Evaluation of Mortality in Natural Stands of *Pinus oocarpa* in Nicaragua

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The Cooperator Team

Yanet, Lori, Roger, Denny, Lucia, Carolina, Alberto

Background History and Current Activity

- Department of Nueva Segovia main area of pine forest 318,000 ha
- 1998-2002 *D. frontalis* kills 30,000 + ha of *Pinus oocarpa and P. caribaean* in the Nueva Segovia Department
  - Control
    - Buffer strips
    - Cut and leave
    - No salvage market
- 2003 devastating wildfires
  - 8000 + ha of natural regeneration
- 2007 areas of mortality in natural regeneration
  - **Alberto Sediles, UNA**, James "Denny Ward and Roger Menard, USDA, Ministry of Natural Resources (MARENA) and Intituto Nacional Forestal (INAFOR) staff
  - Insect and root samples collected
  - Identified suspect insect *Dendroctonus approximatus* and an unknown weevil sp.
  - Suspect fungal isolations from roots and insects; identified *Leptographium terebrantis*, identified *Ophiostoma pulvinisporium*, and unidentified *Leptographium sp.*(1) and (2)
- 2008 continued mortality in natural regeneration
  - Dr. Lori Eckhardt makes first visit
  - Additional sampling
  - Mike Wingfield University from University of Pretoria, South Africa in consult for unidentified *Leptographium spp.*
- 2009 continued mortality in natural regeneration
  - Installation of 10 FHM plots
  - Installation of insect panel and pitfall traps
  - DNA sequencing of fungal isolates identifies *Ophiostoma pulvinisporium*, and confirms a new *Leptographium sp. nov.*
  - Additional sampling
  - Pathogenicity and virulence testing on southern *Pinus sp.*

Types of Symptom Occurrence

Spot Mortality
Indicative of spread by root grafts

Scattered Mortality
Indicative of spread by insects

Wilt Foliar Symptoms

Chlorosis Foliar Symptoms

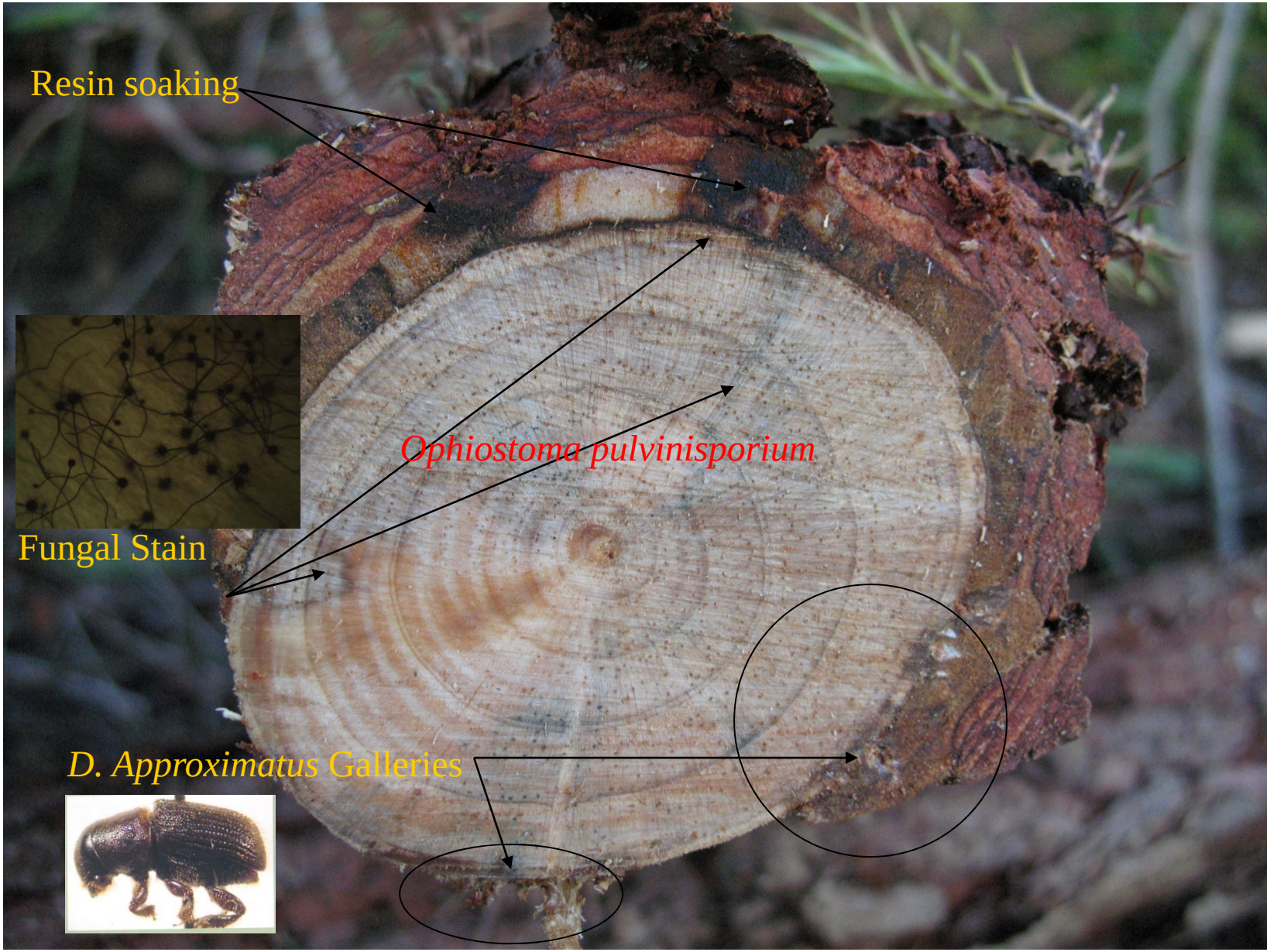
Host Symptoms Over Time

November 2007

April 2008

Root Collar Resinosis and Staining

Host Responses



Why is this Important?

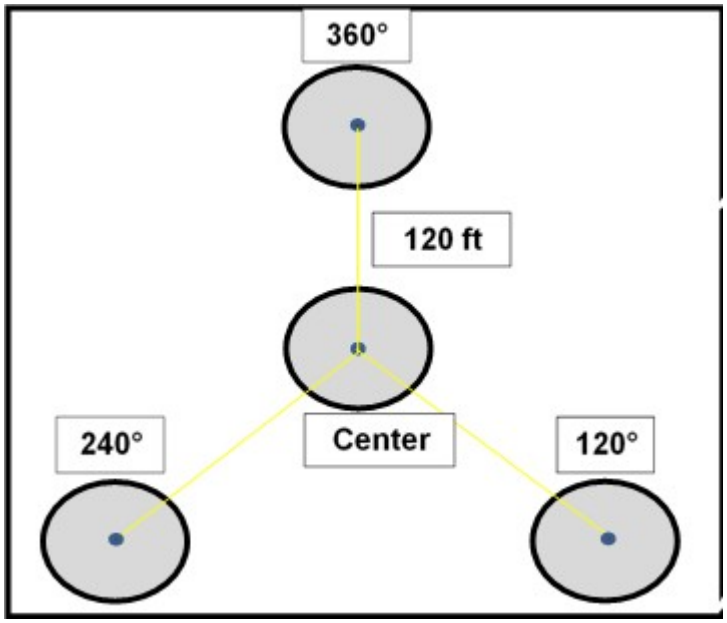
- Increased trade between U.S. and Nicaragua
- Beetle range overlaps???
- Susceptible pine species???

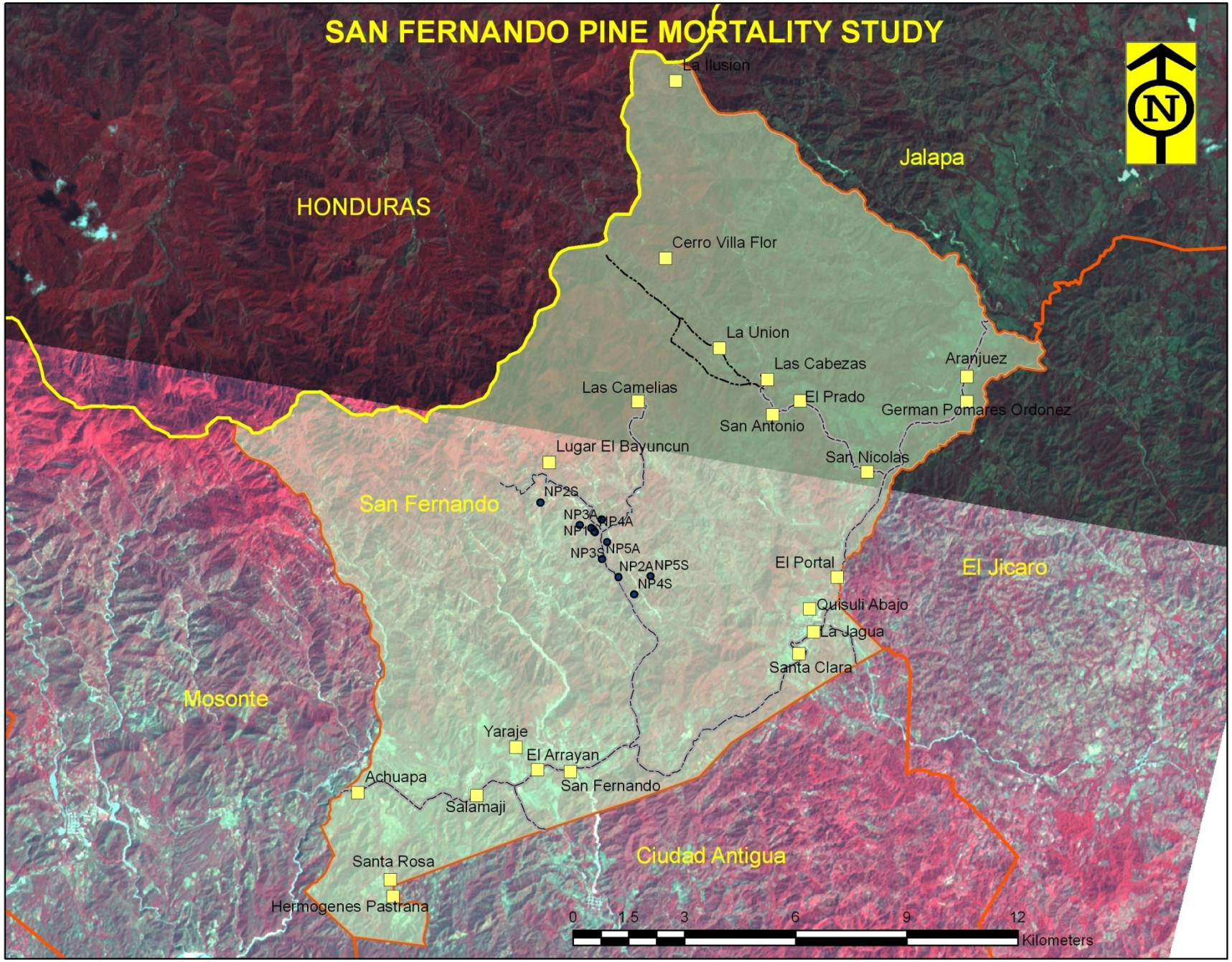
Study Installed

- What species of insects and fungi are involved in the mortality of *Pinus oocarpa?*
- What affect would these fungi on southern pines?

Methods

- 10 FHM plots
  - 5 symptomatic
  - 5 asymptomatic
- Traps
  - Panel & Pitfall on subplots
- Sampling
  - Root tissue
  - Insects

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Santa Clara
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Achuapa
San Fernando
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Ciudad Antigua
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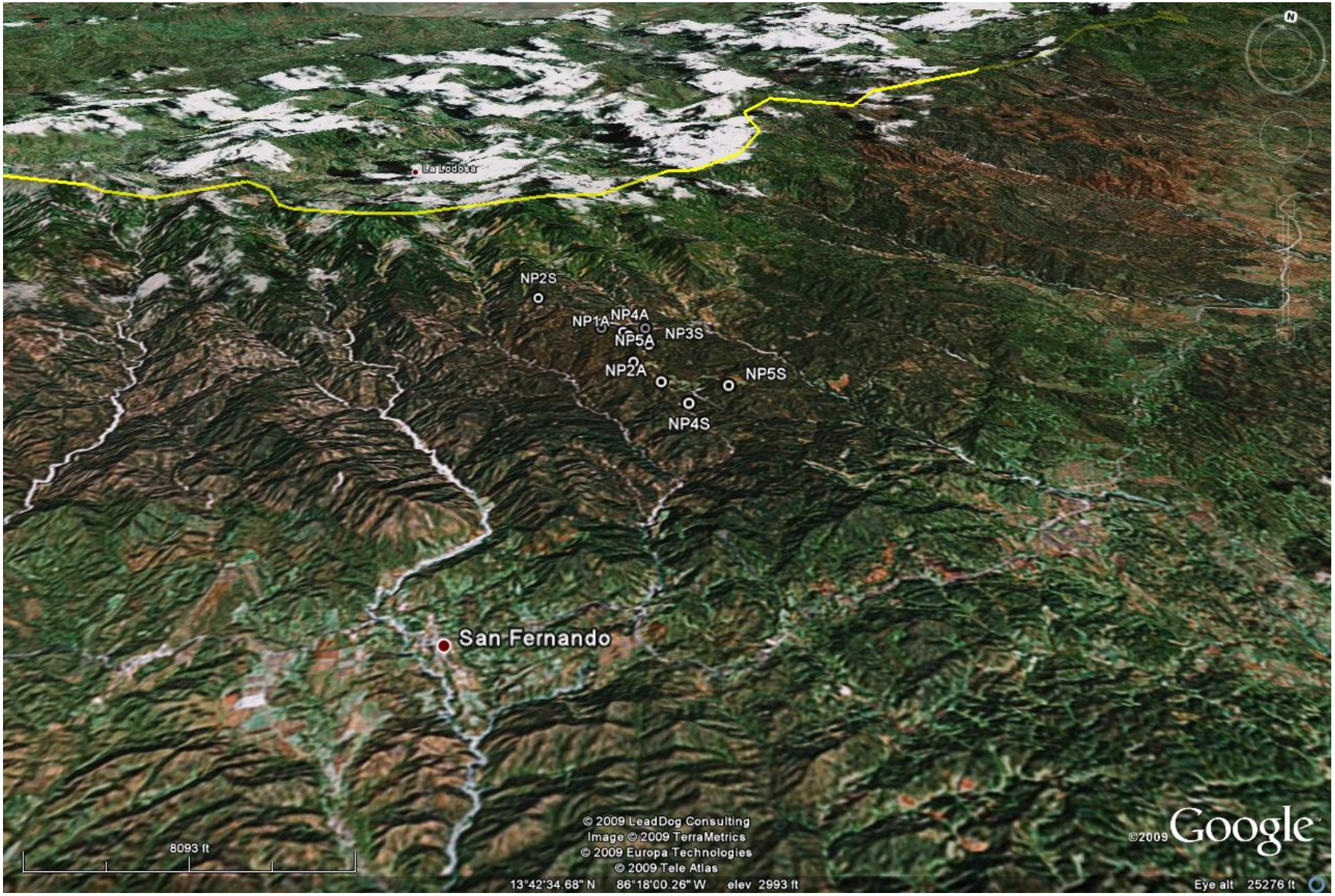
Kilometers

Terrain Features of Plots



Sample Collecting

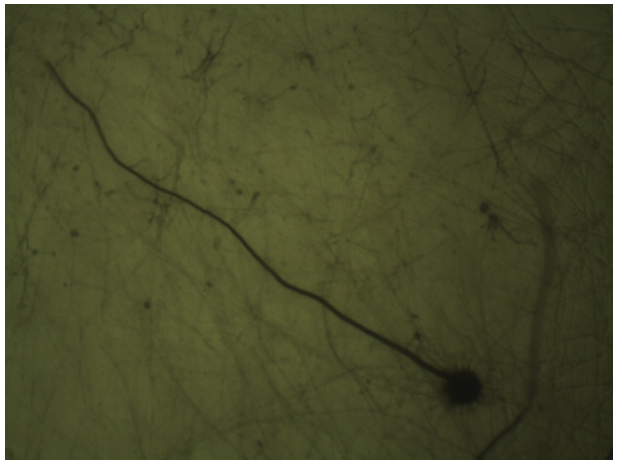
Insect Trapping on FHM Plots

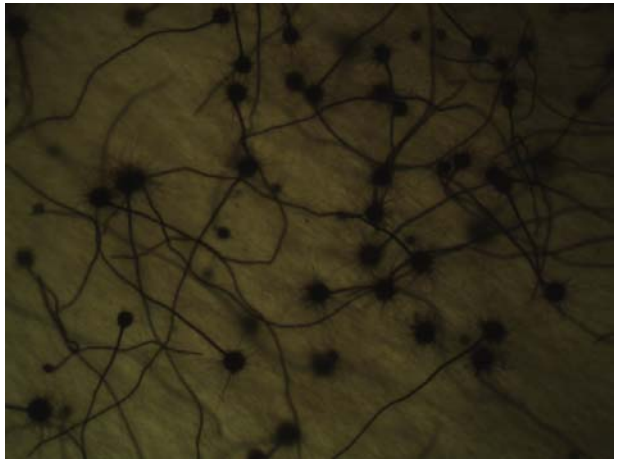
Pitfall Trap

Panel Trap

Results

- Fungi Isolated from roots, insect galleries and insects
  - *Leptographium terebrantis*
  - *Ophiostoma pulvinisporium*
  - *Leptographium* sp. nov. (1)
  - *Leptographium* sp. nov. (2)
- Insects captured in association with these fungi
  - *Dendroctonus approximatus*
  - *Cryptorhynchina* sp.





Results

***Cryptorhynchina* sp.**

D. approximatus

Insect feeding and galleries

Acknowledgements

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Any Questions!