

# Amabilis fir (Ba) - *Abies amabilis*

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# BC Distribution of Amabilis fir (Ba)

Range of Amabilis fir



A dense cohort of young Pacific silver fir on a high elevation cut-over near Chilliwack

## Geographic Range and Ecological Amplitudes

### Description

Pacific silver fir is a medium- to large-sized (exceptionally >70 m tall), evergreen conifer, at maturity with a low-taper stem, a narrow symmetrical crown, with lateral branches perpendicular to the stem and light gray bark becoming scaly and grooved with age. It is a valuable timber species that is marketed with western hemlock. Its light-coloured wood, without odor, gum, and resin, is typically used for construction.

### Geographic Range

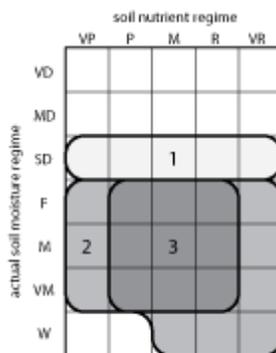
#### Geographic element:

Western North American/mainly Pacific and less Cordilleran

Distribution in Western North America:

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

### Ecological Amplitudes



generalized edaphic amplitude of Pacific silver fir according to actual soil moisture and nutrient regimes

#### Climatic amplitude:

maritime subalpine boreal - (wet subarctic cool temperate) - **wet cool and cold mesothermal**

#### Orographic amplitude:

submontane - **montane** - **subalpine**

Occurrence in biogeoclimatic zones:

hypermaritime - **maritime** - **subarctic MH**, (northern wetter subarctic ICH), wetter hypermaritime - **maritime** - **subarctic CWH**

The summers where Pacific silver fir grows are never hot, and the winters are rather mild (monthly mean January temperature may be as low as -10 C in the MH zone). If occasionally the absolute minimum temperature drops as low as -35 C, Pacific silver fir suffers frost damage to branches and sometimes substantial parts of the crowns die. Such damage is common especially near the timber line, which for Pacific silver fir is about 150 m lower than that for mountain hemlock, subalpine fir, and whitebark pine. It never grows in krummholz form. Towards warmer climates, Pacific silver fir is restricted to sites

with cooler local climate.

### **Edaphic Amplitude**

Range of soil moisture regimes:

(slightly dry) - **fresh - moist - very moist** - (wet)

The water demand of Pacific silver fir is probably the largest for any evergreen tree in British Columbia. Thus, it grows in regions with the mean annual precipitation over 2500 mm (on the wettest areas of Vancouver Island, even as high as 6650 mm). It will also occur in drier regions with the mean annual precipitation as low as 1900 mm and shorter growing season, if a substantial part of annual precipitation is in the form of snow, that slowly melts during spring and early summer.

Range of soil nutrient regimes:

very poor - **poor - medium - rich** - very rich

Field studies indicate that Pacific silver fir is more vigorous on calcium- and magnesium-rich soils derived from basaltic or limestone parent materials. Nitrates appear to be a better source of nitrogen than ammonium compounds as indicated by the Moder (Mull) humus formation on the most productive sites.

## Tolerance and Damaging Agents

### Root System Characteristics

Pacific silver fir develops a taproot system in well drained soils; a relatively flat, plate-like root system is formed in poorly drained soils. Fine roots occupy predominantly surface organic layers and are intensely mycorrhizal (*Cenococceum graniforme*).

### Tolerances

tolerance to	tolerance class	comments
Low light	H	One of the most shade tolerant species.
Frost	M	Frost resistance of roots is very low, so heavy accumulations of snow are required to protect them from freezing.
Heat	L	Protection-requiring on warm and dry sites.
Water deficit	L	Protection-requiring on dry and warm sites.
Water surplus	H	Very frequent on very moist, infrequent on wet sites.
Nutrient (mainly N) deficiency	H	Frequent in acid, very poor soils.

### Damaging Agents

damaging agent	resistance class	comments
Snow	H	Heavy snowpack-tolerant.
Wind	M	Low resistance when exposed by heavy partial cuts.
risk class		
Fire	L	Not a major concern in cool and wet climatic conditions.
Insect	M	Balsam woolly adelgid, western hemlock looper, western balsam bark beetle.
Fungi	L	Not a major concern in high-elevations; laminated root rot,

Indian paint fungus.

**Associated tree species and successional role**

Pacific silver fir grows in all seral stages and in combination with one or more tree species; pure old-growth stands are not rare but not very common. It is present as a major or minor species in early, mid-, and late stages of secondary succession; a major component in old-growth stands in the wetter CWH subzones and MH zone.

associated tree species	occurrence class	major area of occurrence
Mountain hemlock	H	The most common associate in MH
Western hemlock	H	The most common associate in wetter CWH
Alaska yellow-cedar	M	Montane CWH, MH
Western redcedar	L	Wetter CWH
Engelmann spruce	L	Wetter subarctic CWH, subarctic MH
Common douglas	L	Southern montane CWH
Grand fir	L	Wetter subarctic CWH
Subalpine fir	L	Wetter subarctic CWH, subarctic MH

characteristic	interpretive comments class
Reproduction capacity	M
Seed dissemination capacity	L
Potential for natural regeneration in low light	H
Potential for natural regeneration in the open	L

**Silvical Characteristics**

Reproduction capacity	M	Cone production begins at an age of 20-30 years; low percentage of sound seed.
Seed dissemination capacity	L	Maximum seed dispersion <100 m from the parent tree.
Potential for natural regeneration in low light	H	Regenerates well on organic substrates.
Potential for natural regeneration in the open	L	A short dispersion distance.

potential initial growth rate (<5 years)	L	Very low in low light; low rate (<10 cm/yr) when planted.
Response of advance regeneration to release	H	1-2 years delay in radial growth response; 3-5 years delay in height growth response.
Self-pruning capacity in dense stands	H	Frequently grows in dense stands.
Crown spatial requirements	L	Short, narrow crowns.
Light conditions beneath closed-canopy, mature stands	L	Associated with poorly-developed understory vegetation.
Potential productivity	H	Decreases with increasing elevation; site index (50 yr @ bh) >30 m on productive submontane sites, <30 m on productive montane (?600 m) sites.
Longevity	M	Increases with increasing elevation; may approach 800 years on subalpine sites.

## Genetics and Notes

### Genetics

Despite its extensive range, Pacific silver fir is not a highly variable species. Some evidence from field studies on young trees suggests that Pacific silver fir may hybridize with grand fir or subalpine fir; however, such hybrids have not been described (aforementioned observations were made in the Fraser, Skagit, and Skaist River valleys). High-elevation provenances burst buds earlier in low elevation, common garden studies (Worrall, unpublished data).

### Notes

Pacific silver fir is a very productive species on a wide range of sites except on warm and water-deficient ones. Its productivity results from large leaf biomass, shade tolerance, low crown spatial requirements (high basal area per hectare), low taper, and thin bark. These characteristics pertain to the whole genus *Abies*. The shade tolerance of Pacific silver fir makes the species a desirable component in mixed-species stands (mainly with western hemlock, mountain hemlock, western redcedar, and yellow-cedar). Natural regeneration occurs on a variety of seedbeds and should be preferred to planting, especially on subalpine sites, considering a slow initial growth. More detailed silvics information is given by:

Crawford, P.D. and C.D. Oliver. 1990. *Abies amabilis*. Pp. 17- 25 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.

Oliver, C.D. and R.M. Kenady. (editors) 1983. *Proceedings of the biology and management of true firs in the Pacific Northwest*. Symposium Contribution No. 45, College of Forest Resources, University of Washington, Seattle Washington.