**Larix decidua** and other larches in Europe: distribution, habitat, usage and threats

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The European larch (**Larix decidua** Mill.) is a large deciduous coniferous tree that reaches 45 m, rarely over 50 m, and a lifespan of 600–800 years in optimal conditions. Like other tree species, larches in the highest elevations are more slow-growing and long-living, reaching even more than 1,000 years in age, so making this species suitable for dendrochronology studies. The trunk is monopodial, straight or curved at base in slopes, with a diameter of 1.5–2.5 m and fissured bark from reddish brown to light grey. Young plants are very flexible and are not damaged by avalanches. The needles are clustered in bunches of 20–40, flexible, 1.5–4 cm long and 1 mm wide. The colour is light green and turns yellow in autumn before falling. The larch is a monocotylean species: the male cones (5–10 mm) are sulphur yellow, with a reddish margin, hanging on the longer branches; the female cones are pink-red or dark purple when immature and turn a light grey colour with purple margins at maturity. The seed cones are about 2.5 cm long and persist in the plant up to 10 years; when old they turn to a grey colour and fall along with the small branches. The seeds are 4–5 mm long, greyish in colour.

### Distribution

European larch is discontinuously distributed in the mountains of southern, central and Eastern Europe, from south-eastern France and south-western Italy to eastern Poland and central Romania. It has a broad vertical range, forming forests between 180 m (in Poland) to 2,500 m (central Alps, south-western Alps), but reaching very high elevations where it can be found in small groups or single trees in sheltered sites. The species is divided in different geographic varieties, sometimes given the status of subspecies, and their classification is still under debate. Three main varieties are recognised: the Alpine larch (**Larix decidua** var. **decidua**), living in a compact area that includes the Alpine mountains continuing to east Austria and northern Slovenia between 250 m (Austria) and 2,500 m (western Alps) of elevation; the Carpathian larch (**Larix decidua** var. **carpopito**) with three more patchy populations, in the Sudeten Mountains, the Tatra Mountains and in Southeast Carpathians, between 650 and 1,900 m in elevation; the Poland larch (**Larix decidua** var. **polonica**) with patchy often isolated stands growing in central-south Poland between 180 and 650 m. The Carpathian and the Poland larches are often grouped together or divided in geographic subspecies by several authors. In north-western Europe (Great Britain, Scandinavia) larches have been widely cultivated since 16th century and naturalised in some cases. More recently, these plantations have been largely superseded first by the Japanese larch (**Larix kaempferi**) or Siberian larch (**Larix sibirica**) and then by larch hybrids (i.e. **Larix x marschalsii**). The European larch was also introduced in southern Canada and the north-eastern United States from the mid-19th century, and in New Zealand, where it is classified as a naturalised and invasive species.

### Habitat and Ecology

European larch is a light-demanding, pioneer species of the mountain and subalpine regions. This conifer has a large ecological amplitude. In the Alps and Tatra Mountains it grows in continental climates, with cold, dry and snowy winters. In Poland and in the Sudeten Mountains larch thrives at lower altitudes in sub-continental climates with a more temperate influence. It needs light in all stages of development, colonising disturbed soils (avalanches, landslides, livestock grazing, etc.) and forming open woodlands. In lower elevations it is a transitional tree, performing as coloniser better than other mountain tree species in poor to medium nutrient sites, while in the subalpine belt it forms more stable forests in pure or mixed stands. It grows on well-drained soils, not tolerating waterlogging, with a pH range from neutral to acidic. The larch is very cold and wind tolerant during winter (dormant period), and it has a cold hardness limit of around -30°C. Its deciduous habit confers a significant advantage by reducing desiccation damage on foliage during winter. In the Alps at higher elevations larch forms the upper tree limit, occurring in pure forests in the Italian, French and Southern Swiss Alps, while farther north this species is more often found in mixed stands with other alpine tree species, principally the Swiss stone pine (**Pinus cembra**) on poor soils and in open and disturbed areas. In the Carpathian Mountains larch occurs usually with Norway spruce and Swiss stone pine or Scots pine (**Pinus sylvestris**), and also with fir and beech. It only sporadically

Map 1: Plot distribution and simplified chorology map for Larix decidua. Frequency of Larix decidua occurrences within the field observations as reported by the National Forest Inventories. The chorology of the native spatial range for **L. decidua** is derived after Wagner et al. 41.

Map 2: High resolution distribution map estimating the relative probability of presence for the whole genus Larix. Very-high presence > 90% Mid-high presence 50% - 70% Medium presence 30% - 50% Mid-low presence 10% - 30% Low presence 5% - 10%

1, 12, 13. More recently, these plantations have been largely superseded first by the Japanese larch (**Larix kaempferi**) or Siberian larch (**Larix sibirica**) and then by larch hybrids (i.e. **Larix x marschalsii**). The European larch was also introduced in southern Canada and the north-eastern United States from the mid-19th century 1, 11, and in New Zealand, where it is classified as a naturalised and invasive species 18.
Larix decidua forms the timberline belt, typically in the High Tatra Mountains with Swiss stone pine, a vegetation similar to Alpine larch woods. In Poland it occurs in lowlands growing in small groups or even as individual trees within pine-birch and oak-birch forests. These ecotypes are less light demanding and able to grow in the shade of other tree species.

**Importance and Usage**

The larch is an economically and traditionally important timber tree in Europe, thanks to its fast-growing nature, high adaptability and its durable wood. The heartwood ranges from yellow to a medium reddish brown. The narrow sapwood is nearly white or pale yellow and is clearly demarcated from the heartwood. The wood is hard, strongly fragrant and is valued for its durability, due to its concentration in tannins (up to 10%) and resin content (about 2.6%). It is also durable under water. In fact it is largely used for carpentry and naval constructions. In the European mountain areas its wood has been traditionally used for building wooden houses, for producing furniture and fine floors and many weatherproof outdoor objects such as fences, gates, benches and tables, wooden roof shingles and water troughs for cattle. Moreover, larch is used for pulpwood and its good fibre characteristics (also for high-quality printing paper), for extracting tannin from bark and resin from wood, and also as an ornamental tree, appreciated for any foliage turning to bright yellow in autumn.

The larch turpentine, also known as Venice turpentine, is obtained by distillation of larch resin and it has been used in traditional medicine as antitussive and expectorant action for colds, and more recently as industrial solvent, for paint and wax preparation, or as a source of organic compounds (e.g. camphor, rosin, etc.). The larch essential oil is still used in aromatherapy and as perfume in some Alpine areas larch wood is still used to manufacture the Alphorn, a wooden horn, 3-4 m long, end-curved, played with its end resting on the ground, which is able to produce very low and strong notes with great effort from the musician. It was originally used in central European Alps for communications among village communities through the valleys; now it is a traditional Alpine instrument.

Leaves turn to yellow in autumn before falling: the only deciduous European conifer.

Field data in Europe (including absences) vs. Observed presences in Europe
**Other larches in Europe**

The Siberian or Russian larch (*Larix sibirica Ledeb.*) has a wide range along Eurasia, from the coasts of White Sea in northern European Russia, through Siberia up to Baikal Lake, northern Mongolia and China. It is common tree of taiga targa in western Siberia, but also occurring in mountain areas. It forms the northern tree limit and occurs in pure and, more often, mixed forests. It can be distinguished by the European larch for its green seed cones densely pubescent outside. It is adapted to cold and dry continental or sub-arctic climates. In Russia this larch is an important timber tree, logged in natural stands and also in plantations outside its natural range. Its strong and durable wood was traditionally used for Siberian house construction and for rail sleepers of the Trans-Siberian Railroad. Actually it is used for construction, railway sleepers, pel poplar and pulp industry. Hybridly included in the European larch naturally arose in the first 20th century in Scotland and Switzerland, and have been named Dunkeld larch (*Larix x morroanensis*, syn. *Larix x europaea*). They showed superior vigour in growth to other parents, so forests have been propagated and planted in many countries, principally in central Europe.

**Threats and Diseases**

While the larch heart-root system may offer a good resistance to windthrow, the species appears less resistant to rockfall.

Larches are vulnerable to *Phytophthora* and to other species of the *Phytophthora* genus, such as *Phytophthora alni*. These bark beetles are also associated as vectors of important fungal pathogens. The larch canker, caused by *Laschnellula wilkommii*, is a fungal disease, which causes cankers distorting branches and stems. It is considered the most destructive disease of the larch in Europe, particularly at lower altitudes and in inadequate, badly drained sites. Other fungal diseases are the leaf cast fungus, *Roriquea laricis*, and the velvet-tap fungus *Phellinus schweinitzii* causing butt rot. Defoliations, sometimes heavy, can cause butt rot. Defoliations, sometimes heavy, can be caused by the defoliators are rare events, but infested larch stands are vulnerable.

In Europe, the European larch is vulnerable to *Cantharidae* and other beetles, *Hylobius abietis* and the tent caterpillar *Malacosoma americanum* and the velvet tap fungus *Phellinus schweinitzii* causing butt rot. Defoliations, sometimes heavy, can be caused by the defoliators are rare events, but infested larch stands are vulnerable.

**References**

[6] L. E. Pâques, 1986. The silviculture of trees used in forest reserves and are no longer logged, leading through succession to different forest types.

**Field data in Europe (including absences)**

- **Average annual temperature (°C)**
- **Sum of precipitation of the driest month (mm)**
- **Annual precipitation (mm)**
- **Potential spring-summer solar irradiation (kWh m-2)**
- **Average temperature of the coldest month (°C)**
- **Sum of precipitation of the driest month (mm)**
- **Number of frost days**
- **Mean annual wind speed (m s-1)**
- **Autoecology diagrams based on harmonised field observations from forest plots for Larix kempferi**
- **Trees in Europe**

This is an extended summary of the chapter. The full version of this chapter (section 5 and photo reviews) will be published online at http://www.fw Nicaragua.org/wwflora/Taxonomy/Europa.html. The autoecology diagrams provide an accessible dissemination of the main topics. They are derived from the following data sources: