

Western White Pine

BULLETIN

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WESTERN WHITE PINE – What's not to like?

Introduction



Western white pine (*Pinus monticola*)

In the past, this tree species was one of the most widespread, productive and desirable conifers in British Columbia (BC). The species has many favourable characteristics and diverse values.

White pine blister rust (*Cronartium ribicola*)

This rust is an alien invasive disease that infects western white pine trees, causing diamond-shaped, orange coloured cankers. Infection often results in tree mortality.

Genetics resistance breeding

Since the 1970s, significant cooperation between industry and researchers from the BC, Canadian and USA governments has resulted in a very successful selective breeding program which has incorporated multiple resistance mechanisms for long-term durability. The products of this research have fed directly into operational seed orchards and reforestation.

Seed availability

Over the last two decades, this strong tree improvement research program has yielded success in developing operational seed orchards for the coast and interior with western white pine resistant/tolerant to blister rust. Seed orchard seedlots are registered with genetic worth values for general resistance (R) or major gene resistance (M), expressed as a percent of the trees that will survive or tolerate white pine blister rust infection. For example, it is expected that greater than 50% of trees derived from orchard seed will survive white pine blister rust infection in plantations.

Multiple Benefits of Western White Pine

The *Forest and Range Practices Act* (FRPA) and its regulations govern the activities of forest and range licensees in BC and sets high levels of protection for forest values including reforestation. It encourages innovation by skilled resource professionals.

Western white pine offers multiple benefits for reforestation and other FRPA values.

- **Silvics:** Fast-growing species suited to a wide range of sites. Height growth is comparable to Douglas-fir and grand fir. The mean annual increment is comparable to Douglas-fir.
- **Disease management:** Grows well in areas where laminated root disease (*Phellinus* spp.) occurs. Is rarely infected by mistletoe.
- **Seed transfer:** A highly resilient and 'plastic' species, it can be readily moved within a broad elevation band, much broader than many other species.



- **Browse resistance:** Deer browse resistance in plantations has been noted by silviculturists.
- **Biodiversity:** Enhances species diversity in the forest canopy.
- **Fire break:** Crown fire initiation is diminished due to the high live crown of mature trees.
- **Aesthetic and recreation:** The straight, attractive tree is a notable presence in the forest, and its rare occurrence draws recreational users.
- **Wildlife:** The moderately large nutritious seeds are consumed and dispersed by many species of birds and small mammals.

Reforestation

- Seed requires a long stratification period of greater than three months (112 days). Ideally, seedling orders should be placed in early fall for a 1+0 stock type; if selecting 2+0 stock type, the seedling order may be delayed until later in the fall.
- On a per seedling basis, resistant western white pine seed costs are comparable with seed orchard Douglas-fir seed.
- The best available seed orchard seedlots will result in 50% or greater survival for coastal trees, and 65% or greater survival for interior trees when exposed to natural levels of blister rust spores.
- Western white pine seedlings perform well and are suited to production in a PSB 410 or 412B container size. Larger container cavities do not necessarily provide a larger seedling.
- On FRPA blocks, there is no requirement to prune western white pine to control white pine blister rust because of the availability of highly resistant western white pine seed.
- The stocking standards reference guide footnote states that the “use of resistant stock mitigates risk of white pine blister rust.”
- Current reforestation trends are to plant up to 25% western white pine seedlings on ecologically suitable sites; a species mix provides insurance against long-term losses to white pine blister rust.
- Planting of resistant stock demonstrates a high degree of survival and productivity relative to other regularly planted tree species. Western white pine performs especially well in areas with root rots and browsing pressure.
- Host resistance to blister rust occurs in three ways; 1) fewer and slower growing cankers (M genes), 2) “totally clean” (R genes), and 3) developmental resistance as the tree ages.
- Seed orchards currently produce seed using the first two types of resistance. (Infection of a resistant tree does not mean that the tree will die).



Summary

The multiple benefits of western white pine, combined with the development of seed orchards producing resistant seed, make it a good choice for many areas being planted. Returning western white pine grown from resistant seed to the landscape will contribute to a sustainable and resilient forest.

References for western white pine:

King, J.N., A. David, D. Noshad, and J. Smith. 2010. A review of genetic approaches to the management of blister rust in white pines. *For. Path.* 40: 292–313.

<http://onlinelibrary.wiley.com/doi/10.1111/j.1439-0329.2010.00659.x/full>

FORREX Stand Establishment Decision Aid link:

http://www.forrex.org/publications/jem/ISS50/vol10_no1_art9.pdf

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