Pathogenicity of *Leptographium terebrantis* to loblolly pine: effect of inoculum density

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Background

L. terebrantis – Southern pine decline

Alabama Forestry Commision

Eckhardt, 2003

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- **Pathogenicity of *L. terebrantis***
  - Seedlings and saplings
  - Under greenhouse
  - Field conditions

Lee et al, 2006

- **Inoculation techniques**
  - Agar plugs of fungal mycelia
  - Spore suspension
  - Colonized substrates

Matusick, 2010

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- *L. terebrantis* ability to cause decline symptoms in field grown trees has not been investigated
- Mimic the feeding habits of the bark beetles
- Toothpick inoculation technique

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Objectives

- Determine the efficacy of *L. terebrantis* colonized toothpicks for artificial inoculation in stems of loblolly pine saplings
- Determine the impact of inoculum density of *L. terebrantis* on loblolly pine saplings

Hypotheses

- Toothpick inoculation technique will cause infection and expression of symptoms in loblolly pine saplings
- Tissue damage caused by *L. terebrantis* will significantly increase with inoculum density

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Study Area

- Solon Dixon Forestry Education Center - Andalusia, AL
- Naturally regenerating stand – loblolly, slash, long leaf
- Loblolly pine trees selected
  - Without signs and symptoms of disease
  - Ground level diameter: 2.5 inches
- 18 trees per treatment
- *L. terebrantis* was cultured on toothpicks and used for inoculation
- Post inoculation assessment - 8weeks

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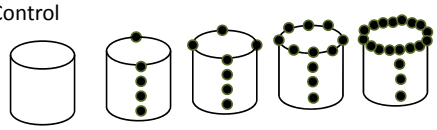
Methods

- 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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Pictures Showing the Inoculation Process

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Results – Tissue occlusion



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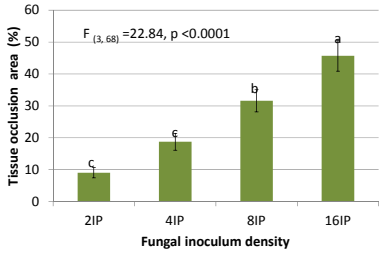
Tissue Area Occlusion



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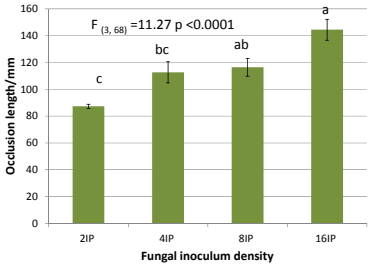
Occlusion Length



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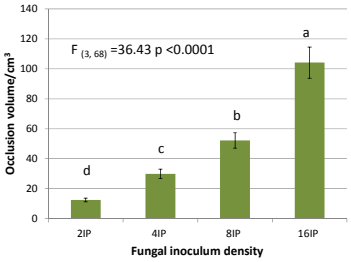
Occlusion Volume



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Relationship between Tissue Occlusions and Inoculum Density

Equations	Pr > F	R-Square	Root MSE	Coeff Var
Occlusion = -4.42 + 12.27(ID)	<.0001	0.4986	13.9529	53.1596
log(OL) = 4.31 + 0.156(ID)	<.0001	0.3275	0.2530	5.3839
log(volume) = 1.79 + 0.677(ID)	<.0001	0.6134	0.61042	17.49

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Conclusion

- *L. terebrantis* colonized toothpicks succeeded in causing infection of saplings of loblolly pine
- No decline symptoms were observed
- Tissue occluded area, length and volume increased with increasing fungal inoculum density
- Inoculum density associated best tissue occlusion volume

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Acknowledgements

- Dalton Smith
- Sarah Peaden
- Andrea Cole
- Shrijana Duwadi
- Pratima Devkota (PhD)

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