Lodgepole pine (Pli) - *Pinus contorta*

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BC Distribution of Lodgepole pine (Pli)

Range of Lodgepole pine

A very high density stand of lodgepole pine developed after fire on water and nutrient deficient fluvial deposits in the Prince George Forest District

Geographic Range and Ecological Amplitudes

Description

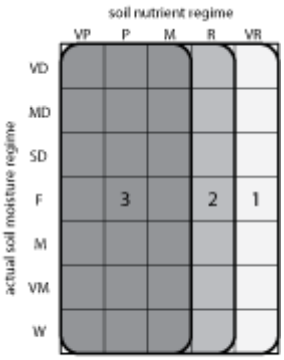
Lodgepole pine is a medium-sized (occasionally >30 m tall), evergreen conifer at maturity with a sparse, variable crown, spreading branches, and a thin, orange brown to gray bark, with fine scales – bark is thicker and more grooved on the coast. It is the most widely distributed pine species in western Canada and an important timber species for pulp, lumber, and a variety of other products.

Geographic Range

Geographic element:
Western North American/Pacific, Cordilleran and marginally Central

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

Ecological Amplitudes



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

Climatic amplitude:
continental subalpine boreal - **montane boreal** - (cool semiarid) - cool temperate - cool mesothermal

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

Occurrence in biogeoclimatic zones:
(lower MH), (lower SWB), **lower ESSF, MS, BWBS, SBS, SBPS**, (PP), IDF, ICH, CDF, CWH

Edaphic Amplitude

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

Range of soil nutrient regimes:
very poor - poor - medium - rich - (very rich); weakly oxylophytic

In comparison with jack pine, lodgepole pine is easily established in acid mesothermal bogs which do not freeze. On the other hand, lodgepole pine is very infrequent or absent in boreal bogs which freeze every winter. This indicates that the frost resistance of lodgepole pine in more continental climates is lower than that of jack pine, white spruce, black spruce, or tamarack.

Tolerance and Damaging Agents

Root System Characteristics

The root system of lodgepole pine is generally shallow but taproot and vertical sinkers develop on well-drained sites. Roots of lodgepole pine are associated with both ecto- and endo-mycorrhizae.

Tolerances

tolerance to	tolerance class	comments
low light	L	slightly shade-tolerant in driest climates
frost	H	frequent on sites affected by growing season frost
heat	M	frequent on insolated sites
water deficit	H	very frequent on the driest sites
water surplus	H	tolerates well wet sites and sites with a strongly fluctuating water table
nutrient (mainly N) deficiency	H	very frequent on very poor sites

Damaging Agents

damaging agent	resistance class	comments
snow	L	intolerant of heavy snowpack
wind	M	prone to blowdown in dense stands
	risk class	
fire	H	adapted to regenerate after wildfires
insect	H	mountain pine beetle, pine engraver, northern lodgepole pine needleminer, lodgepole pine terminal weevil
fungi	H	atropellis canker, comandra blister rust, western gull rust; root and butt rots not a serious concern (e.g., red ring rot and Armillaria root disease)

other agents	H	dwarf mistletoe (Arceuthobium americanum Nutt. ex Engelmann)

Associated tree species and successional role

In British Columbia, lodgepole pine grows predominantly in even-aged, post-fire forests, in pure or, less often, mixed-species stands. It is a pioneer species (primary succession) on rock outcrops and in ombotrophic wetlands, and is present in early, mid-, and late stages of secondary succession on water deficient and waterlogged sites). It is a major component in the hypermaritime forest and fire-disturbed communities in the SBPS zone.

associated tree species	occurance class	major area of occurance
black spruce	H	BWBS.
white spruce (& hybrids)	H	montane boreal climates
western larch	H	cool temperate climates in southern B.C
common douglas	M	cool temperate climates
trembling aspen	M	montane boreal and cool temperate climates
engelmann spruce	M	ESSF
subalpine fir	M	boreal climates
western hemlock	L	ICH and hypermaritime CWH
western redcedar	L	hypermaritime climates
balsam poplar & Black cottonwood	L	montane boreal and cool temperate climates
ponderosa pine	L	mainly in southern IDF
tamarack	L	BWBS
alaska yellow-cedar	L	hypermaritime climates
paper birch	L	montane boreal climates

	characteristic	interpretive class	comments
Silvical Characteristics	reproduction capacity	H	viable seed is produced very early (5-10 years); prolific seed producer
	seed dissemination capacity	L	predominantly serotinous cones, when open, dispersal is <100 m
	potential for natural regeneration in low light	L	practically nil; advance regeneration develops in driest climates in canopy gaps
	potential for natural regeneration in the open	H	especially after wildfires
	potential initial growth rate (<5 years)	H	>50 cm/yr after the third growing season on productive sites
	response of advance regeneration to release	L	very slow (>10 years)
	self-pruning capacity in dense stands	H	dense stands are infrequent on wetland sites
	crown spatial requirements	L	develops a short and narrow crown in dense stands , and wider crown on wetland sites
	light conditions beneath closed-canopy, mature stands	H	associated with well-developed understory vegetation
	potential productivity	M	site index (50 yr @ bh) <30 m; growth rate decline after about 150 years
	longevity	M	<300 years

Genetics and Notes

Genetics

Lodgepole pine has evolved several highly differentiated but inter-fertile geographic races that differ morphologically and ecologically: Rocky Mountain-Intermountain, Sierra-Cascade, Coastal, Mendocino White Plains, and Del Norte races.

Lodgepole pine hybridizes with jack pine, producing the hybrid *P. x murraybanksiana* (see *Pinus banksiana*). This interspecific breeding is probably of rather recent origin, because it affects populations of lodgepole pine only in certain limited areas. Geographic variation in lodgepole pine was discussed by Critchfield (1957).

Notes

Lodgepole pine is one of the few species with a very wide ecological amplitudes and tolerances. Because it has little taper and thin bark, it produces a higher volume of wood than many of its associates of the same diameter and height. A common problem of regenerating lodgepole pine is overstocking which results in growth stagnation at the early stand developmental stage on water-deficient, nutrient-poor sites. More detailed silvics information is given by:

Baumgartner, D.M., R.G. Krebill, J.T. Arnott, and G.F. Weetman. (compilers and editors) 1985. Lodgepole pine and its management. Washington State University, Pullman, Washington. 381 pp.

Lotan, J.E. and W.B. Critchfield. 1990. *Pinus contorta*. Pp. 302-315 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.