

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*

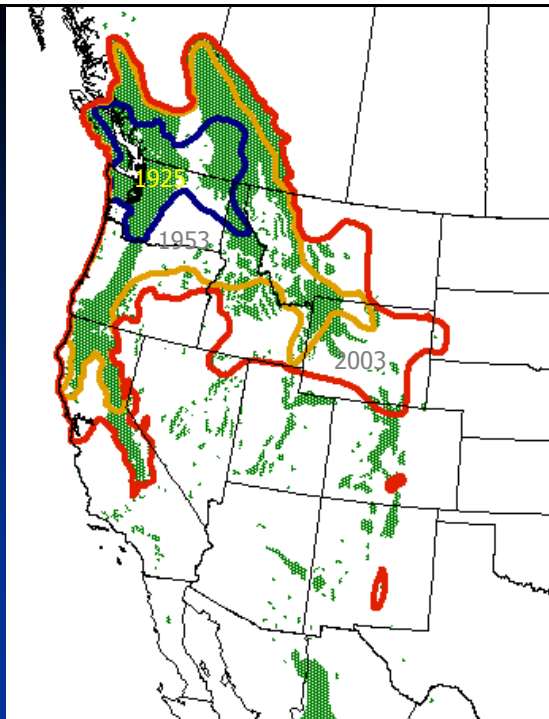


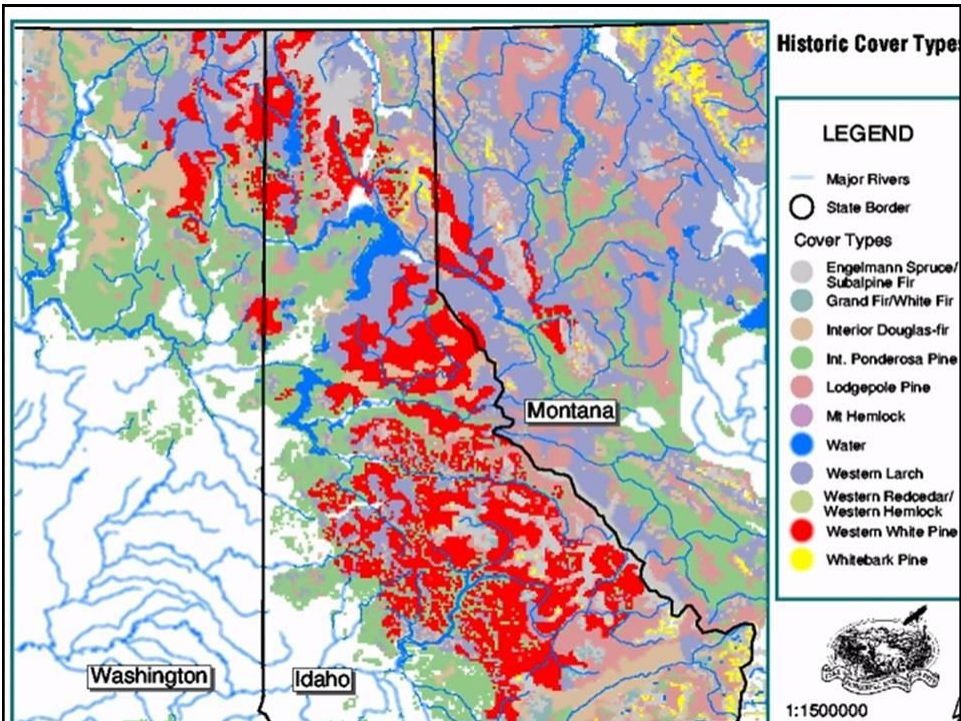
Girdles branches Causes top-kill

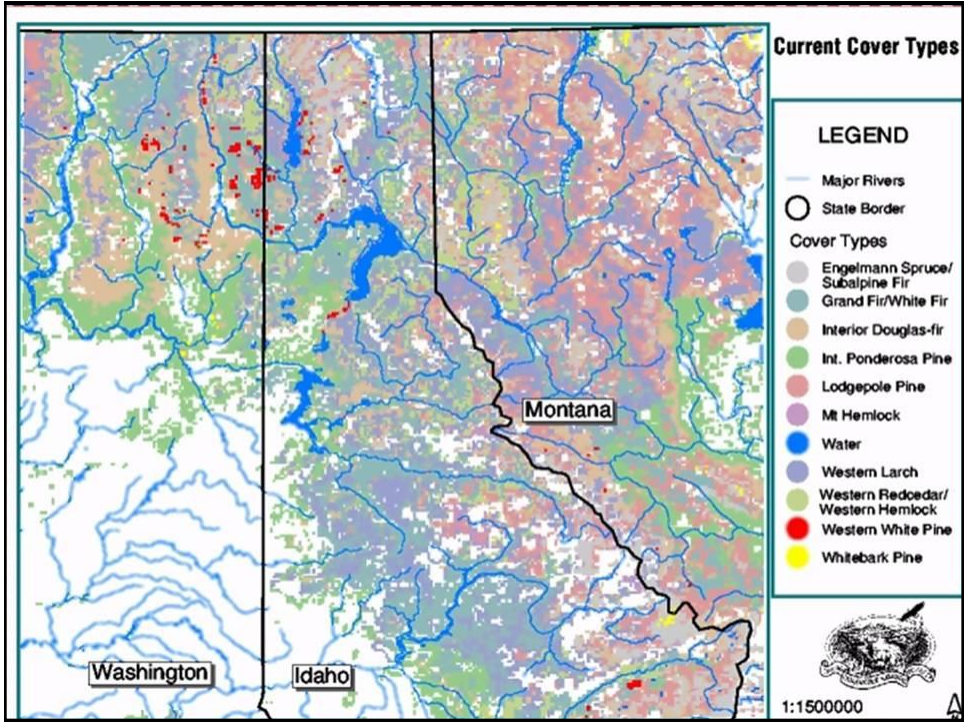


History of the Invasion

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

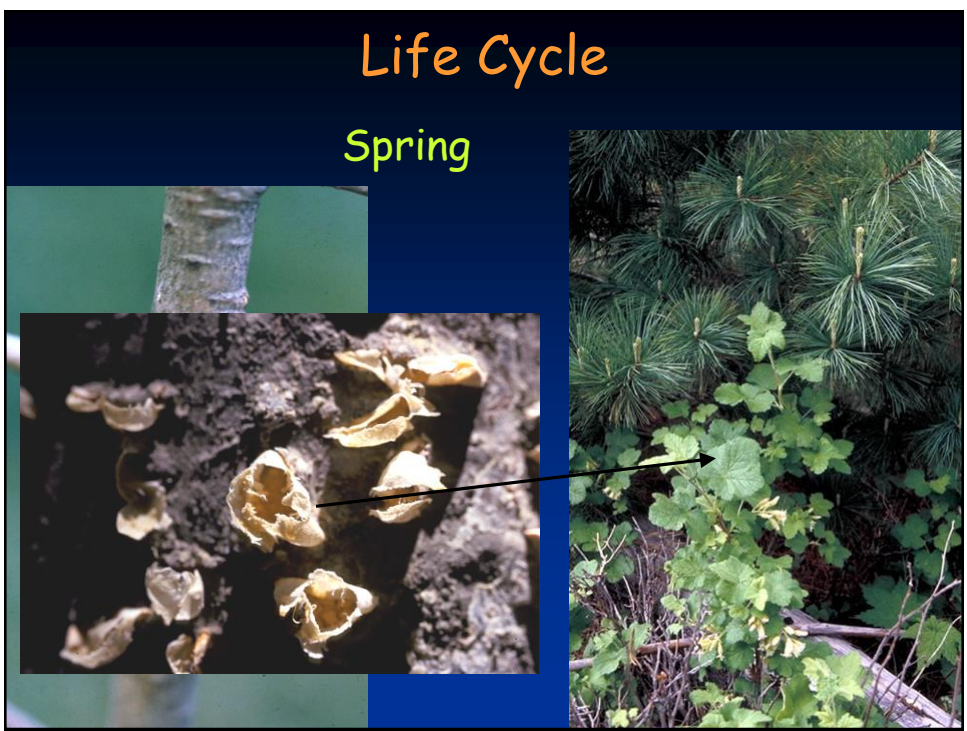






Life Cycle

Spring



Life Cycle



Summer:
intensifies on Ribes



Fall:
infects needles



1-2 yr - grows down needles
into branches and bole

Life Cycle





Spermatia

summer - early fall

Spermatia exuded
in droplets along
margin of canker



Branch swellings/discoloration



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

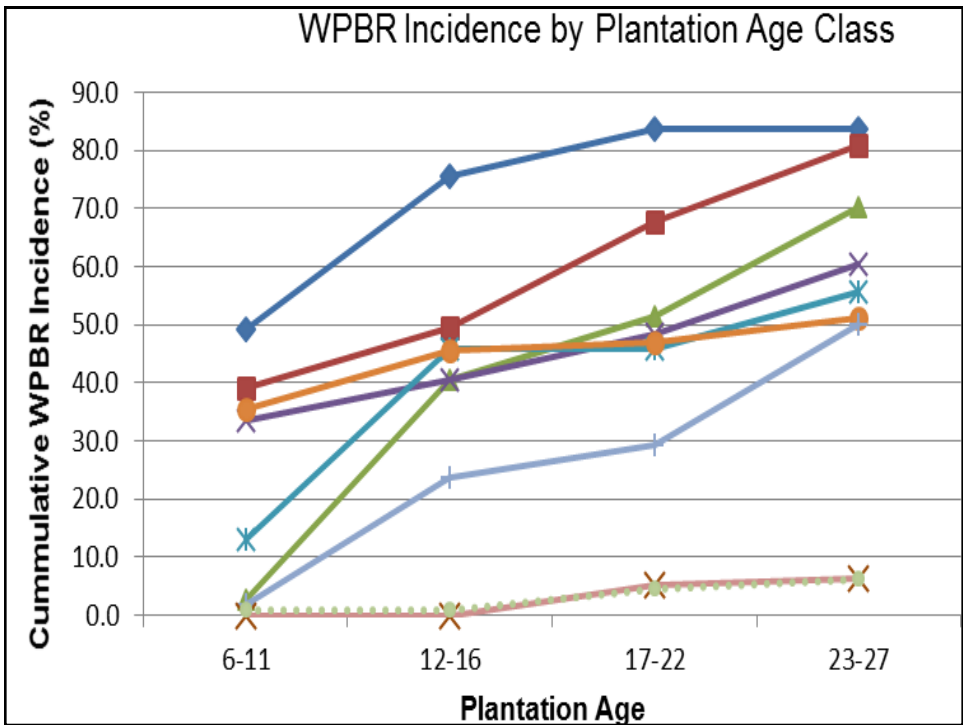
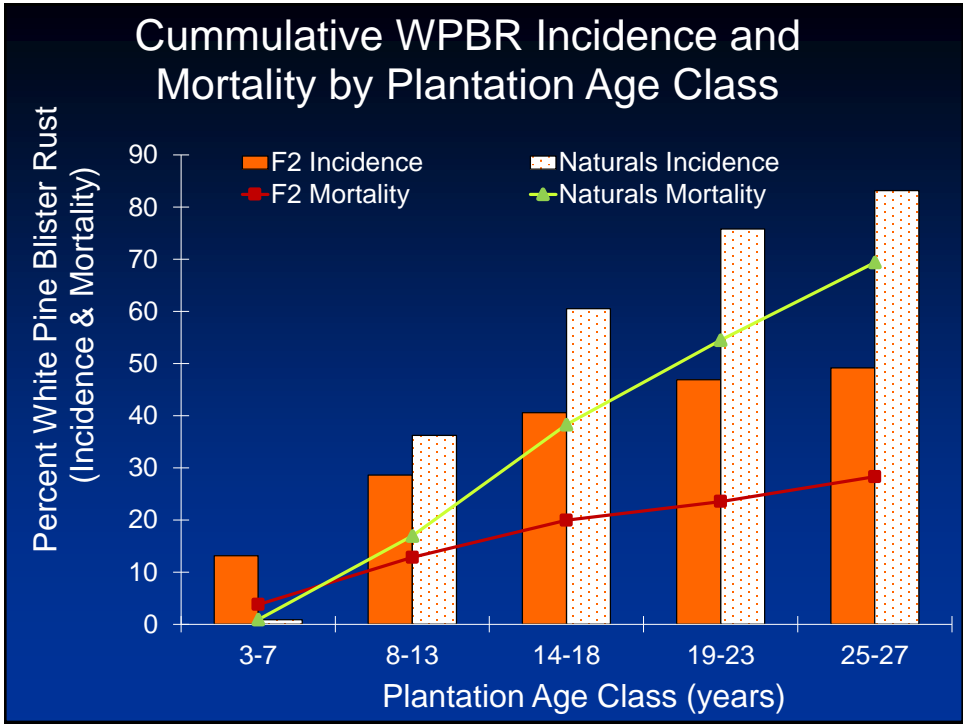
- Trees with no (or very few cankers), dense, rapidly growing crowns
- Potential for genetic resistance
- Improved genetic diversity

WWP with Improved Resistance

Breeding for improved resistance has been ongoing since the 1950's



Resistant stock ALLVA100% less infected than unrange 96% infection
 • Range 43% variability than half on average

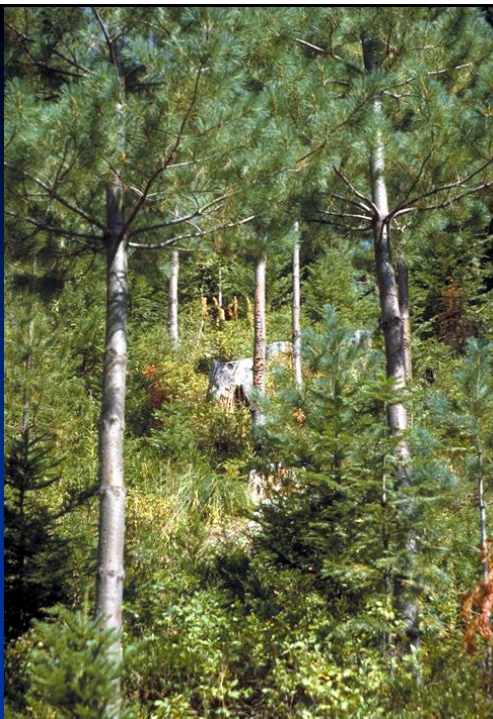


Why Prune?

- 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



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

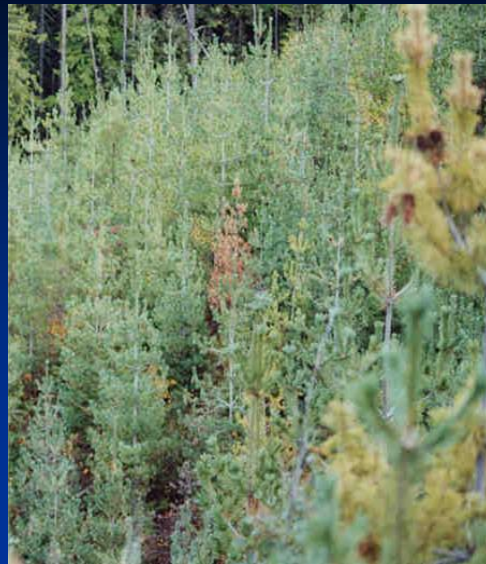
- *Ribes* prefer sunlight
 - Are enhanced by activities that open stands
 - Logging
 - Low intensity fire
- Seed may survive 200 years in duff
- Will die out in shade



Photos by Maria Newcomb

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:

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5415080.pdf



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White Pine Blister Rust General Ecology and Management

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Introduction

Management of western white pine (*Pinus monticola*) (WWP) has been confounded by the introduction of white pine blister rust (WPBR), caused by the fungus *Cronartium*

needed pines native to North America are susceptible (Hoff et al. 1980), but the Great Basin Bristlecone pine (*Pinus longaeva*) is the only pine host that has not yet been

