15 Years of White Pine Needle Damage: What Have We Learned?

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White Pine Needle Damage (WPND)

1. Fungal Pathogens Responsible
2. Role of Climate Change
3. Effect on White Pines
4. Management Strategies

Eastern White Pine in Massachusetts

- EWP comprises 12% of all forest trees >1” dbh (second only to red maple) – FIA 2024

FIA Datamart (2024)
https://apps.fs.usda.gov/fia/datamart/datamart.html

White Pine Needle Damage (WPND)

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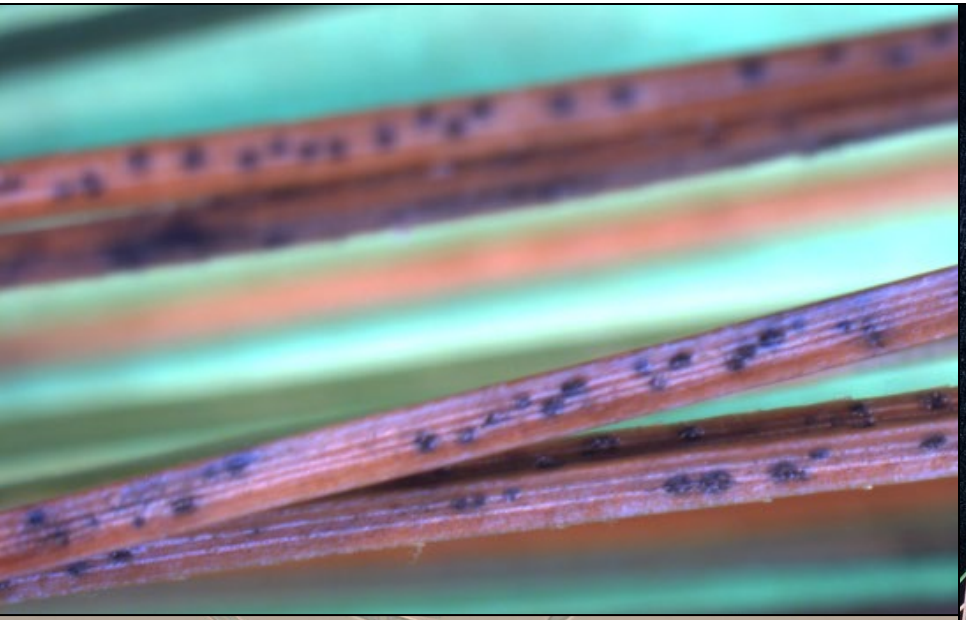
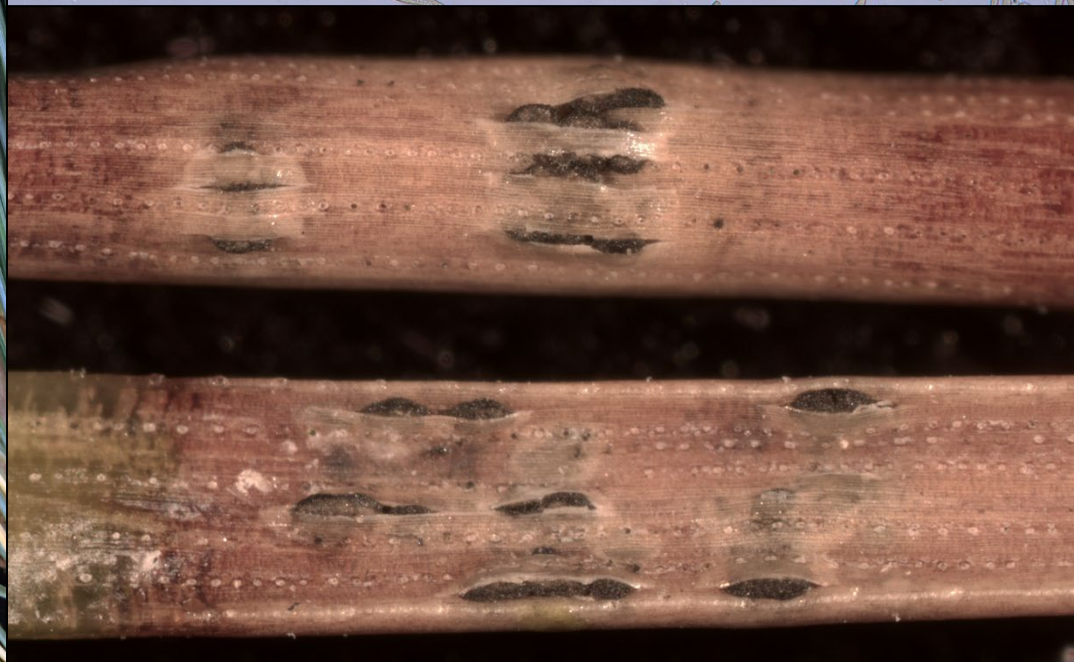
Septorioides Needle Blight (*Septorioides strobi*)



Brown Needle Spot (*Lecanosticta acicola*)



WPND Disease Cycle

1. Late May to mid-June 2025: 2nd (and 3rd) year needles turn brown and are shed

2. (May) **June** (July-August) 2025: Fungal pathogens sporulate from diseased needles and infect newly emerging needles

3. Late summer 2025 through spring 2026: Symptoms of WPND may appear

Effect of Climatic Variables on Abundance and Dispersal of *Lecanosticta acicola* Spores and Their Impact on Defoliation on Eastern White Pine

S. A. Wyka, C. D. McIntire, C. Smith, I. A. Munck, B. N. Rock, H. Asbjornsen, and K. D. Broders

Affiliations

Published Online: 16 Jan 2018 | https://doi.org/10.1094/PHYTO-02-17-0065-R

Global Change Biology

Primary Research Article | Full Access

Emergence of white pine needle damage in the northeastern United States is associated with changes in pathogen pressure in response to climate change

Stephen A. Wyka, Cheryl Smith, Isabel A. Munck, Barrett N. Rock, Beth L. Ziniti, Kirk Broders

First published: 19 May 2016 | **https://doi.org/10.1111/gcb.13359** | Citations: 39

June 2023 Rainfall: 5.7” (VT), 6.4” (NH & ME) → Severe WPND Symptoms in 2024

Photo by Mike Mauri

WPND-Induced Growth Decline

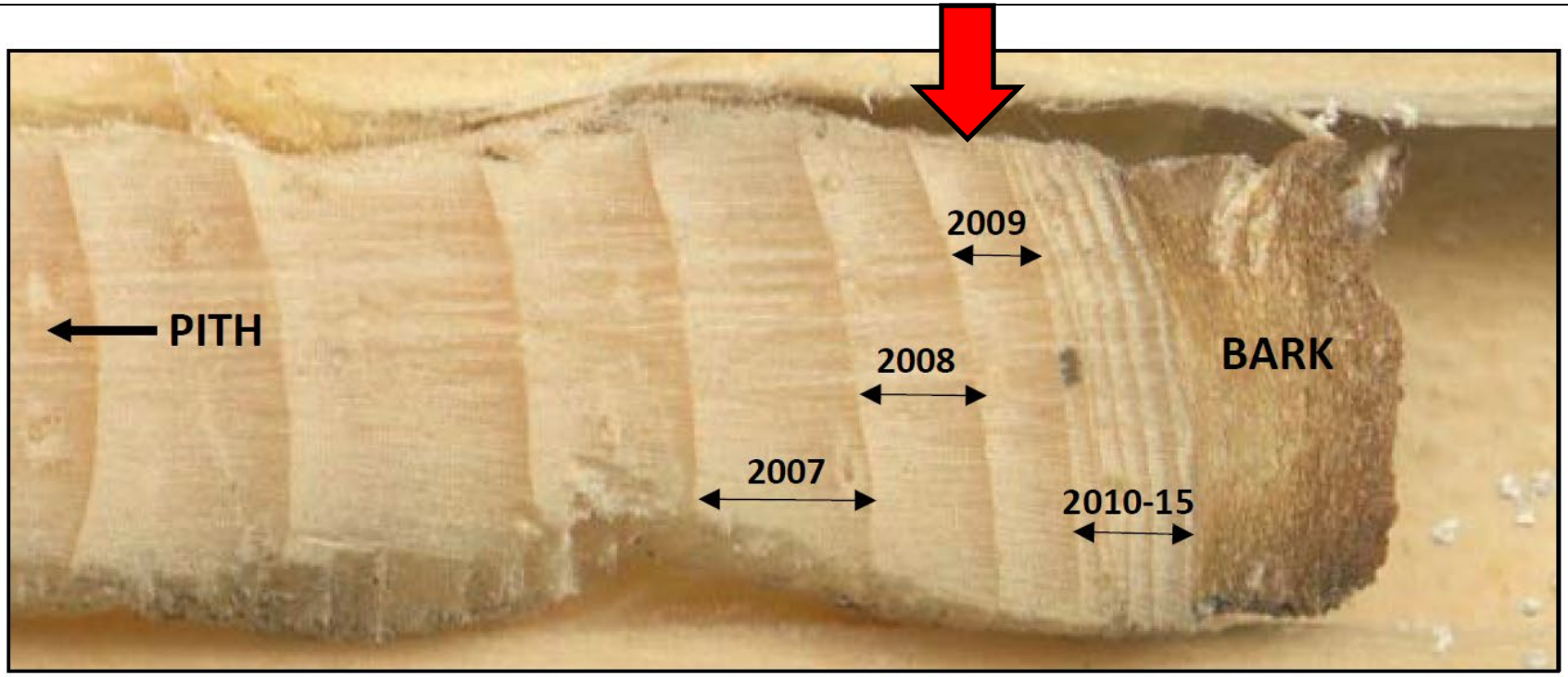


Figure 4. A tree core extracted from the Mohawk Trail State Park, Charlemont, MA. The onset of the outbreak is clearly visible after 2009. The post-outbreak ring widths (2010-15) are significantly reduced over this six-year period following WPND infection.

Photo by Cameron McIntire (USFS, Durham, NH)

McIntire *et al*. (2021) Trees 35: 357–373

1. Exhibit higher rates of photosynthesis
2. Use less water (better efficiency)

- Diseased trees prioritize **storage** of non-structural carbohydrates over annual growth

Management of WPND

ELSEVIER

Forest Ecology and Management

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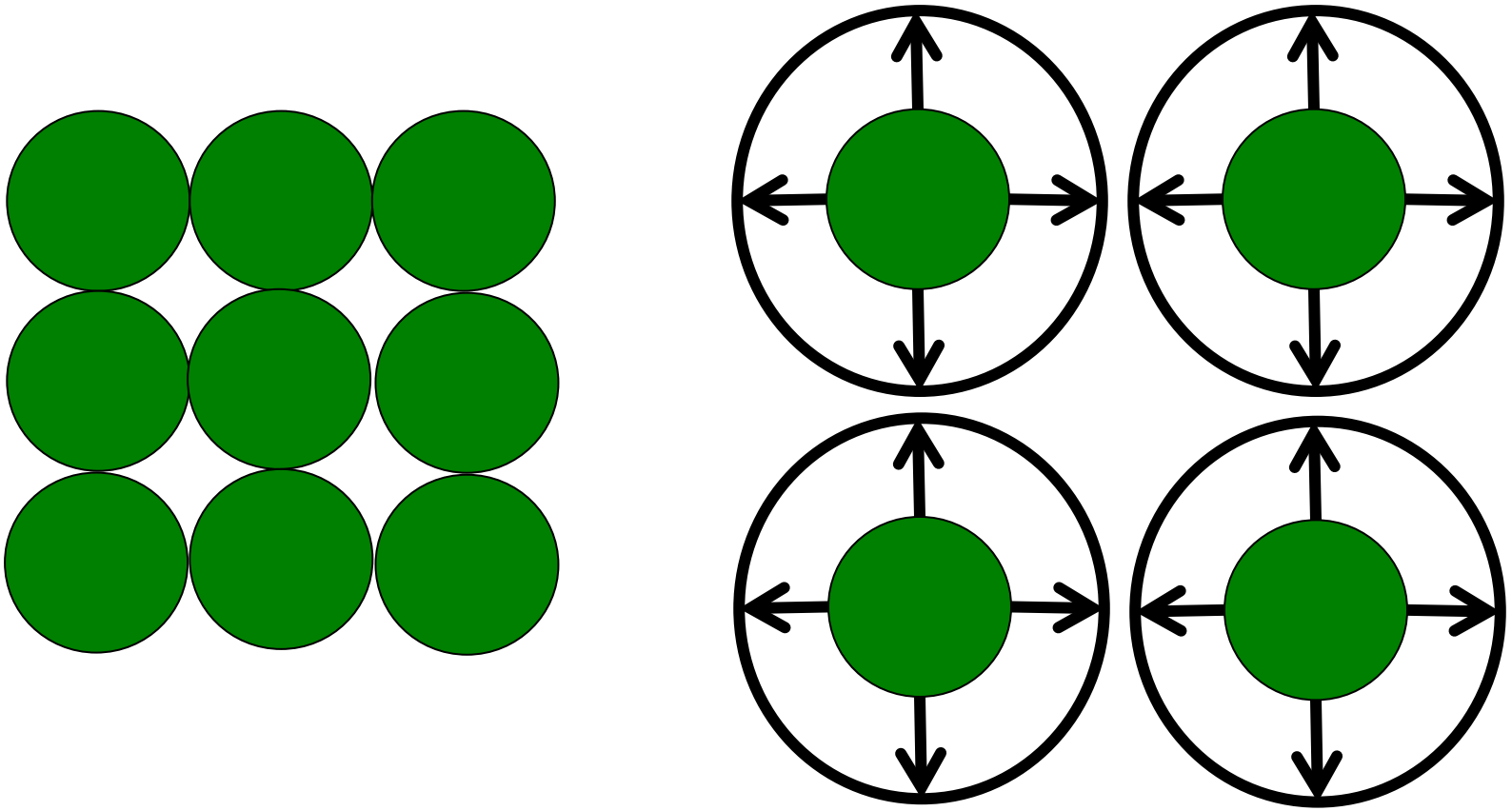
Thinning treatments reduce severity of foliar pathogens in eastern white pine ☆

Cameron D. McIntire [a], Isabel A. Munck [b], Mark J. Ducey [a], Heidi Asbjornsen [a c]

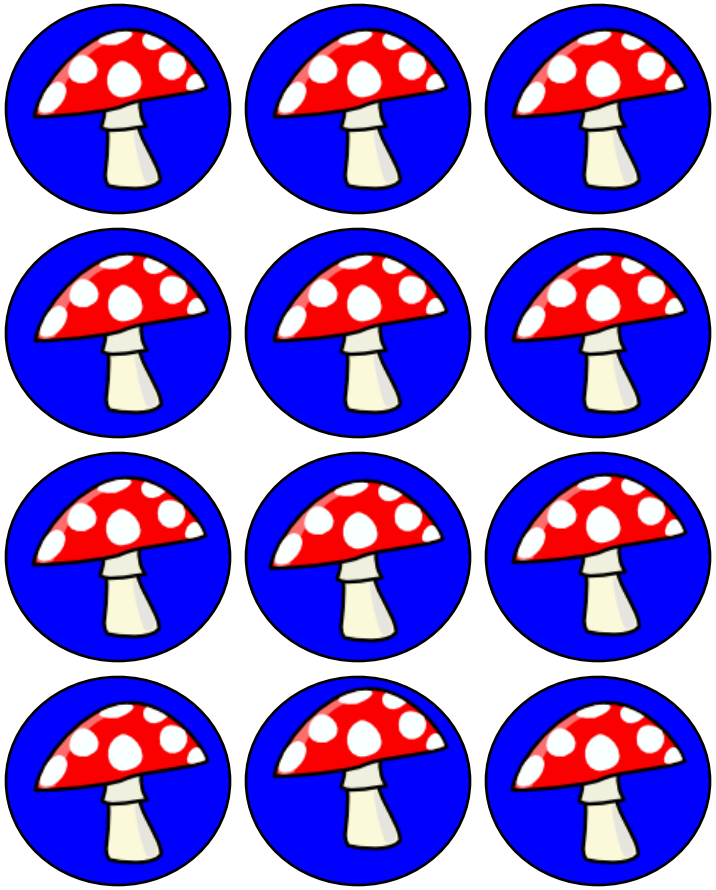
- Nitrogen fertilization (chronic starvation due to needle loss)
- Increased stand diversity

Height Growth Repression and low LCR



LCR <30% = decrease in vigor

Natural Environment vs. Monoculture



Stress > Opportunistic Pathogens

Armillaria

Caliciopsis

Questions?

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