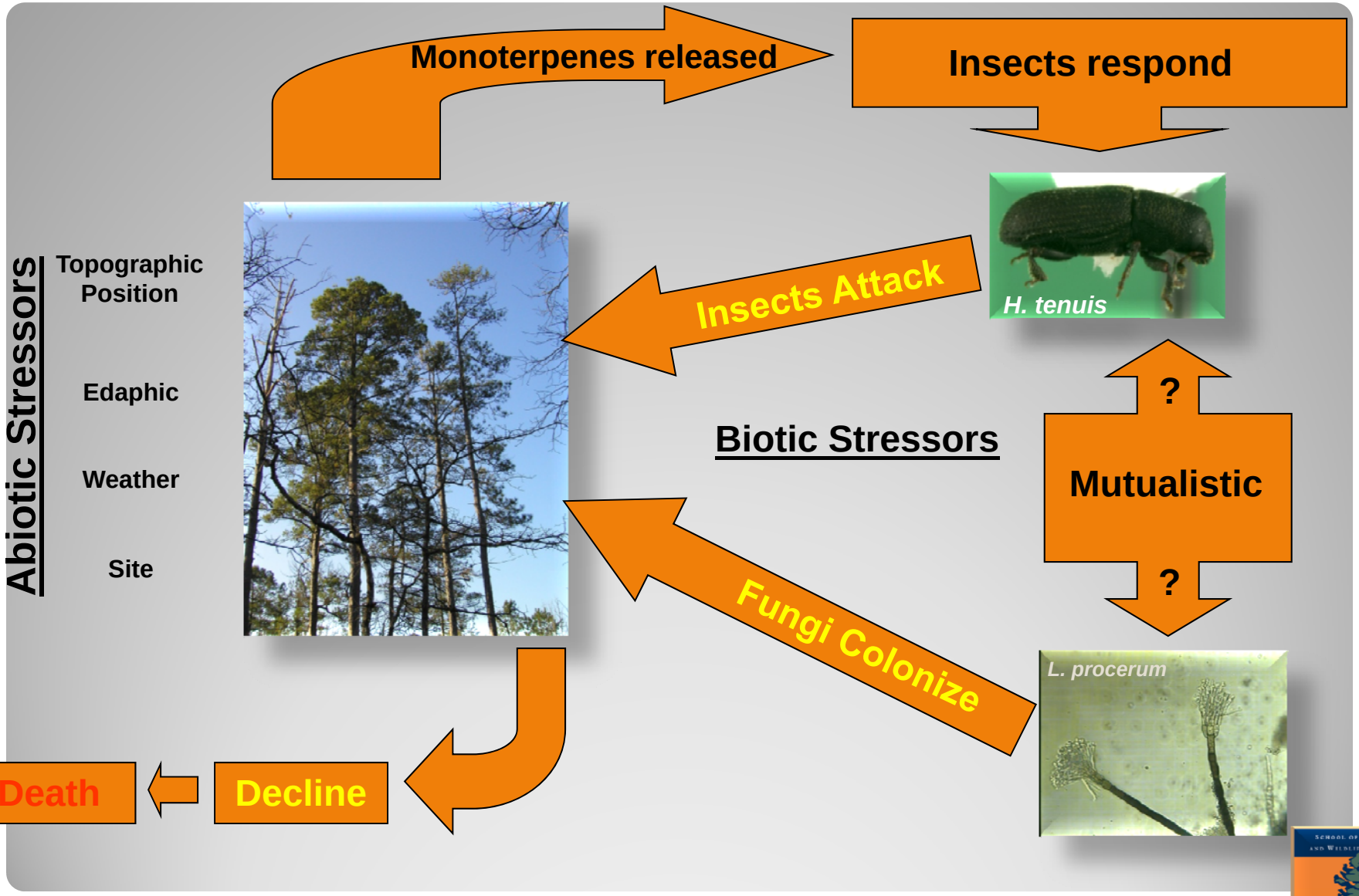
Pine Decline: The Involvement of Bark Beetles and Ophiostomatoid Fungi

Lori Eckhardt[1], Roger Menard[2], George Matusick[1], and James Zanzot[1]

[1]Forest Health Dynamics Laboratory, School of Forestry and Wildlife Sciences, Auburn University, AL; [2]US Forest Service, Forest Health Protection, Pineville, LA

The combination of stress factors abiotic (e.g. topography, edaphic) and biotic (e.g. insect pests, pathogens) that contributes to root disease, reduced vigor, and premature mortality of pine trees.

What is Pine Decline?



Pine Decline Cycle

Predisposing Stressors

- Abiotic
  - Topography
  - Edaphic
- Biotic
  - Gentic
  - Age

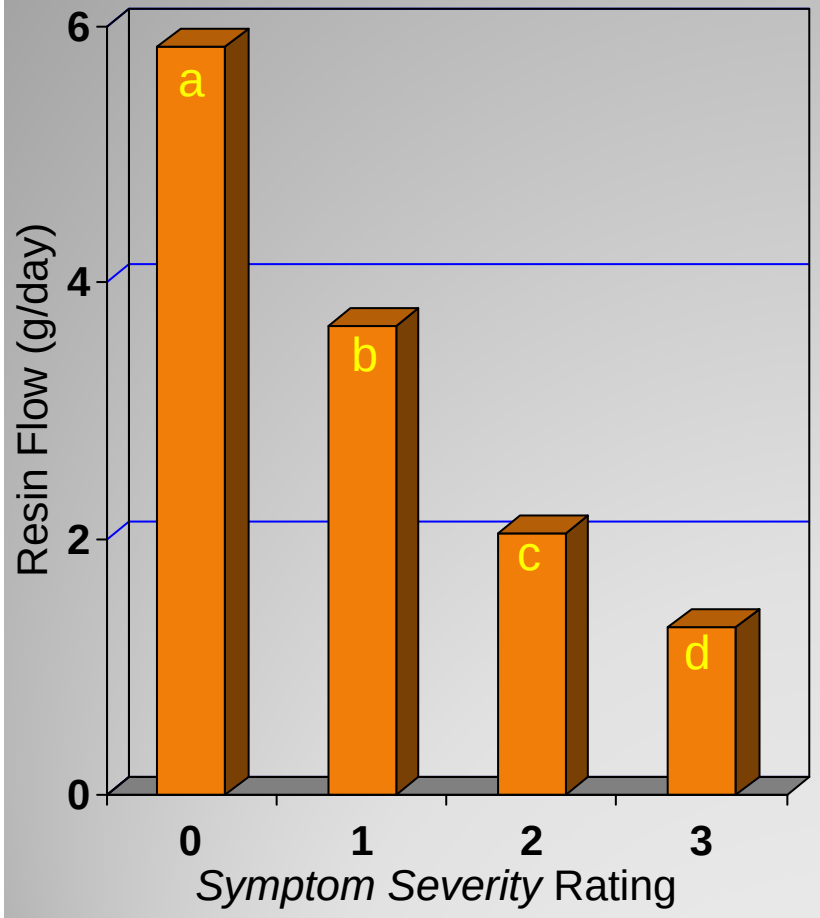
Contributing Stressors

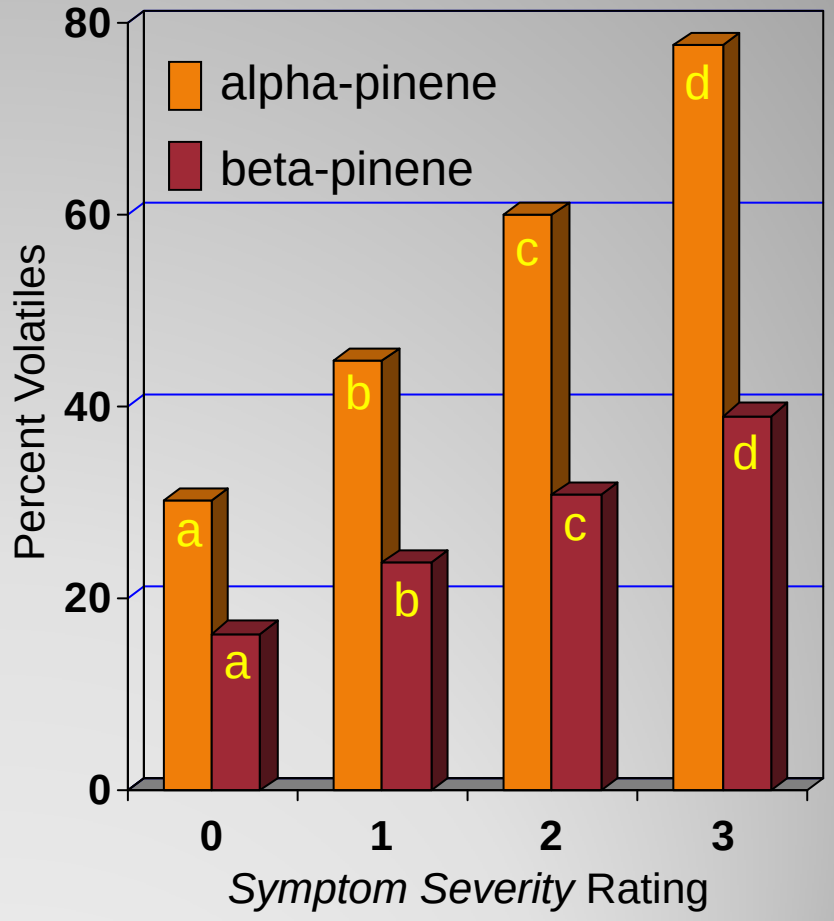
- Vector populations
- Inoculum potential

Inciting Stressors

- Anthropogenic disturbances
  - Silvicultural (any management)
  - Recreational (ie. off-road vehicles)
  - Training (ie. Military)
- Natural disturbances
  - Weather (ie. drought, flood, storm)
- Biotic issues
  - Stand density
  - Stand species composition
  - Understory vegetation density

Host Stress Factors





Tree Response - Resin Analysis

Insect Associations

Vector Insects

Hylastes salebrosus
Hylastes porculus
Hylastes tenuis
*Hylastes opacus**
Dendroctonus terebrans
Hylobius pales
Pachylobius picivorus

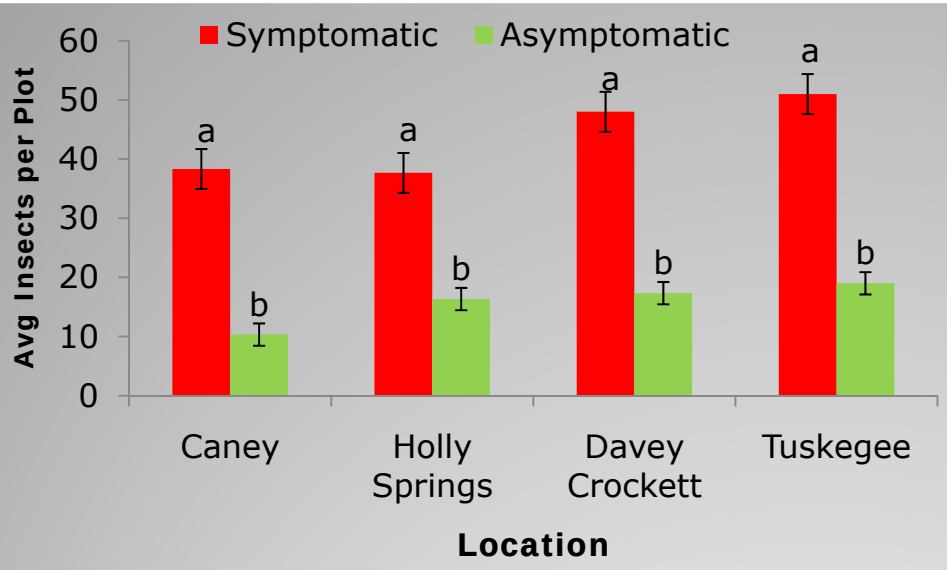
**Non-native*

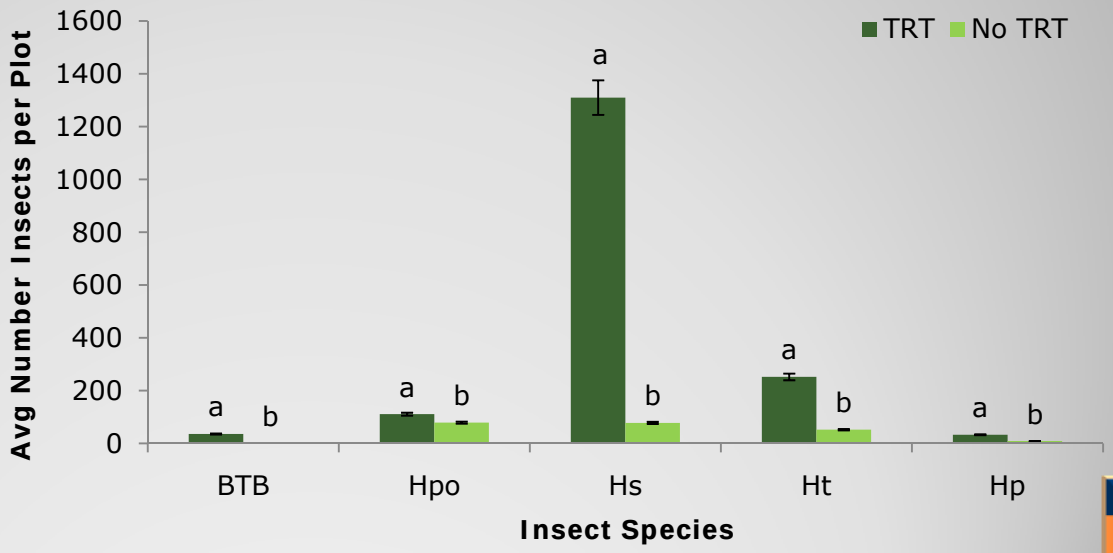
Others Pestiferous Insects

- *Dendroctonus frontalis*
- *Ips avulsus*
- *Ips granicollis*
- *Ips calligraphus*
- *Pissodes nemorensis*

Ambrosia Beetles

- *Gnathotrichus materiarius*
- *Monarthrum fasciatum*
- *Monarthrum mali*
- *Orthotomicus caelatus*
- *Xyleborinus saxeseni**
- *Xylosandrus crassiusculus**
- *Xylosandrus compactus**
- *Xylosandrus germanus*
- *Xylosandrus mutilatus**
- *Xyleborus atratus**
- *Xyleborus pubescens*



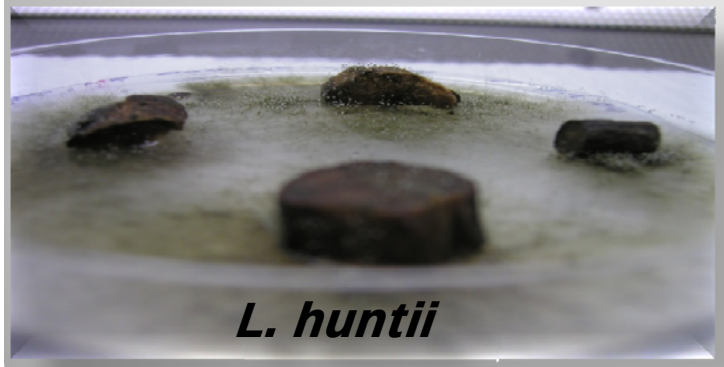


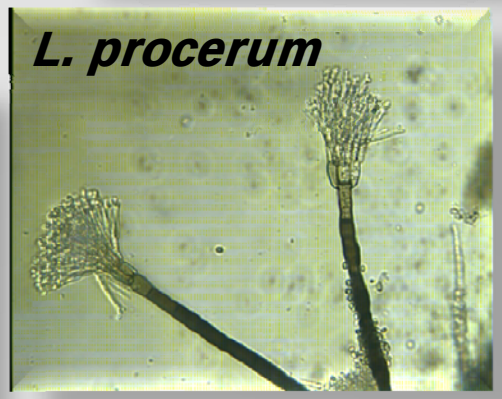
Insects Response

Associated Fungi

- *Grosmannia huntii**
- *Leptographium serpens**
- *Leptographium terebrantis*
- *Leptographium procerum*
- *Ophiostoma (psuedo) ips*
- *Ophiostoma sparsiannulatum*
- *Ophiostoma culverii sp. nov.*
- *Ophiostoma sp. nov.*

**Non-native*

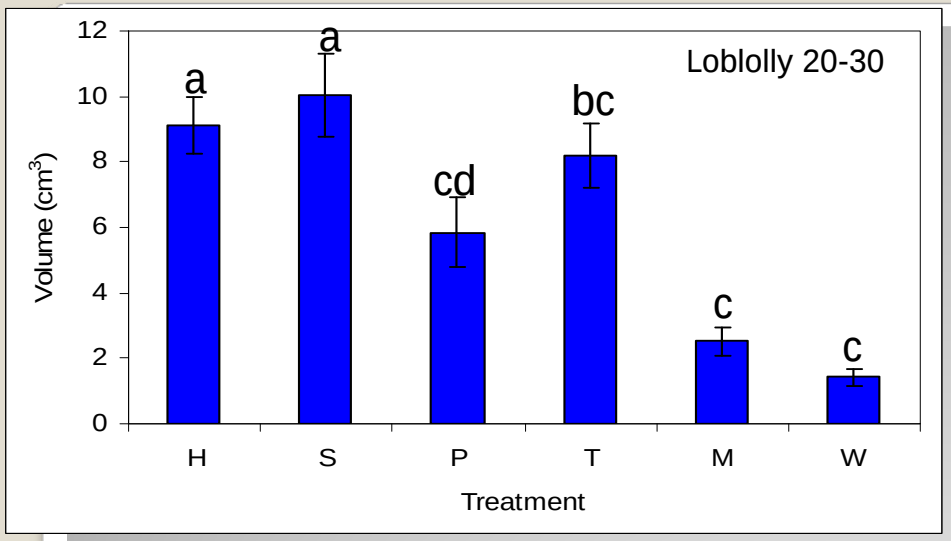


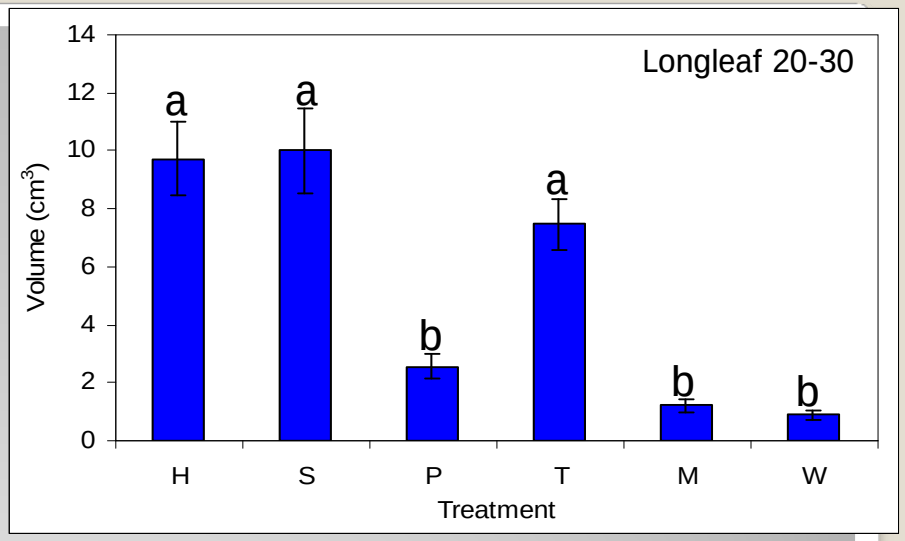


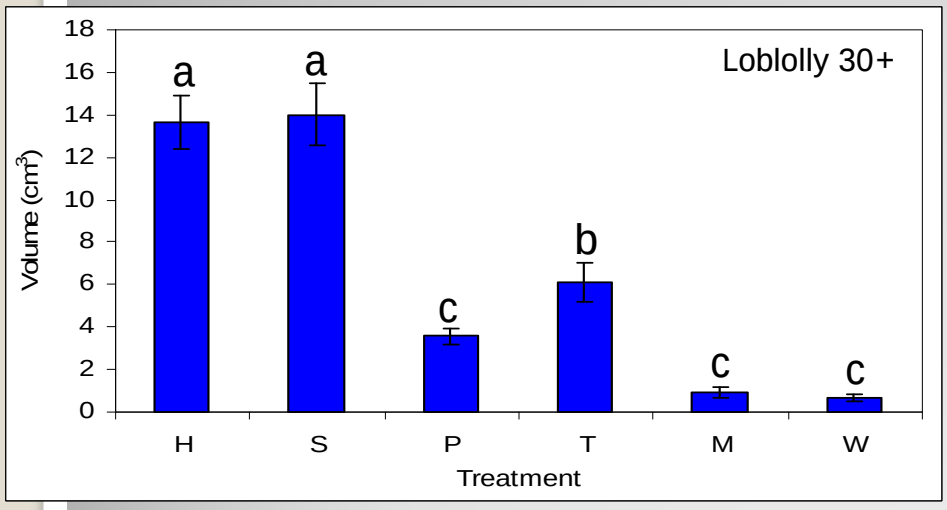
Fungal Associates

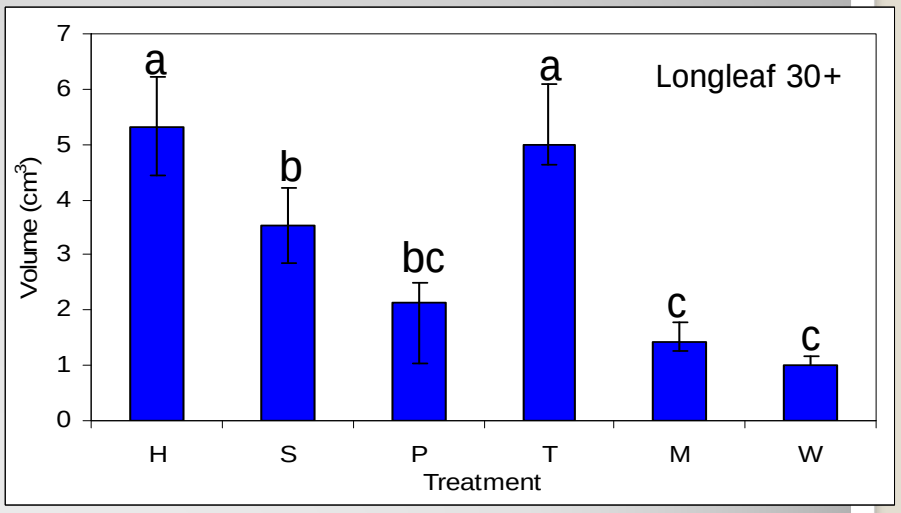
Root Damage

Forest Health Dynamics Laboratory, 2009





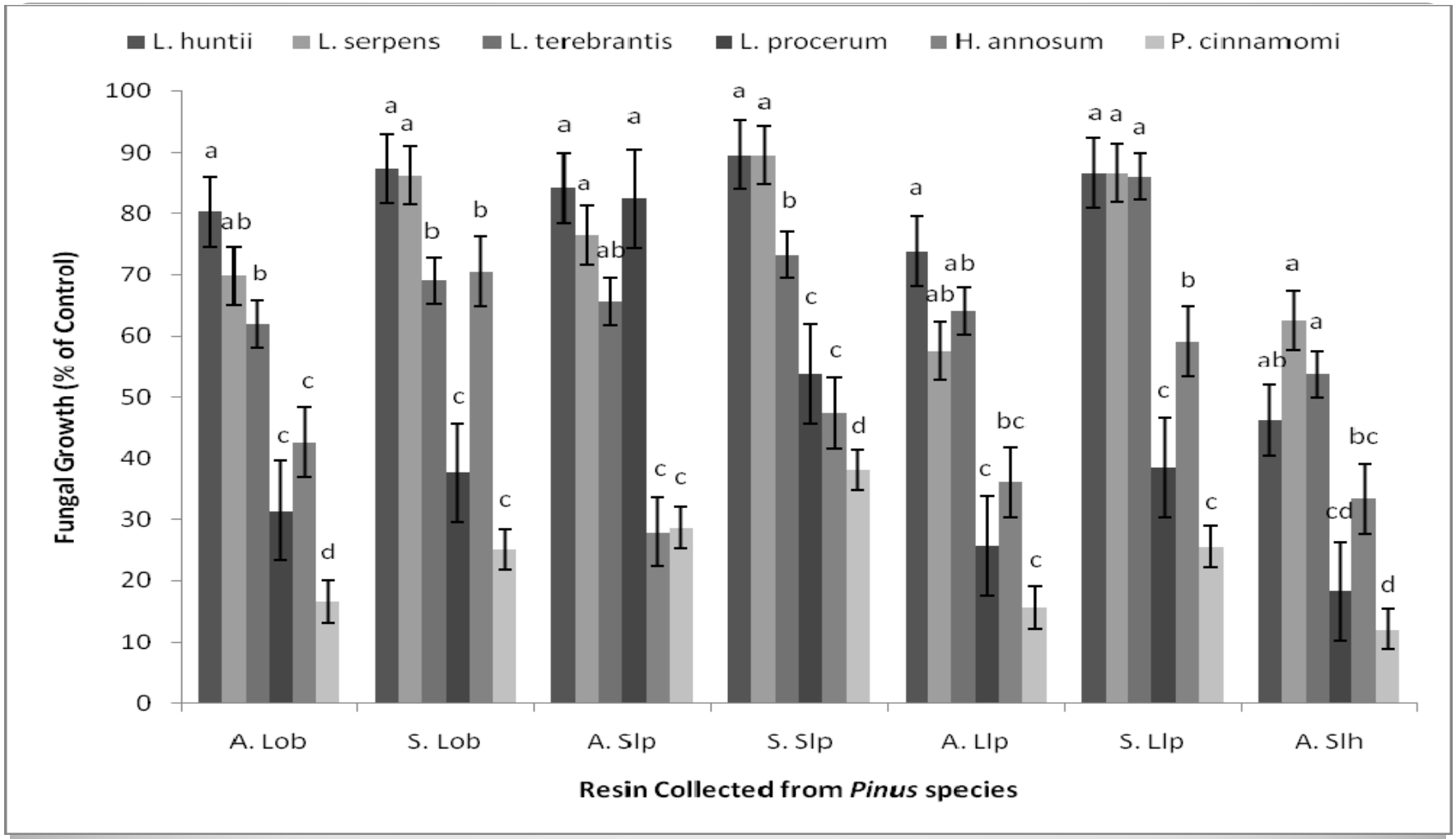




Pathogenicity

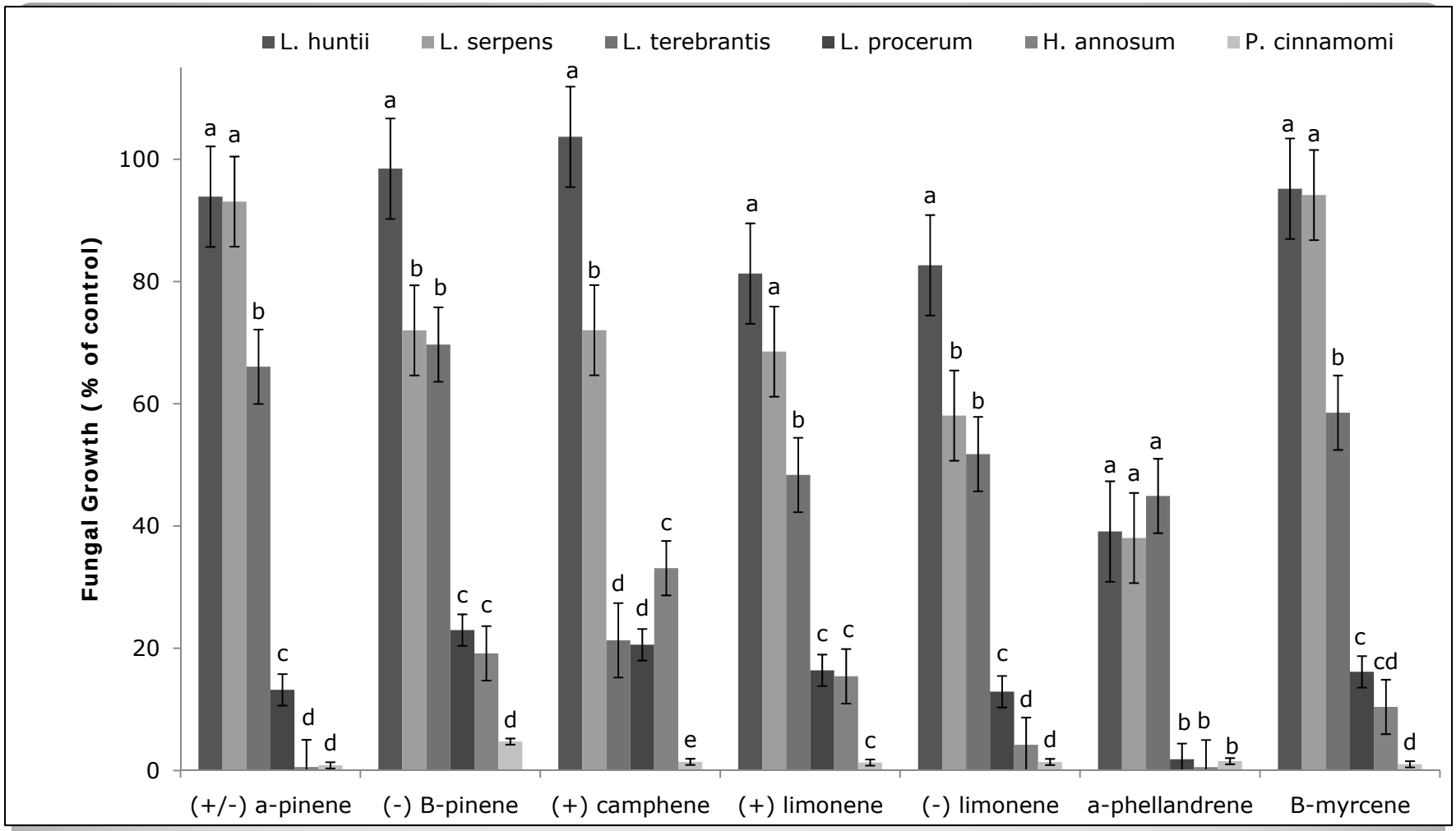
Pathogenicity

Forest Health Dynamics Laboratory, 2009

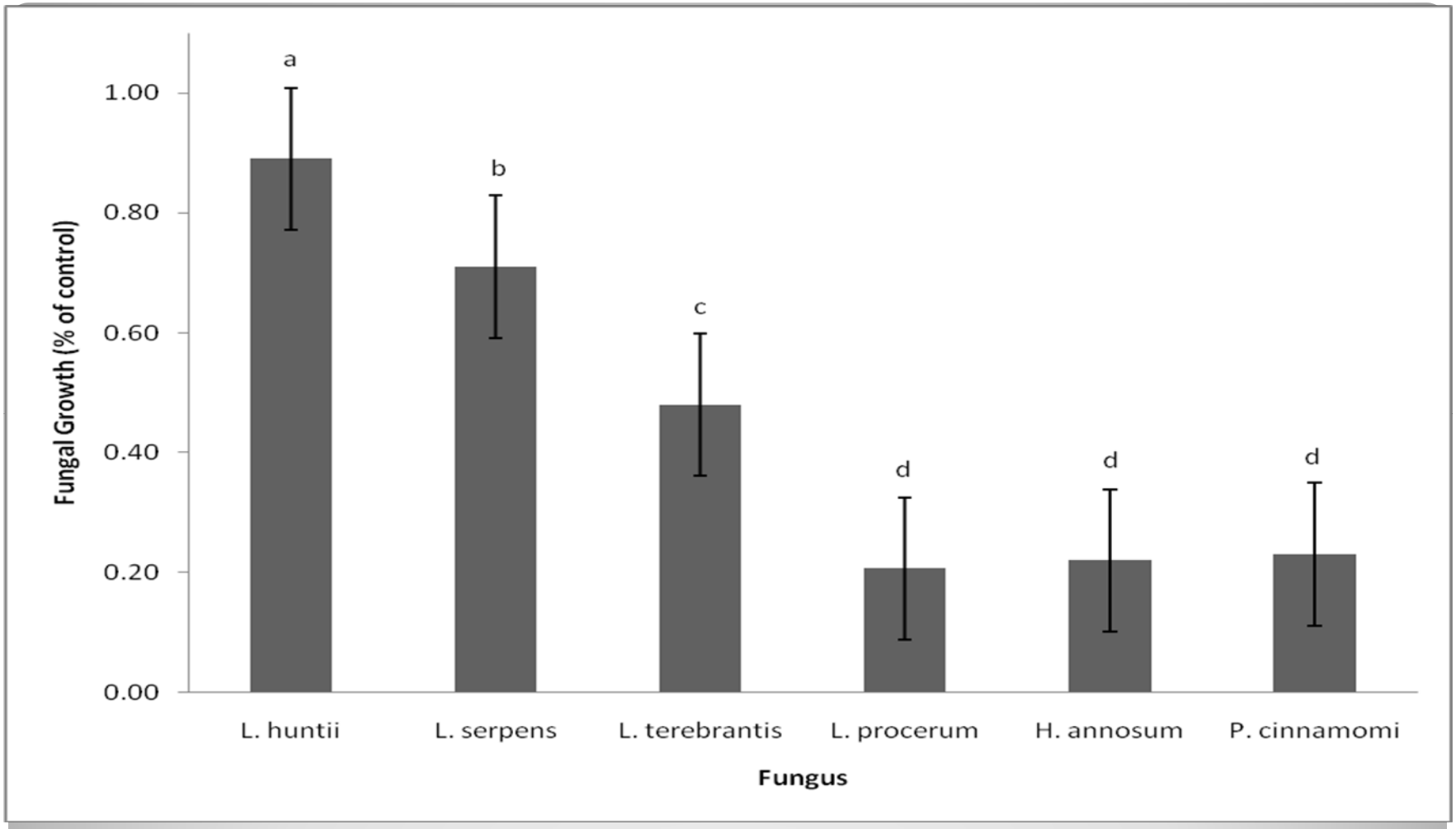


Effects of Oleoresin on Fungal Growth

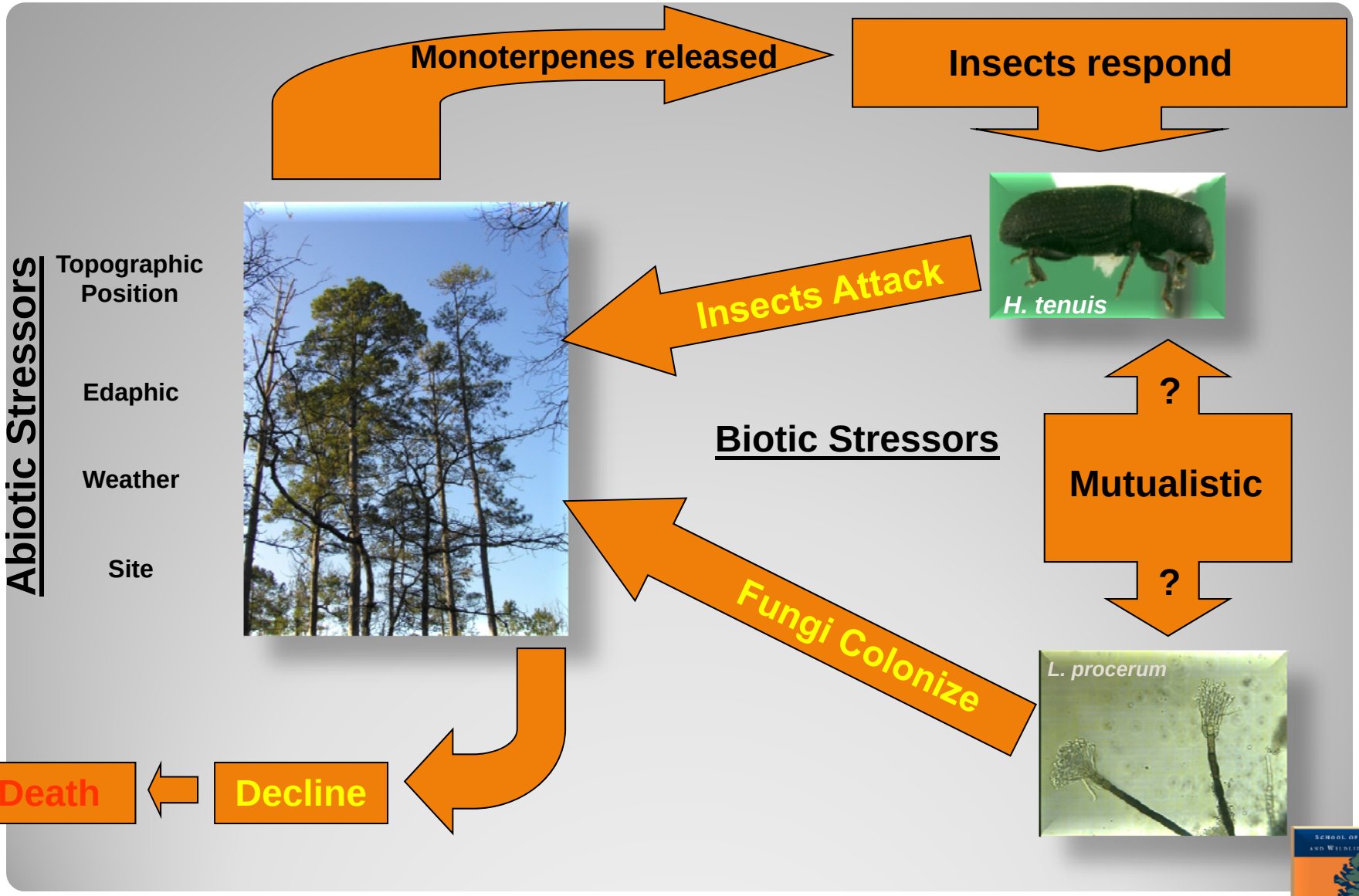
Forest Health Dynamics Laboratory, 2009



Effects of Terpenes on Fungal Growth



Effects of 4-AA on Fungal Growth



Pine Decline Cycle

- 100 Feral Hogs sampled 2006
- Currently sampling 2009






Feral Hogs and Ophiostomatoid Fungi

- Two new species of *Ophiostoma*
  - *Ophiostoma sparsiannulatum*
    - Also isolated from *Hylastes salebrosus, H. tenuis,* and *Dendroctonus terebrans,* as well as, root tissue from *P. teada and P. palustris.*
  - *Ophiostoma culverii*
    - Also isolated from *Hylastes salebrosus, H. tenuis, and* root tissue from *P. teada* and *P. palustris.*
- *Leptographium procerum*

L. procerum	*O. sparsiannulatum*	*O. culverii*
48%	51%	67%

Feral Hogs and Ophiostomatoid Fungi


ANY QUESTIONS?
Forest Health Dynamics Laboratory, 2009
AUBURN
UNIVERSITY