Identification & Management of White Pine Blister Rust

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What is White Pine Blister Rust?

- A rust fungus
  - Cronartium ribicola
- Complex life cycle
  - Obligate parasite
  - 5 spore stages
  - Requires 2 hosts to complete life cycle
    - 5-needled pines
    - gooseberries/currants (Ribes)
    - Pedicularis & Castilleja
Girdles branches Causes top-kill

Kills young trees

History of the Invasion

- Exotic pathogen
  - Native to EurAsia
  - Imported ~1910 from France
  - Arrived in Inland Northwest 1920s
Life Cycle

Spring
Summer: intensifies on Ribes

Fall: infects needles

1-2 yr - grows down needles into branches and bole
Spermatia
summer - early fall
Spermatia exuded in droplets along margin of canker

Branch swellings/discholoration
Sporulating Cankers
easiest positive diagnosis

Applying water to cankers makes them easier to see
Cankers in F2 Stock

May be very irregular in shape
May have little or no pitch
Cankers in F2 Stock
May show bark reactions

Other Indicators
Management Options

- Leave the best as leave trees
- Plant genetically improved stock
- Prune
- Evaluate site hazard
- Manipulation of alternate host (*Ribes*)
- Monitor plantations

Save the best looking trees

- Trees with no (or very few cankers), dense, rapidly growing crowns
- Potential for genetic resistance
- Improved genetic diversity
Breeding for improved resistance has been ongoing since the 1950's

Out plantings are NOT 100% resistant
• Range 0–96% infection
• Range 0–43% mortality

Resistant stock ALWAYS less infected than unimproved stock
• Range 2–43% less infected than half on average
Cummulative WPBR Incidence and Mortality by Plantation Age Class

Percent White Pine Blister Rust (Incidence & Mortality)

Plantation Age Class (years)

- F2 Incidence
- Naturals Incidence
- F2 Mortality
- Naturals Mortality

WPBR Incidence by Plantation Age Class
Why Prune?

- Infections only occur on green needles
- Live branches close to the ground are at highest risk of infection
  - shady, cool, and moist
- Pruning removes infections before they reach the stem & removes the lower needles as infection sites

Why Prune?

- Pruning does not change genetic resistance of trees, but can help maintain white pine as a functioning component in forests
  - important in mixed conifer stands due to white pine’s tolerance to native root diseases

- If done correctly...
Pruning Results

- Nearly doubled survival over 30 years
- Improved numbers of trees without infection
- Prevents stand transition to less desirable species
- Higher quality volume production

Evaluating Stands for Pruning

- Stand Factors to consider
  - Management objectives
  - *Amount of White pine (TPA)
  - *Level of rust infection
  - Average age/height of WP
  - Species composition
  - Other treatments such as thinning
Determine Level of Infection

Pre-treatment survey of white pines

Pruning Guidelines

- Max. 50% of crown
- Pruning height
  - 8 feet, but less than 50%
- Canker distance out
  - More than 6” for surveys
  - More than 4” for contracts
  - Cankers >24” are usually not lethal
- Remove ALL branches
Evaluating Site Hazard

- Estimates the suitability of the site for development of the rust
- Can be based on:
  - *Ribes* abundance
  - Nearby infection levels
  - Site factors

Site Hazard Rating

- Based on survey of 41 plantations in N. Idaho
- Highest infection occurred on:
  - higher elevations (>3500’)
  - steeper slopes (>15%)
  - *Ribes* present
  - tall brush (>4.5’)
  - broadcast burned
  - cedar-wild ginger habitat type
- These relationships need further testing
**Ribes Management**

- *Ribes* prefer sunlight
  - Are enhanced by activities that open stands
    - Logging
    - Low intensity fire
- Seed may survive 200 years in duff
- Will die out in shade

**Monitoring is crucial**

- Infection may vary widely and won't know changes if not monitored
- The best way to make decisions regarding pruning and thinning
The Bottom Line

- Rust-resistant white pine consistently perform better than natural white pine
- Currently no exact predictor of rust site hazard
- Infection levels vary
  - Do not plant pure stands of rust-resistant white pine
- Pruning has doubled survival in young natural stands
- You can’t just “plant it and forget it” = Monitoring, Monitoring, Monitoring!

Management Guide available online:
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