Impact of *Leptographium terebrantis* Inoculum Density on Loblolly Pine Physiology

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Introduction

Leptographium terebrantis

- Lesions in the root epidermis and phloem
- Occlusion blocking water movement through vascular tissues
- Alter plant physiology

Introduction

Pine Decline

- Thinned crown
- Chlorotic needles
- Detoriation of roots
- Premature decline
- Mortality

Inoculum density of fungi ?

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Objectives

1. To determine the most pathogenic *Leptographium terebrantis* isolate
2. To understand the growth of different inoculum densities of *L. terebrantis* isolate in loblolly pine bolts and stem
3. Determine hydraulic conductivity in loblolly pine stems infected by *L. terebrantis*
4. Develop regression equations relating inoculum density, tissue occlusions and hydraulic conductance in loblolly pine

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Leptographium terebrantis Isolate Screening (Objective 1)

1. • Single family of loblolly pine
   • Completely Randomized Design
2. • 42 Isolates of *L. terebrantis* inoculation
   • For 8 weeks
3. • Measurements - Lesion and vascular tissue occlusion

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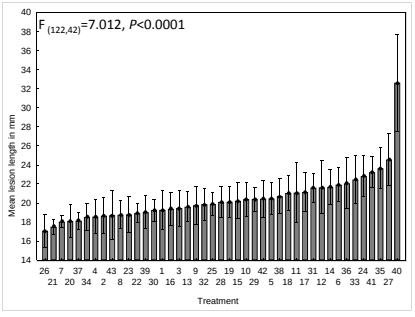
Results (Lesion Length by different LT isolates)



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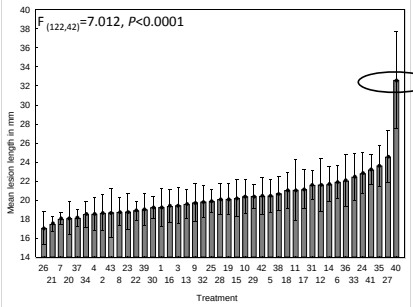

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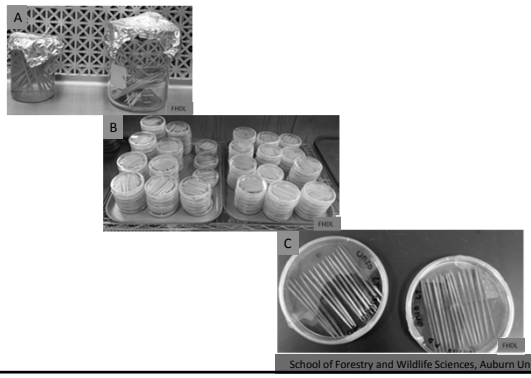
Methodology - Objective 2



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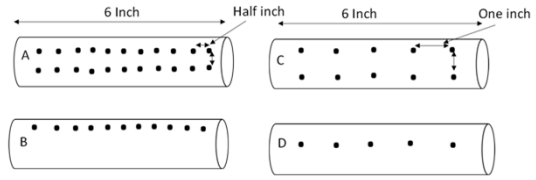
Methodology - Objective 2



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Methodology - Objective 2

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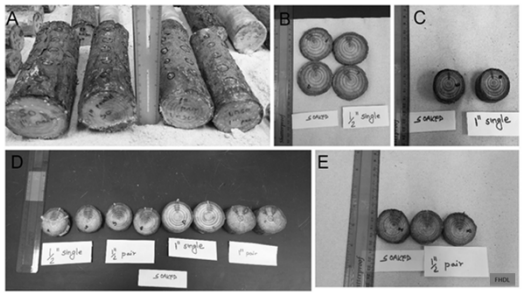
Results



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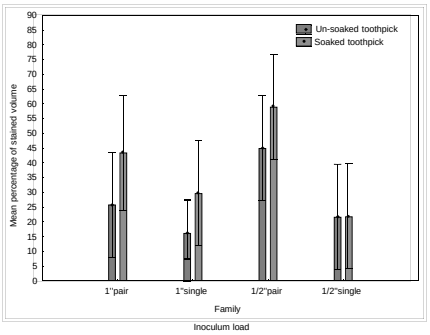

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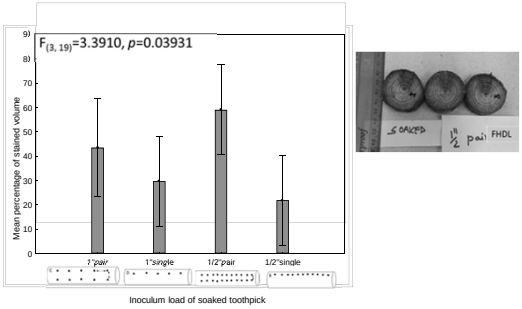

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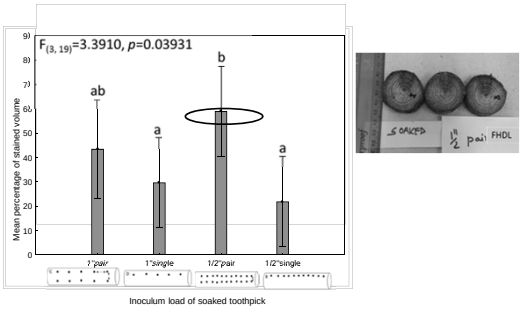

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Background

- Stem Hydraulic Conductance
  - Movement of water through stem
  - Capacity of stem to supply water to photosynthetic active tissues
  - Environmental stress
  - Plant pathogens

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Methods

- Healthy loblolly trees
  - No signs & symptoms of disease
  - Diameters: 2-3 inches at ground level diameter
- 25 trees per treatment in a completely randomized design
- *L. terebrantis* – Was cultured on toothpicks and used to inoculate the trees after colonization
- A second experiment will be set-up in July using different diameter class of loblolly pine

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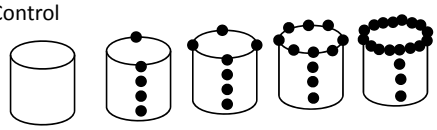
Methods

- Five treatments
  - Two inoculation points (IP) at 180^{O} apart (2IP)
  - Four at 90^{o} apart (4IP)
  - Eight 45^{o} apart (8IP)
  - Sixteen 22.5^{o} apart (16IP)
  - Control



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Methods

- Post inoculation assessment will be done on 8th week to determine
  - Size of occluded tissue
  - Hydraulic conductance

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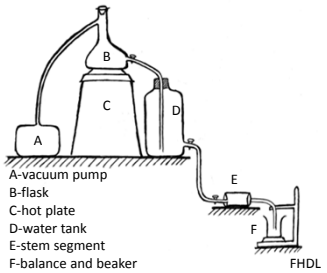
Methods - Set-up for Measuring Hydraulic Conductance



A-vacuum pump
B-flask
C-hot plate
D-water tank
E-stem segment
F-balance and beaker

FHDL

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Methods

K= QL/ (P.A)
P=ρgh

K – Stem hydraulic conductivity
Q – Flow rate
L – Length of stem segment
P – Pressure
ρ – Density
h – Height

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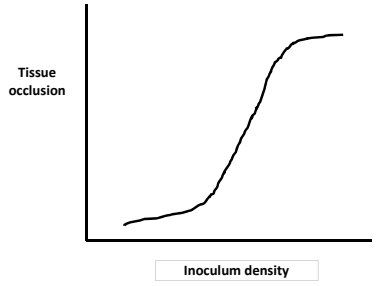
Potential Results



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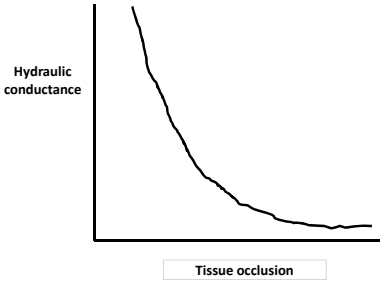
Potential results



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