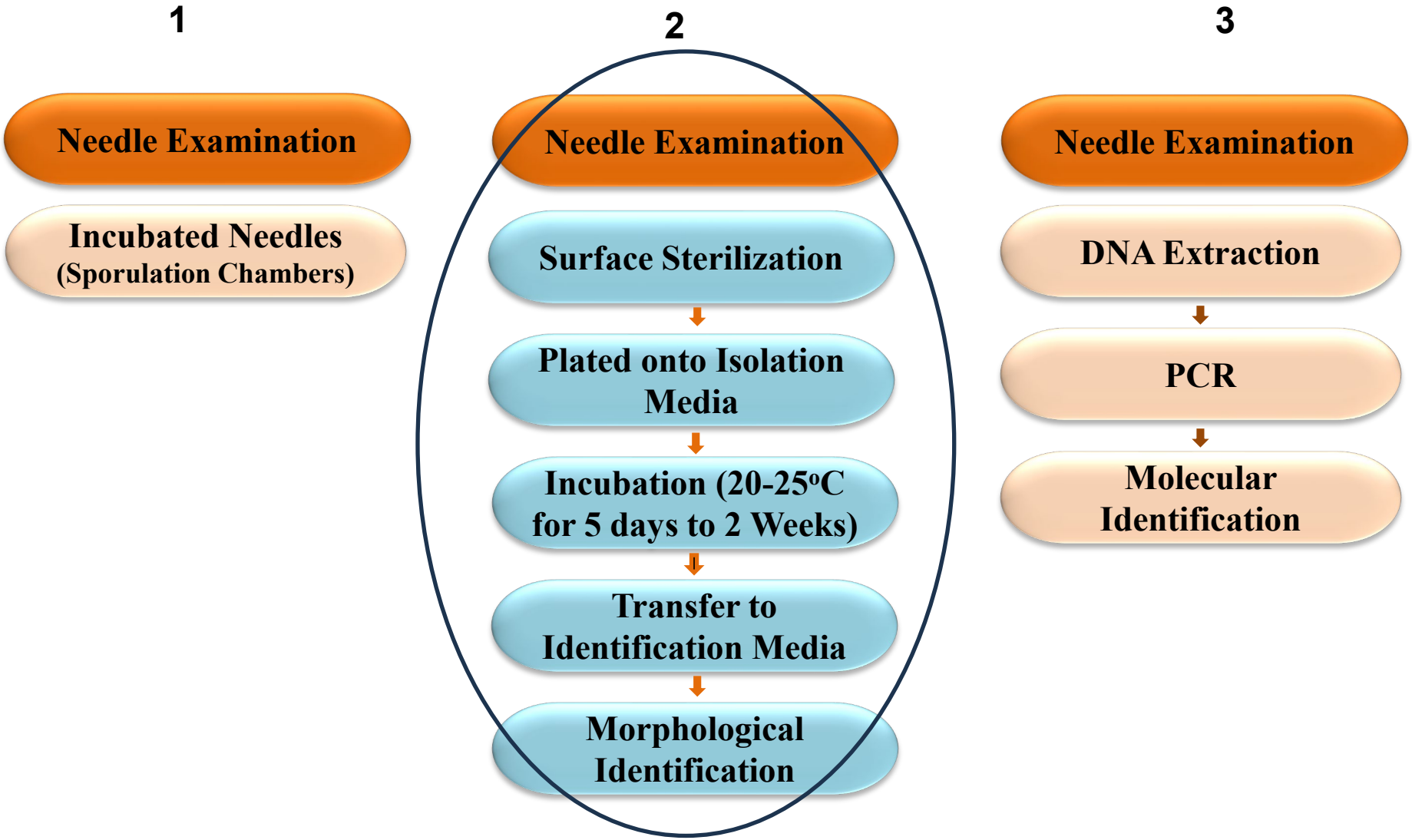
Needle collection

Sampling period – monthly (March to November)

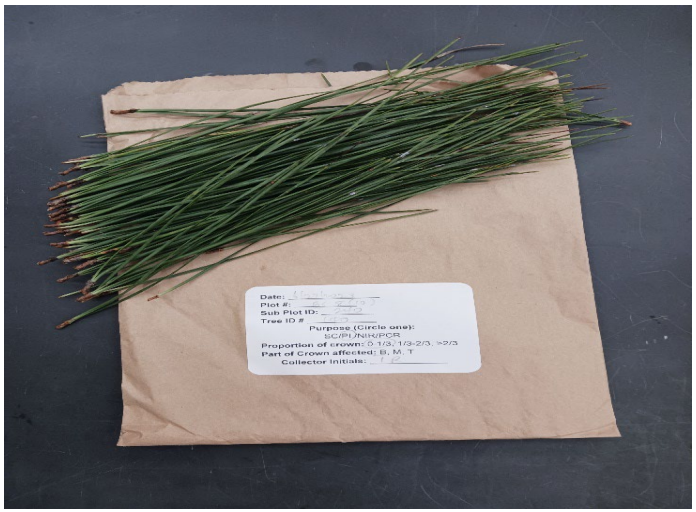
Needle samples collected from one tree per subplot in all plots

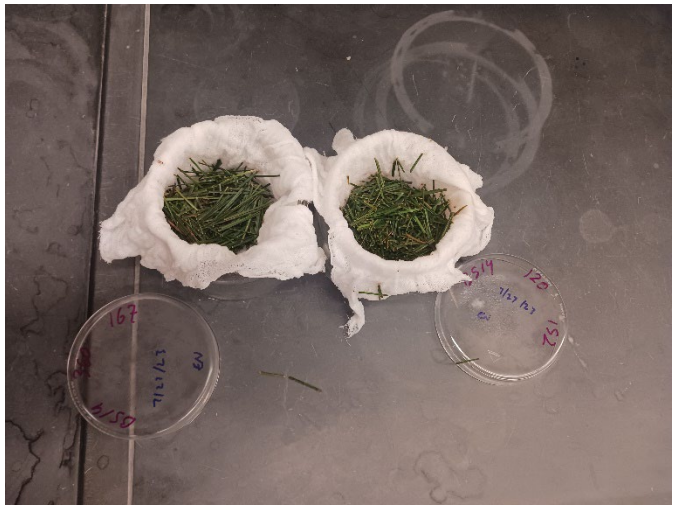
Transported to the Forest Health Lab for processing

Processing and Identification



Sample processing (Plating)





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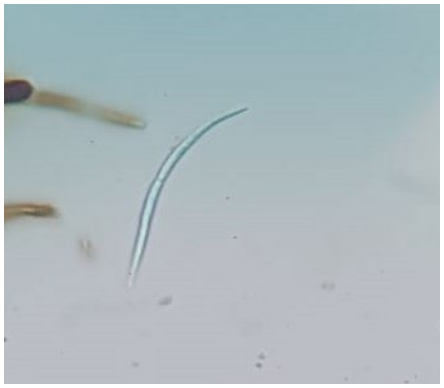
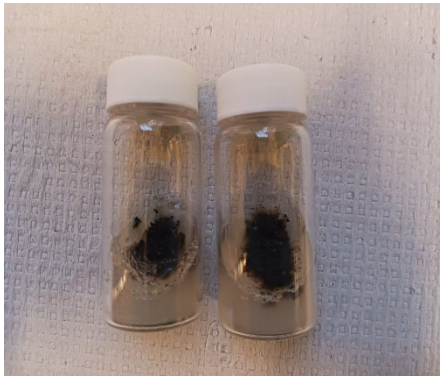
Results

Predominant fungi recovered from plated needles

Lecanosticta acicola



FHDL



FHDL

Hendersonia

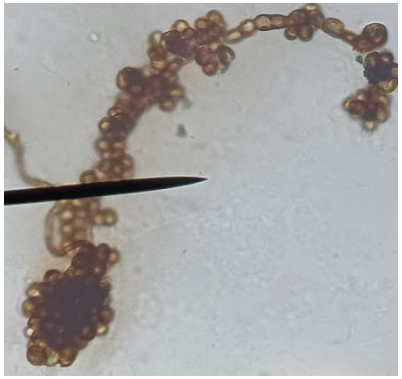
FHDL

Barnett, H. L, &Hunter B.B., 1998

Results

Predominant fungi recovered from plated needles

Cladosporium



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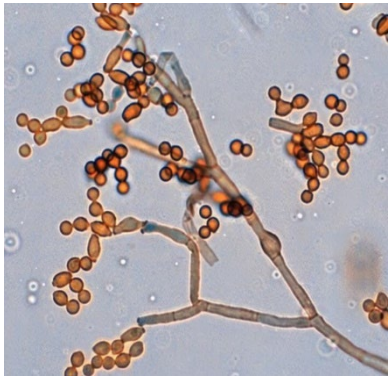
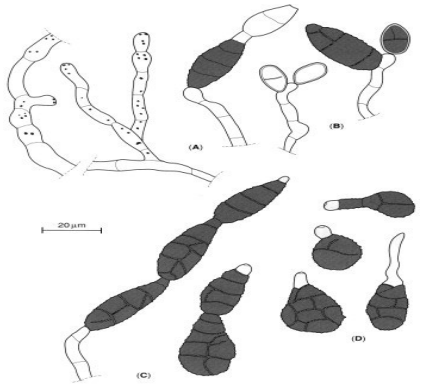


Barnett, H. L, &Hunter B.B., 1998

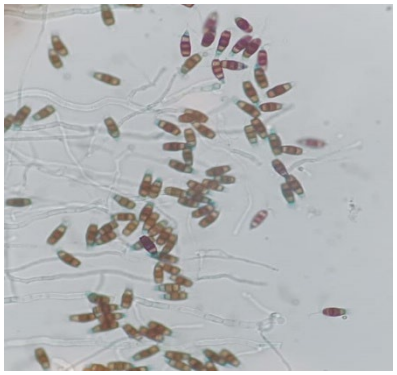
Alternaria

FHDL



Barnett, H. L, &Hunter B.B., 1998

Pestalotiopsis



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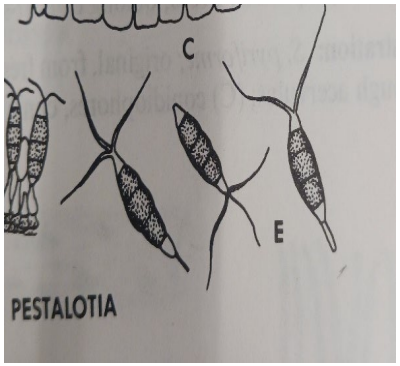
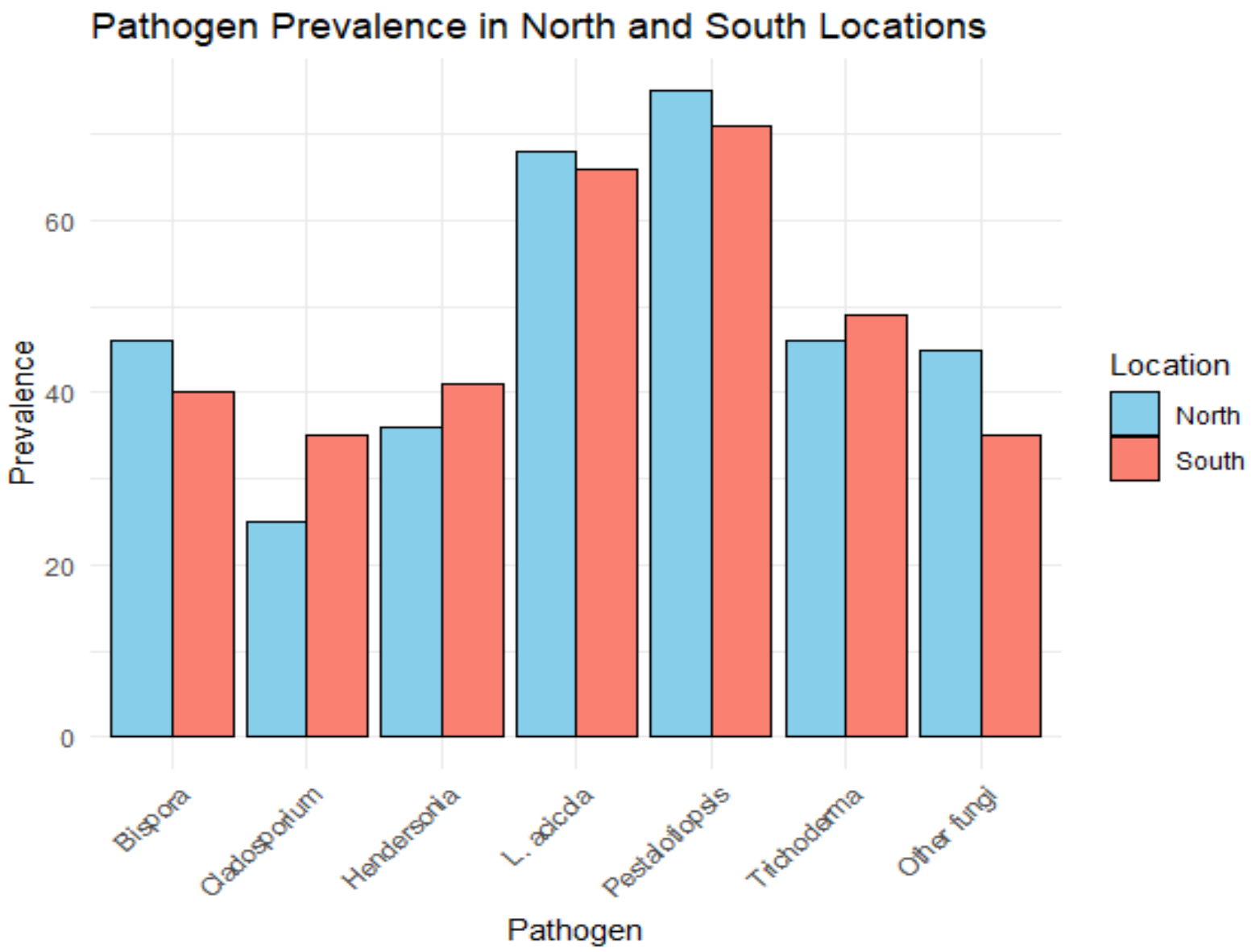
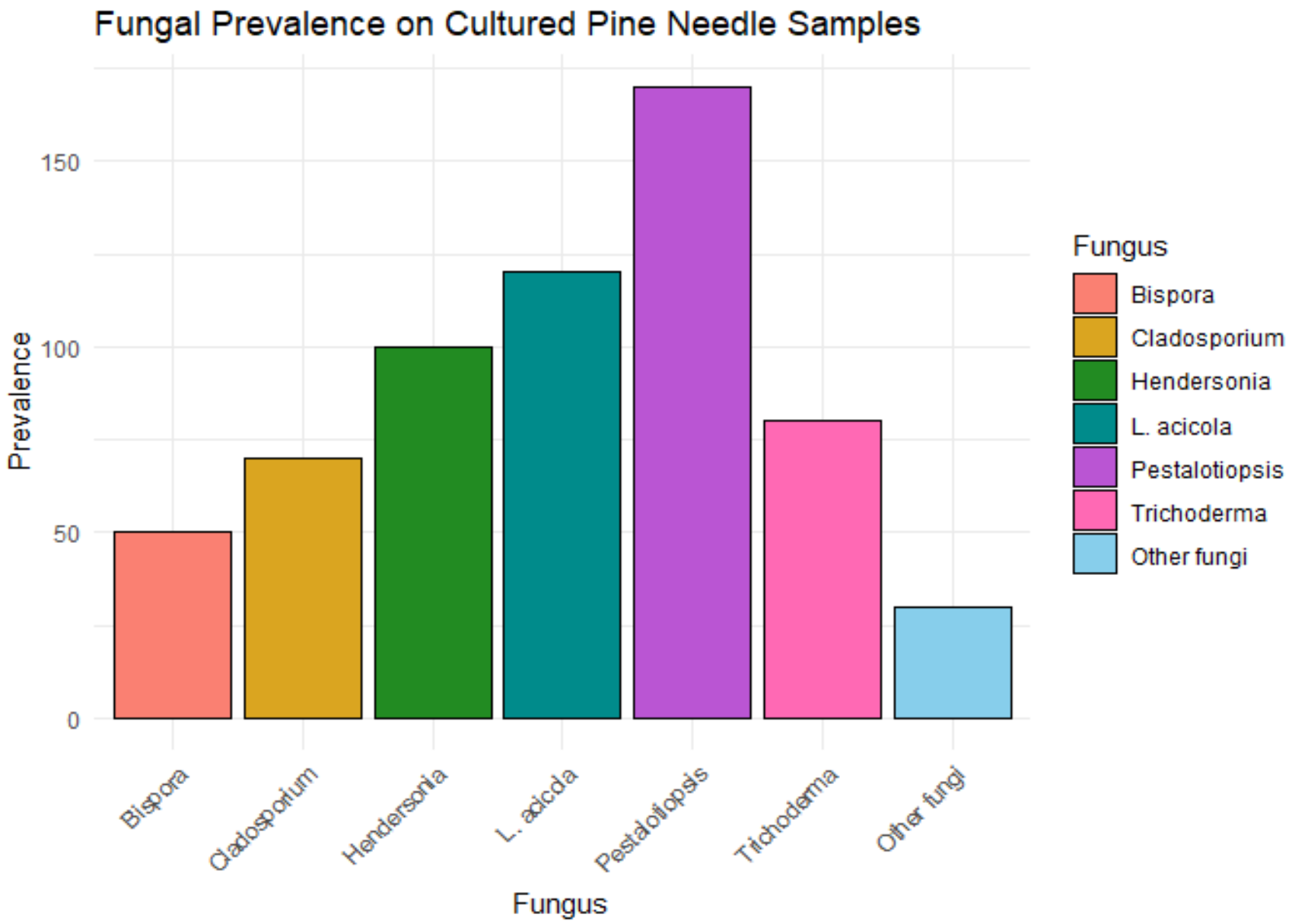


Barnett, H. L, &Hunter B.B., 1998


Pathogen Prevalence in North and South Locations
Prevalence
0
20
40
60
Bispora
Cladosporium
Hendersonia
L. acicda
Pestalotiopsis
Trichoderma
Other fungi
Pathogen
Location
North
South


Fungal Prevalence on Cultured Pine Needle Samples
Prevalence
150
100
50
0
Bispora
Cladosporium
Hendersonia
L. acicola
Pestalotiopsis
Trichoderma
Other fungi
Fungus
Fungus
Bispora
Cladosporium
Hendersonia
L. acicola
Pestalotiopsis
Trichoderma
Other fungi

Ecological roles of predominant fungi

Fungi	Ecological role
L. acicola	Parasitic
Pestalotiopsis	Endophytic, saprophytic
Cladosporium	Weakly parasitic, saprophytic
Alternaria	Parasitic, Saprophytic
Trichoderma	Saprophytic
Bispora	Saprophytic

Barnett, H. L, &Hunter B.B., 1998. Illustrated Genera of Imperfect Fungi 4th Edition

On-going work

- DNA extraction for samples collected in 2023
- Needle sample collection on newly added National Forests
- Seedling susceptibility experiment (Study 2)

Barnett, H. L, &Hunter B.B., 1998. Illustrated Genera of Imperfect Fungi 4th Edition

Acknowledgment

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THANK YOU