Forest Health Cooperative Annual Meeting - FY2021

Pine Needle Study Update

Presented By

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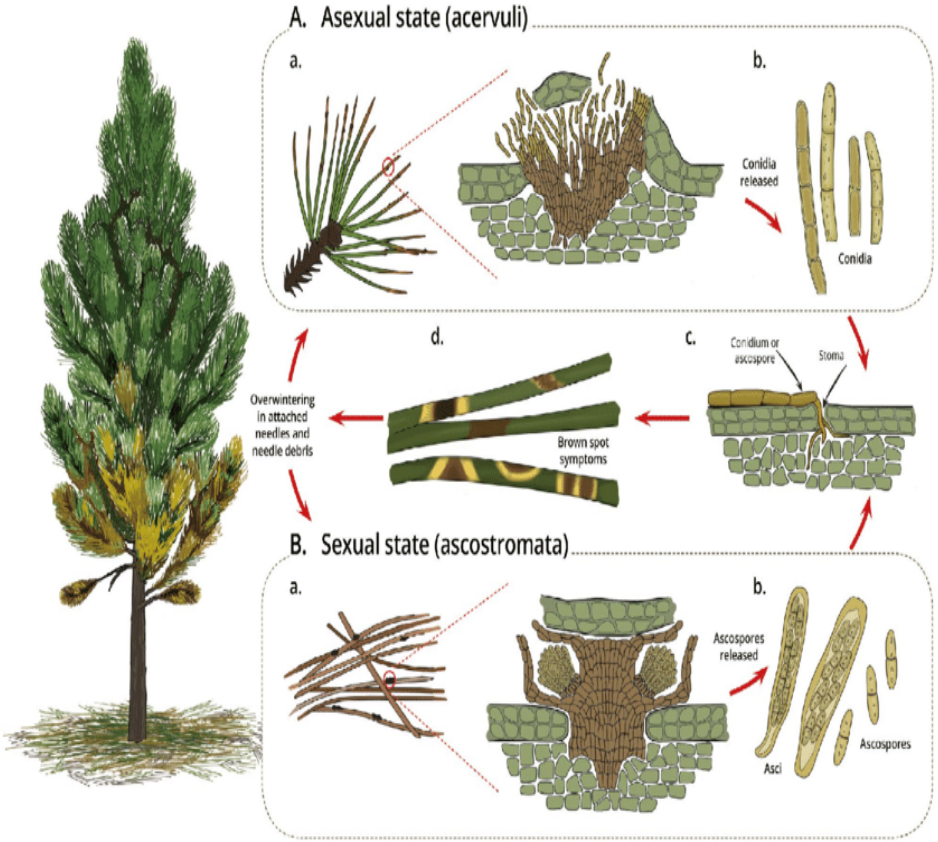
Needle Pathogen, *Lecanosticta acicola*, effects on *Pinus taeda* Needle and Shoot Lengths

Introduction

Needle pathogen, *Lecanosticta acicola*

- life cycle on needles
- Overwinters
  - (a) Vegetative mycelium
  - (b) Asexual acervuli
  - (c) Sexual ascostromata
- Light, temperature and humidity
- Conidia and ascocspores
- Air-currents or rain-splash spores



Life Cycle of the brown spot needle blight fungus, *Lecanosticta acicola*

Introduction

Healthy trees

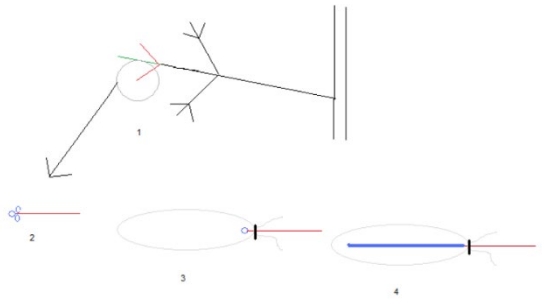
- Robust shoot growth, long and lush green needles
- Optimal growth and productions

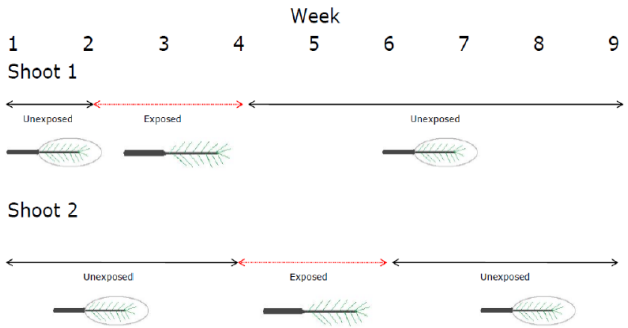
Shoot development in pine trees

- Long shoot and short shoot development
- Impacts of stress and growth promotion factors

Brown spot needle blight fungus, *L. acicola* impacts

- Needle and shoot sizes have not been assessed
- Disease progression



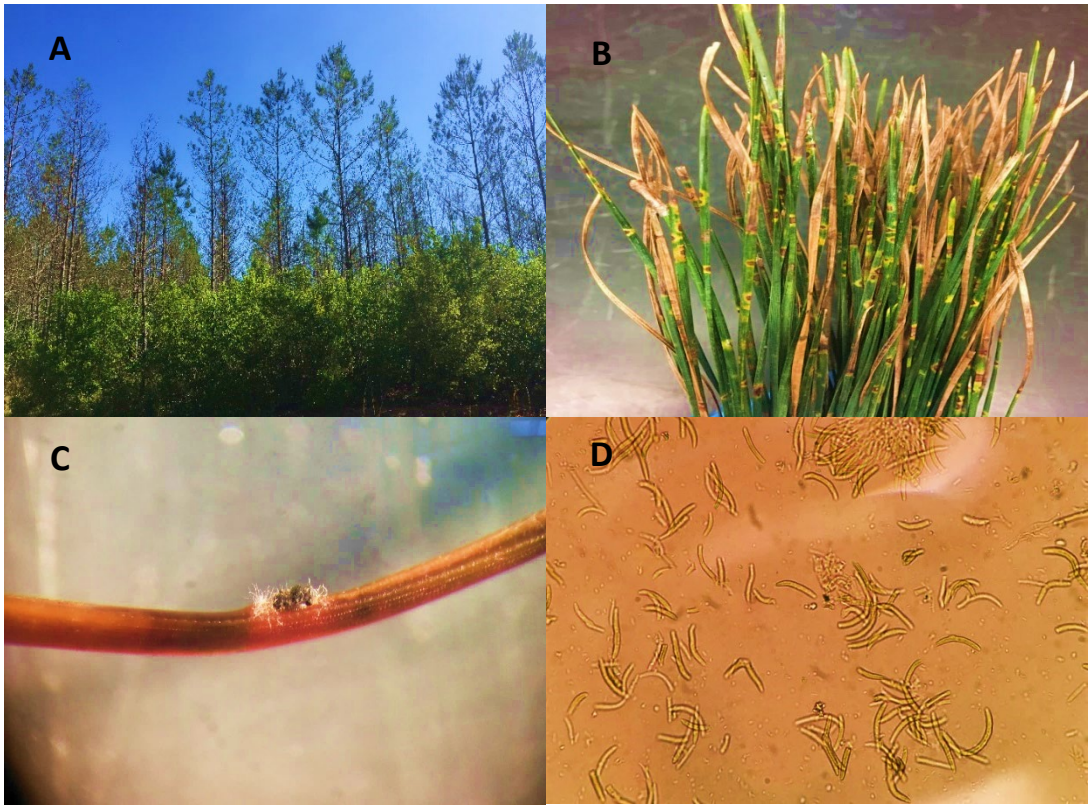


Objectives

To assess brown spot needle blight fungus, *Lecanosticta acicola* effects on shoot and needle lengths

To annually monitor loblolly pine health for chlorosis and defoliation in permanent study plots

Materials & Methods

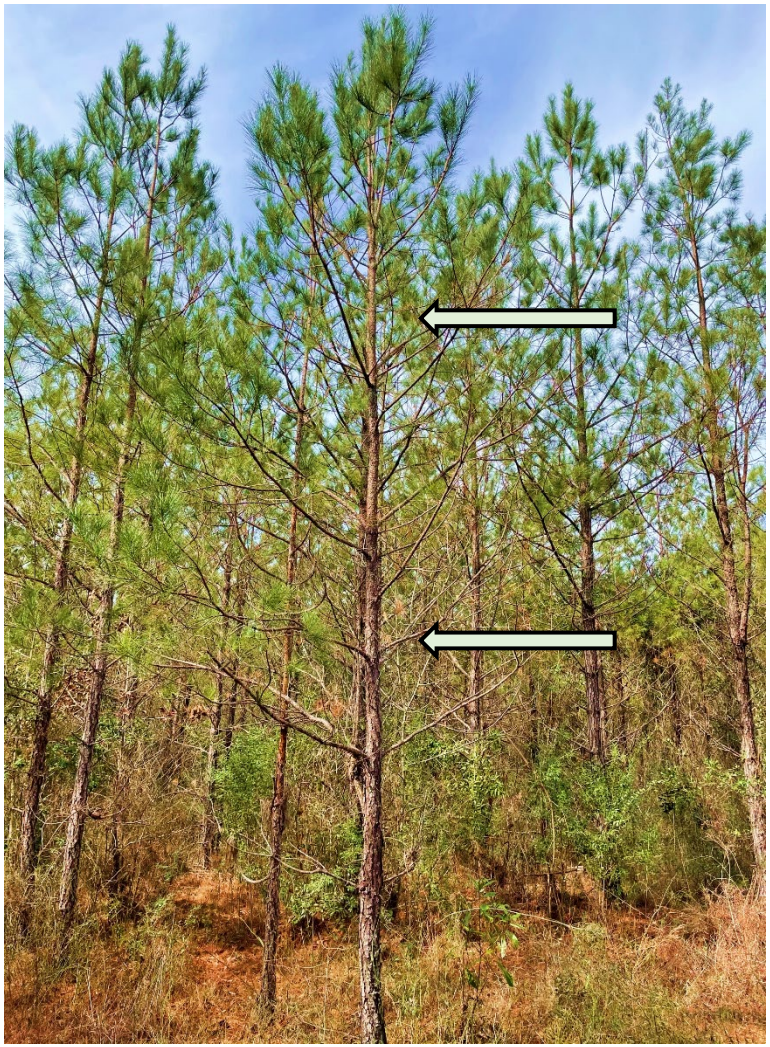


Disease symptoms and reproductive structures showing (A) stands infected by brown-spot needle blight, note the thinning canopies (B) irregular frequent brown-spots surrounded by a yellow halo (C) black shiny fruiting body protruding needles & (D) microscopic banana-shaped septate conidia

Materials & Methods

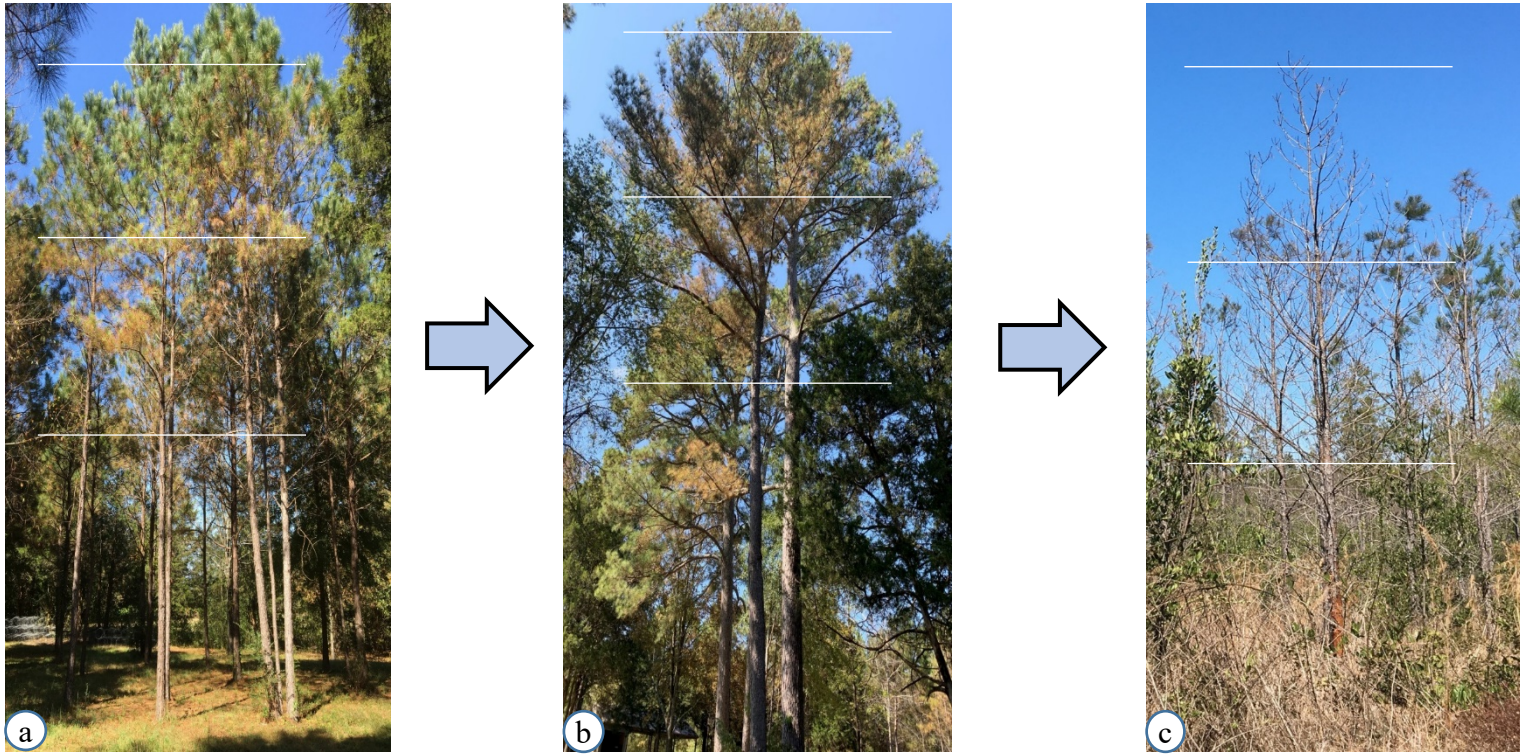
Study design and data collection:

- Two infection levels
- Two whorl heights
- 28 low incidence and 33 high incidence trees
- 10 fascicles
- End of the growing season
- 2019 and 2020



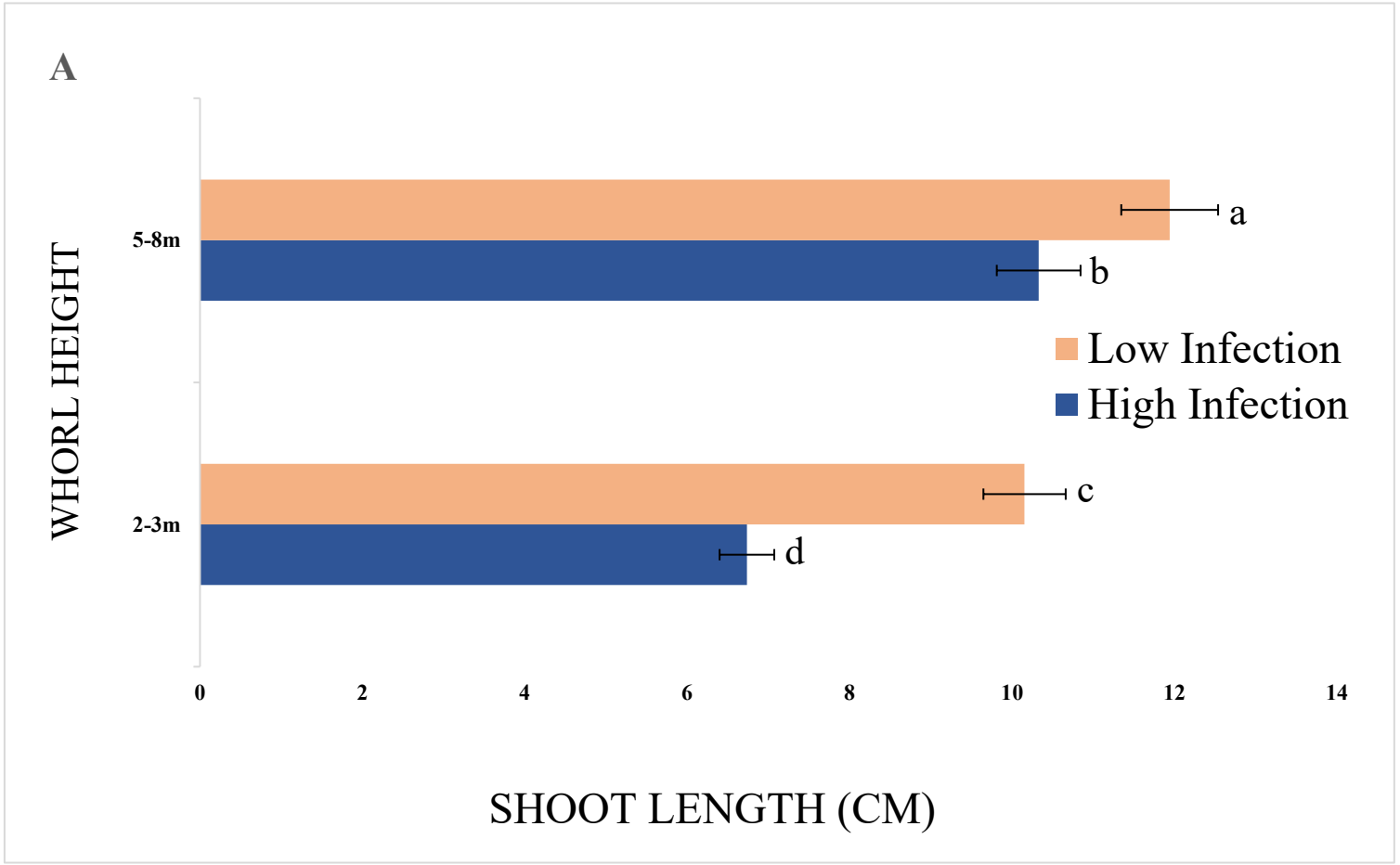
Loblolly Pine Health Monitoring

Tree health rating was done by visual inspection to determine disease severity as the proportion of the crown affected;



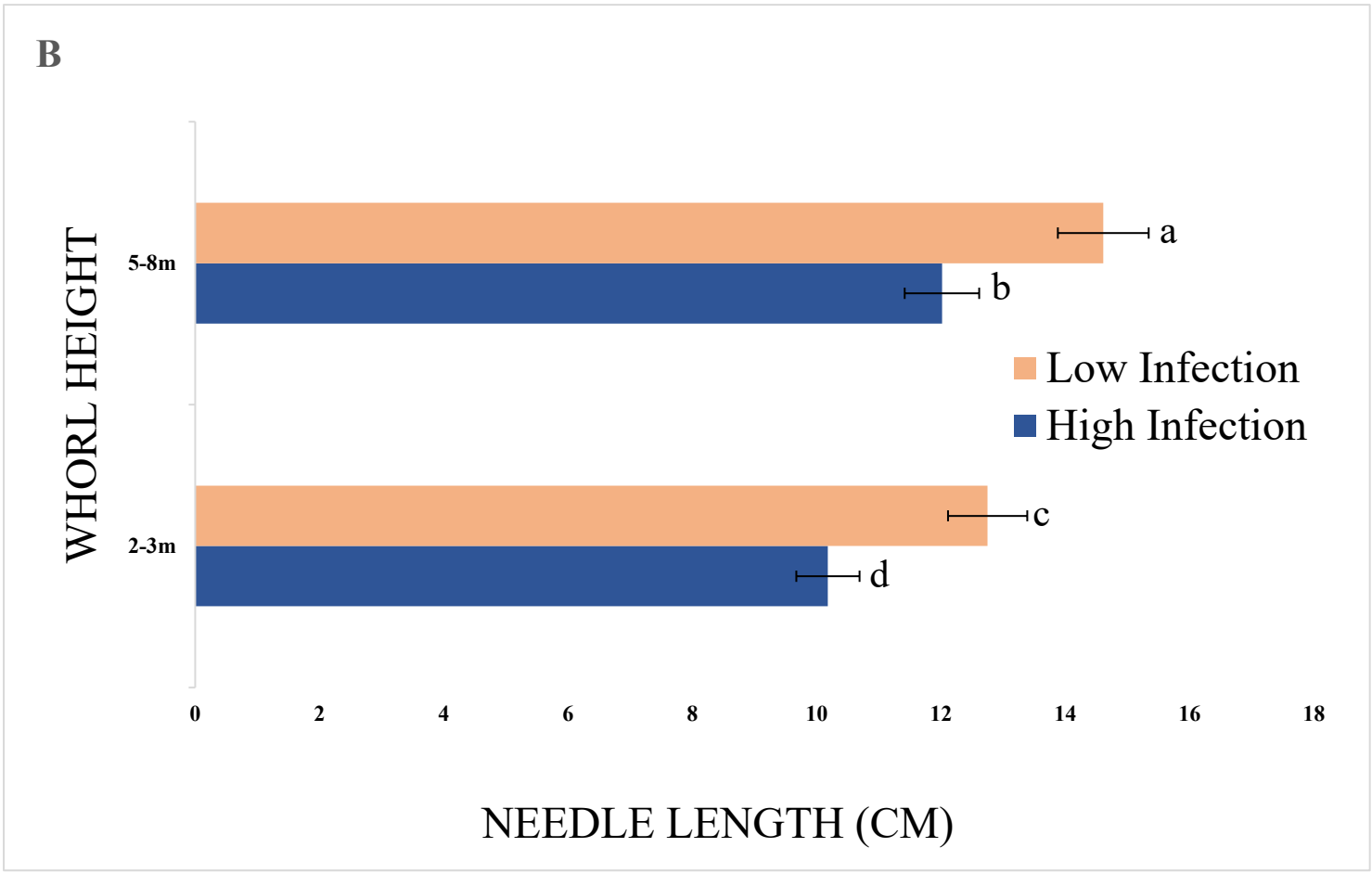
Data were analyzed using MS Excel 2010. Response variable was either "chlorosis rating per tree" or "defoliation per tree"

Results



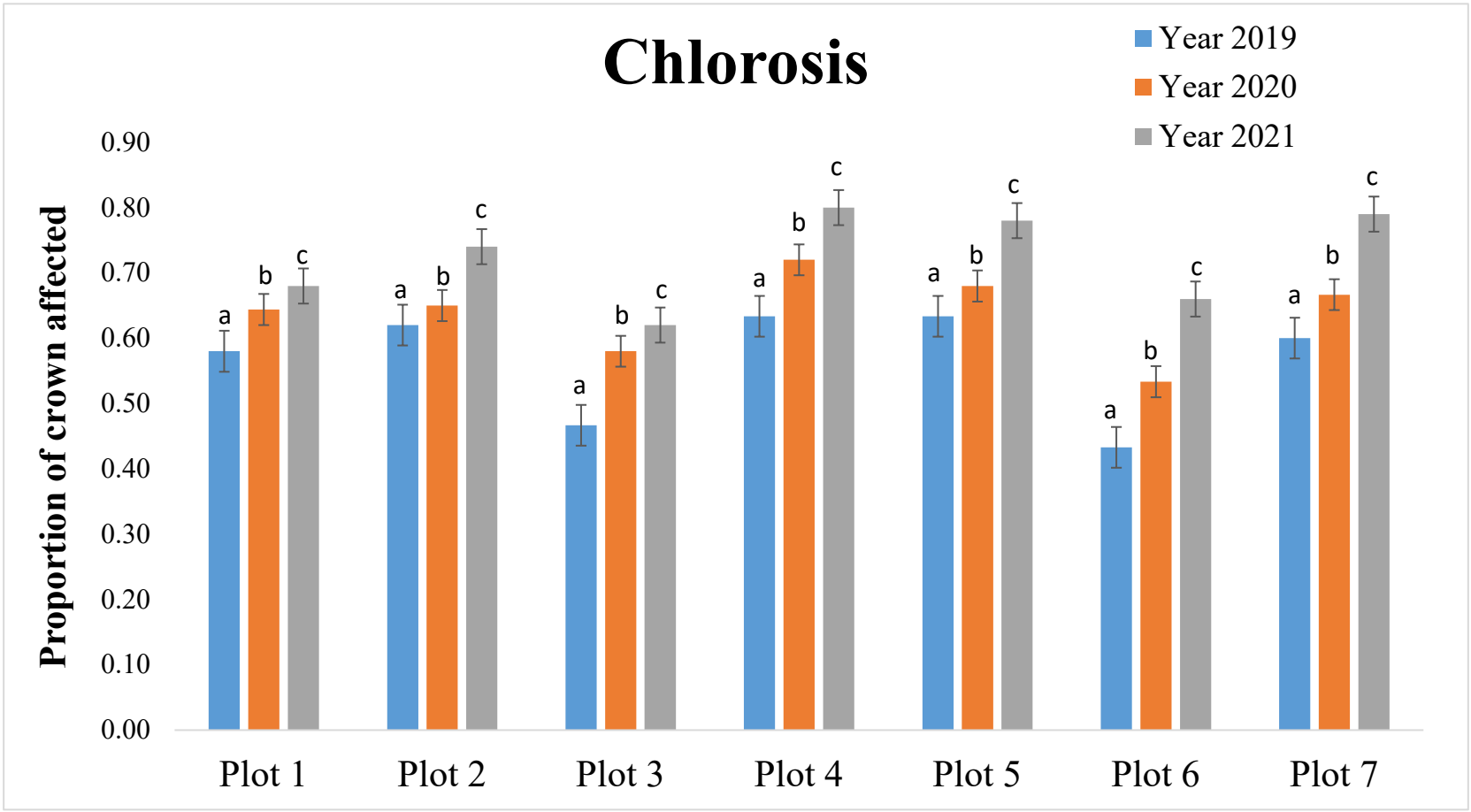
Observed means and standard errors of shoot length

Results



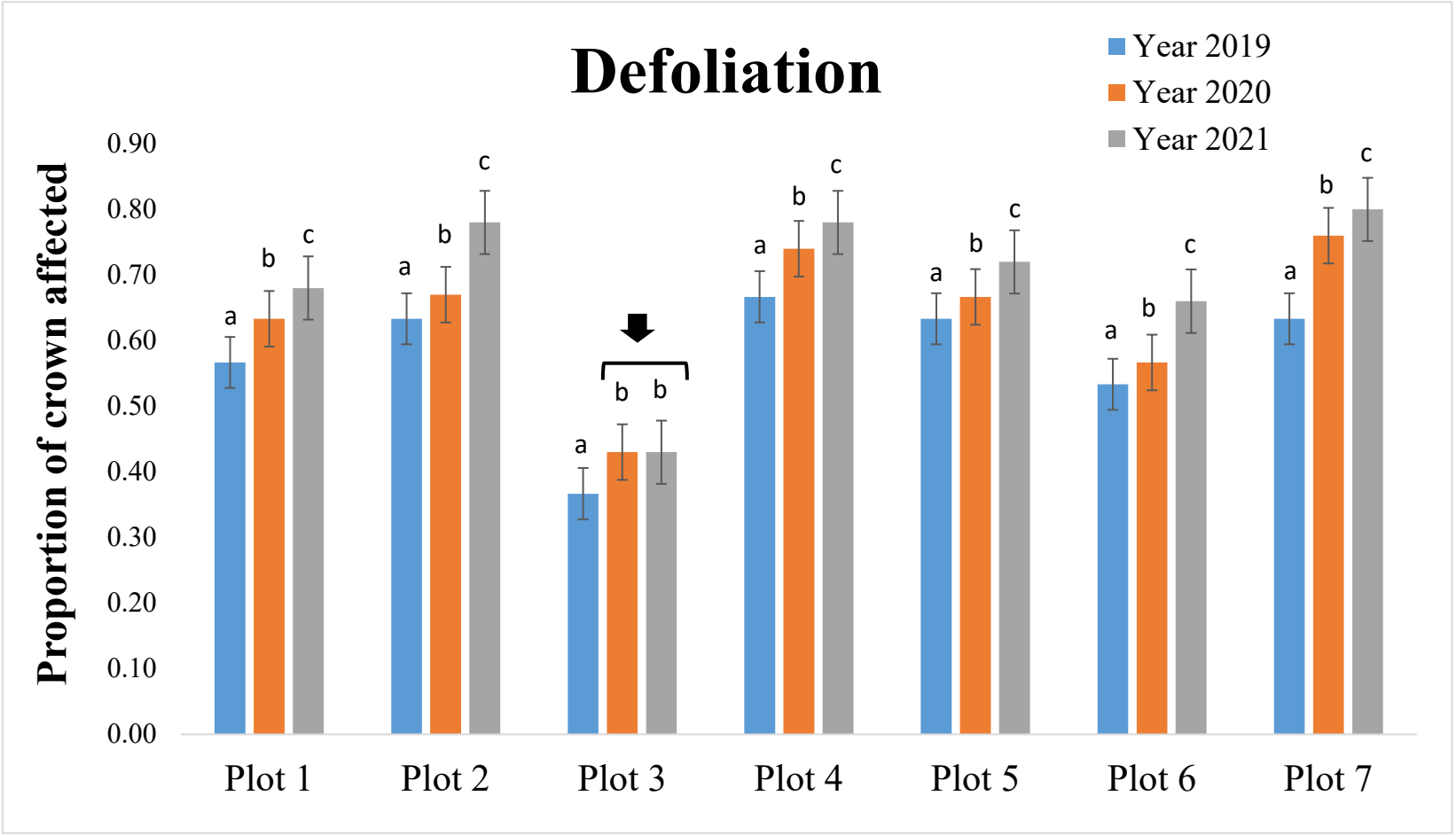
Observed means and standard errors of needle length

Results



Mean chlorosis of seventy tagged trees at seven long-term monitoring plots in Chatom, Washington County, Alabama in the summer of 2019, 2020 and 2021

Results



Mean defoliation of seventy tagged trees at seven long-term monitoring plots in Chatom, Washington County, Alabama in the summer of 2019, 2020 and 2021

Results

Needle pathogen, *L. acicola*

- Healthy trees becoming infected
- Unhealthy trees more chlorotic and defoliated
- Lower crown to upper crown
- Premature mortality of the trees

Repeated *L. acicola* infection results in

- Significantly shorter needles
- Significantly shorter shoots
- Correlated to whorl height

Discussion

Needle and shoot length reduction

- Chlorosis, necrosis and premature defoliation
- Photosynthesizing area and reserves
- Carbon deficit
- More infection on lower crown
- Genetic effects

Brown spot needle blight is progressing

- Air currents and/or rain splash spores
- Host susceptibility
- Suitable favorable conditions

Conclusions

Lecanosticta acicola infection

- Shoot and needle lengths reduced

- Whorl height and shoot and needle lengths reduced

- Altered leaf mechanical support and physiological functions

Long-term monitoring of loblolly pine health

- Disease progression

- Air currents or rain-splash spores

- Healthy trees infected

- Unhealthy trees more chlorotic and defoliated

Acknowledgements

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KEEPING TREES HEALTHY