

Western white pine (Pw) - *Pinus monticola*

Tree Species > Western white pine



Page Index

Distribution
Range and Amplitudes
Tolerances and Damaging
Agents
Silvical Characteristics
Genetics and Notes

BC Distribution of Western white pine (Pw)

Range of Western white pine



Naturally established western white pine outgrowing common douglas in the Drier Maritime CWH subzone on Southern Vancouver Island

Geographic Range and Ecological Amplitudes

Description

Western white pine is a medium- to large-sized (exceptionally >70 m tall) evergreen conifer. At maturity, it has a sparse, variable crown, short branches (except for cone bearing branches which are long), and dark gray bark broken into small, scaly plates. It is an important timber species; its wood is desired for sash, frames, doors, interior paneling, building construction, match wood, and other products.

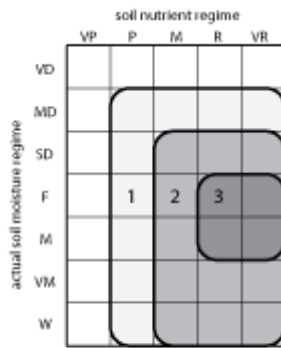
Geographic Range

Geographic element:
Western North American/mainly Cordilleran and less Pacific

Distribution in Western North America:
central and (south) in the Pacific region, central and south in the Cordilleran region

Ecological Amplitudes

Climatic amplitude:
subalpine boreal - cool temperate - cool mesothermal



generalized edaphic amplitude of western white pine according to actual soil moisture and nutrient regimes

Orographic amplitude:
submontane - **montane** - subalpine

Occurrence in biogeoclimatic zones:
(lower southern MH), (lower southern ESSF), MS, wetter IDF, **ICH**, (CDF), CWH

The tolerance of western white pine for dry and cold climates is lower than that of interior common douglas. However, western white pine occurs in the lower, southern MH and ESSF zones.

Edaphic Amplitude

Range of soil moisture regimes:
(moderately dry) - slightly dry - **fresh - moist** - very moist - wet

Range of soil nutrient regimes:

(poor) - medium - **rich - very rich**; calciphytic

Western white pine does not grow in very acid peat bogs, but it may grow on wet sites that are slightly acidic to neutral (e.g., skunk cabbage sites).

Western white pine grows well in calcium-rich soils or on seepage sites. It was found experimentally that the requirements of western white pine for calcium and magnesium are fairly high (Krajina 1969). When deprived of calcium, western white pine is first affected strongly by calcium dieback of its root system. Western white pine does not readily develop new roots when the older roots are killed. Therefore, calcium deficiency becomes a strong factor in the survival of western white pine.

Many young western white pine trees are eliminated in strongly leached calcium-poor soils, such as in the CWH zone. In the ICH zone, this elimination takes place when trees are much older and is therefore more easily noticed. When the trees (i.e., their roots) are already affected by calcium deficiency, they may be readily killed by drought. Plants experimentally inflicted with calcium deficiency frequently appear to wilt, even when water is available. In other cases of calcium deficiency, western white pine collapses more slowly - from the top of the crown down - by a process of chlorosis and later necrosis.

Tolerance and Damaging Agents

Root System Characteristics

Approximately 65 percent of the total root system occurs in the uppermost 30 cm of soil. The root system of mature trees can spread 8 m laterally from the root collar with verticals descending off the lateral system. Roots of western white pine are associated with both ecto- and endo-mycorrhizae.

Tolerances

tolerance to	tolerance class	comments
low light	M	variable; tolerance increases from perhumid to subhumid climates
frost	M - H	intermediate in coastal populations, high in interior populations
heat	M	absent or very sporadic in CDF and IDF
water deficit	L	following a long drought, pole blight may occur
water surplus	H	tolerates wet sites and inundation well
nutrient (mainly N) deficiency	L	sensitive to calcium deficiency

Damaging Agents

damaging agent	resistance class	comments
snow	H	tolerates heavy snowpack
wind	M	increasing with increasing age
risk class		
fire	M - H	intermediate in coastal populations, high in interior populations
insect	M	mountain pine beetle, pine engraver
fungi	H	white pine blister rust; root and butt rots not a major concern (e.g., red ring rot, Armillaria root disease, annosus root and butt

rot, Schweinitzii butt rot)

Associated tree species and successional role

In British Columbia, western white pine grows predominantly in even-aged, post-fire, mixed-species stands with a variety of species, and usually persists to late seral stages. It associates as a scattered species with a great number of species such as: Pacific silver fir, Grand fir, Subalpine fir, Western larch, Engelmann spruce, Common douglas, Western redcedar, and Western hemlock. It is present in early, mid-, and late stages of secondary succession; a minor component in the old-growth stands in cool temperate and mesothermal climates.

Silvical Characteristics

characteristic	interpretive comments class	
reproduction capacity	H	cone production as early as an age of 7 years; frequent and abundant production at an age of 70 years
seed dissemination capacity	M	most seeds fall 120 m from the source; maximum distance >800 m
potential for natural regeneration in low light	L	medium, if adequate seedbeds are present
potential for natural regeneration in the open	H	especially after wildfires
potential initial growth rate (<5 years)	M	<10 years are required to reach a height of 2 m
response of advance regeneration to release	na	advance regeneration does not develop in the absence of seed source, adequate light, and seedbeds
self-pruning capacity in dense stands	H	dense stands are very infrequent
crown spatial requirements	M	generally forms uniform and low density crowns

light conditions beneath closed-canopy, mature stands	H	associated with well-developed understory vegetation; closed-canopy stands are very infrequent
potential productivity	H	site index functions for B.C. are not available; rapid early growth; site index (50 yr @ bh) close to 35 m in coastal populations and 30 m in interior populations
Longevity	M	Rarely >500 years.

Genetics and Notes

Genetics

Western white pine is different in genetic variation from most of other conifers. There is little geographical or ecological variation in western white pine populations. Work on blister rust indicated considerable heritability of resistance.

Notes

Western white pine is a very productive and desirable species considering its rapid growth, clean bole with minimum taper, narrow crown, and non-resinous wood. The major hazard limiting its wider application is blister rust. More detailed silvics information is given by:

Graham, R.T. 1990. *Pinus monticola*. Pp. 385-394 in R.M. Burns and B.H. Honkala (technical coordinators) *Silvics of North America*, Vol. 1. Agri. Handbook 654, USDA For. Serv., Washington, D.C.