

Ponderosa pine (Py) - *Pinus ponderosa*

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BC Distribution of Ponderosa pine (Py)

Range of Ponderosa pine



Ponderosa pine is distributed from the southern-interior of BC to Mexico. It is characteristic of the PP zone.

Geographic Range and Ecological Amplitudes

Description

Ponderosa pine is a medium- to large-sized (rarely >40 m tall) evergreen conifer at maturity with a moderately dense, conical crown, long branches, and orange-brown, deeply fissured bark. It is an important timber species, but open-canopy ponderosa pine forests are also important as wildlife habitat, watersheds, and for livestock grazing and recreational use.

Geographic Range

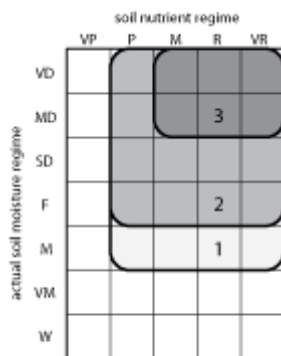
Geographic element:

North American/Pacific, Cordilleran, and Central

Distribution in Western North America:

(central) and south in the Pacific region; central and south in the Cordilleran region

Ecological Amplitudes



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

Climatic amplitude:

(subalpine boreal) - (semiarid) - (cool) warm temperate - (cool) **warm mesothermal** - dry tropical

Orographic amplitude:

montane - subalpine

Occurrence in biogeoclimatic zones:

(lower southern ESSF), (southern MS), PP, southern IDF, (southern ICH)

Edaphic Amplitude

Range of soil moisture regimes:

(extremely dry) - **very dry** - **moderately dry** - slightly dry - fresh - (moist)

Range of soil nutrient regimes:

poor - **medium** - **rich** - **very rich**; calciphytic inclinations

The soils in which ponderosa pine grows cannot be of a very fine texture, otherwise either grasses (mainly *Agropyron* and *Stipa* spp.) or shrubs (mainly

Artemisia and *Arctostaphylos* spp.) would become the main users of available water and a grassland community would develop. In contrast to fine-textured soils, coarse-textured soils allow a higher permeability, deeper penetration, and greater water storage which may be reached only by the roots of trees. It was concluded from field and experimental studies that ponderosa pine is a very demanding species as it required larger quantities of available nitrogen (mainly in the form of nitrates), magnesium, calcium, and potassium than any other tree species studied by Murison (1960) and Krajina (1969). Its slightly lower demands for phosphorus could be considered advantageous for growing in alkaline soils where phosphorus availability is low. Ponderosa pine was found to have similar responses to deficiency treatments as western white pine.

Tolerance and Damaging Agents

Root System Characteristics

Ponderosa pine develops deep taproots (up to 50 cm in watered soils in the first growing season). Mature trees have roots to depths of more than 200 cm in coarse-textured soils but less than 100 cm in fine-textured soils. In open-canopy stands lateral roots may extend 46 m. The main root mass is concentrated within the top 60 cm. Roots of ponderosa pine are associated with both ecto- and endo-mycorrhizae.

Tolerances

tolerance to	tolerance class	comments
low light	L	possibly intermediate in the ecotone between temperate and semiarid climates
frost	M	absent on sites with growing season frost
heat	H	protection-requiring in the ecotone between temperate and semiarid climates
water deficit	H	very frequent on very dry sites
water surplus	H	tolerates short-term inundation - present on coarse-skeletal, high floodplain benches
nutrient (mainly N) deficiency	M	absent in very poor, acid soils

Damaging Agents

damaging agent	resistance class	comments
snow	M	does not tolerate heavy snowpack
wind	H	deeply rooted
risk class		
fire	M	easily survives ground fires when mature
insect	M	mountain pine beetle, pine engravers (Ips spp.)

fungi	M	western gall rust; root and butt rots not a serious concern (e.g., red ring rot, Armillaria root disease, annosus root and butt rot)
other agents	M	dwarf mistletoes (Arceuthobium spp.); rabbits, hares, pocket gophers

Associated tree species and successional role

In British Columbia, ponderosa pine grows predominantly in pure stands that consist of many small, even-aged cohorts as a result of frequent ground and crown fires. It is present in early, mid-, and late stages of secondary succession; it is a variable component in old-growth stands in the IDF zone and the only component in the PP zone.

associated tree species	occurrence class	major area of occurrence
common douglas	M	Southern IDF
lodgepole pine	L	Southern IDF
western larch	L	Southern IDF

Silvical Characteristics

characteristic	interpretive comments class	
reproduction capacity	H	cone production as early as an age of 7 years; frequent and abundant production of viable seed after an age of 60 years, seed-producing until at least an age of 350 years
seed dissemination capacity	L	most seeds fall within 40 m from the source; maximum distance about 120 m
potential for natural regeneration in low light	L	low light conditions do not exist in the understorey of ponderosa pine stands
potential for natural regeneration in the open	H	especially after wildfires
potential initial growth rate (<5 years)	H	>1.5 m after 5 years on very productive sites

response of advance regeneration to release	na	advance regeneration does not develop in the absence of adequate light and seedbeds
self-pruning capacity in dense stands	M	dense stands are infrequent
crown spatial requirements	H	especially in driest climates
light conditions beneath closed-canopy, mature stands	H	associated with well-developed understory vegetation
potential productivity	H	site index functions for B.C. are not available; site index (100 yr @ bh) close to 50 m on the most productive sites
longevity	M	Rarely >600 years

Genetics and Notes

Genetics

Ponderosa pine shows distinct geographic variation over its wide range. Provenance studies have revealed genetic variation within and between var. ponderosa and scopulorum in a number of characters.

Notes

Ponderosa pine is a productive and desirable species considering its drought tolerance and its rapid growth, which remains fairly constant for a long time provided trees are given adequate growing space. More detailed silvics information is given by:

Oliver, W.W. and R.A. Ryker. 1990. *Pinus ponderosa*. Pp. 413-424 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.