*Alnus viridis* in Europe: distribution, habitat, usage and threats

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*Alnus viridis* (Chax.) D.C., known as green alder, is a native deciduous shrub or small tree that grows up to 6 m, occasionally taller, distributed widely across the cooler parts of the Northern Hemisphere, from north-west America to Japan through Central Europe. It is a light-demanding, fast-growing shrub that grows well on poorer soils. The species is well known for soil enrichment through atmospheric nitrogen fixation, soil stabilisation by forming a highly fibrous root system, and for producing abundant leaf litter. The species went through a considerable expansion during the last decades as a result of land abandonment. More recently a deterioration of *Alnus viridis* is occurring in the Alps as a consequence of pest damage and fungal disease.

The green alder (*Alnus viridis*) (Chax.) D.C. is a deciduous shrub or small tree. It forms many prostrate to ascending stems, and normally reaches a height of between 0.5 to 3 m in ideal conditions it can live more than 50 years. The bark is thin and from grey to blue-grey colour. The leaves are alternate, sticky when young, from 7 to 14 cm long and from 3 to 10 cm wide. The flowers are *monocious* with separate male and female catkins on the same plant. Flowering occurs in early or later spring depending on the elevation and latitude, while seeds mature between mid-September and December. Pollination occurs mainly by wind. The seeds are small, 1-2 mm long, light brown with a narrow encircling wing. The roots form a highly fibrous root system, which make this plant very suitable for preventing soil erosion. The roots also host a symbiosis with fungi enabling fixation of atmospheric nitrogen.

**Distribution**

Green alder is distributed widely across the cooler parts of the Northern Hemisphere in form of different subspecies. The subs. *viridis* is found in Europe mainly in the Alps, Balkans and Carpathians, but also in the Pyrenees, Apennines, Dinaric mountains and Norwegian mountains. The subs. *suaveolens* is endemic in Corsica. The subs. *fruticosa* occurs in Northeast Europe, northern Asia and northwestern North America. The subs. *crispa* is present in Northeastern North America and Greenland. The subs. *sinuata* is found in Western North America and far northeastern Siberia, and the subs. *maximowiczii* is constrained in Japan. In Europe it's altitudinal range varies between 1600 m and 2300 m, although scattered individuals can be observed up to 2500 m.

**Habitat and Ecology**

Green alder requires moist soil and is a colonist of scree and shallow stony slopes. It prefers moist and open areas, including avalanche tracks, edges of wet meadows, stream-banks and other disturbed sites. It is usually found at mid to subalpine elevations. The abundant leaf litter is an important source of organic matter for soil building and nutrient cycling. This species plays an important role in primary successions, successfully colonising areas after strong disturbances such as glacial retreat or avalanches. This is because it recovers quickly from avalanches by being able to regrow from roots and broken stumps, while larger trees are killed. However, in European mountain areas, secondary succession is also important. The land abandonment occurring during the last decades at the upper tree line was the main trigger for the colonisation of green alder at the expense of subalpine grassland. This success is due to its strong ability to spread under a high disturbance regime.

**Importance and Usage**

Green alder can be used for soil enrichment, for slope and stream bank stabilisation and more generally to prevent erosion on disturbed, nutrient poor soils, although one recent study considers this species neither to protect against avalanches nor to secure slopes from erosion.

In the western Alps the rapid expansion of green alder on subalpine grasslands causes considerable environmental changes which have a mostly negative effect on the conservation of vascular plant diversity (particularly concerning conifer species) when it reaches more than 50% cover. Below this level, it appears to contribute to the increasing floristic diversity of the subalpine belt. The economic importance of this species is very low. Only in the past it was partly used as fuel wood.

**Threats and Diseases**

During the last decades, the populations of green alder in the Alps went through a considerable deterioration, mainly as a result of pest damage and fungal disease, where Cryptodiploarces oxystomoi was considered to be the primary fungus involved.

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**References**


This phenomenon usually takes place after winters with low snow amounts, which reduce the alder vitality and makes it more sensitive to parasite attacks. This could develop into a widespread problem as a consequence of climatic changes, although green alder is considered an invasive species in New Zealand, especially in South Island where it has been widely planted.