

## Alnus cordata in Europe: distribution, habitat, usage and threats

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The Italian alder (*Alnus cordata* (Loisel.) Duby) is a medium-sized pioneer tree, native of the hill and mountain areas in southern Italy. It is also present in Corsica and western Albania. This tree is a fast-growing species, able to colonise different kinds of soils in borders and open areas, so that it has been used widely for soil protection and wind breaks. In coppices this alder was traditionally used for firewood. Now it is more planted for biomass production or used as an ancillary species in high-quality timber plantation. This species is able to stimulate the growth of associated species thanks to its nitrogen-fixing root capacity, and to its nitrogen-rich and easily degradable leaves which improve the litter quality. As other alders, its wood is particularly appreciated for its durability when immersed in water. In natural ranges the Italian alder is threatened by the reduction of clear cuttings and by increasing temperatures, which can push this species into higher and more restricted areas.

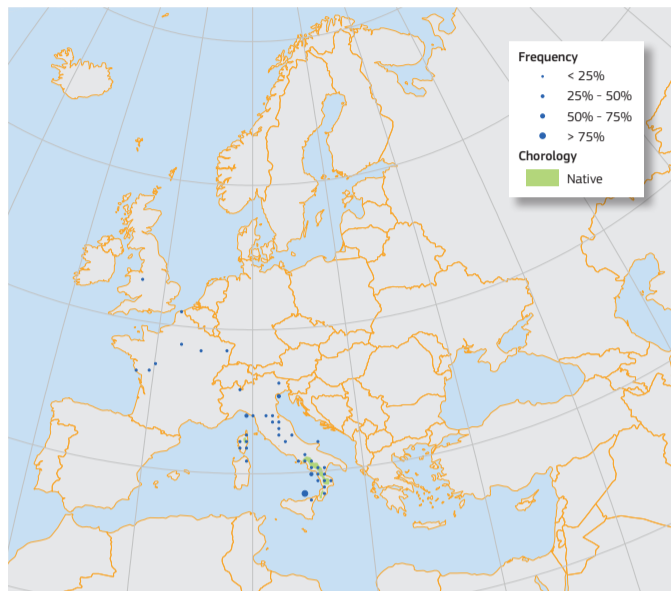
The Italian alder (*Alnus cordata* (Loisel.) Duby) is a medium-sized tree growing up to 25m tall, rarely to 30m in even-age stands, and reaching 70-80 cm in diameter<sup>1</sup>. The stem is straight; the crown is pyramidal, compact and dense. The leaves are dark bright green, lighter underneath. They are 5-12 cm long, heart-shaped, with long stalks and persist from April to December. This species is **monoecious** with male and female catkins in the same shoot, appearing when 10-12 years old. The male catkins are in groups of 3-5 and pendulous, cylindrical, 7-10 cm long, pale purplish; they turn to gold from February to April when wind pollination occurs. The female catkins are ovoid, above the male ones, erect, on a 2-5 cm stalk, and with red stigmas when mature. The catkins appear at the beginning of summer, are dormant during winter until the end of February, when flowers are fully mature and functional. The fruit is ovoid, 3 cm long, green then woody and dark brown when ripe, similar to conifer cones and called pseudo-strobili. The winged seed are small, leaving the pseudo-strobili from September-October up to a year after. The bark is brown-grey, smooth in young trees, and then blistered with fissures. The wood is a light tan to reddish brown, homogeneous, with a fine, even grain and with relatively wide annual rings resulting from the fast growth<sup>1-5</sup>.

### Distribution

This species is **endemic** to the western side of the Apennines in southern Italy and mountains in south-central of Corsica and north-west of Albania, from 800m to 1500m of elevation, frequently down to 300-400m with higher rainfall regimes<sup>1, 4-10</sup>. It is considered a relict species of the Tertiary period for its resemblance to eastern alders, in particular to the Caucasian alder (*Alnus subcordata*)<sup>1</sup>. In Italy it has been introduced in Sardinia, in the northern Apennines and up to the Southern Alps. Plantations were also established in different European countries during the late 20th century (France, Spain, Portugal, England, Netherlands, etc.) and it has been recently introduced in other continents (Chile, New Zealand)<sup>1, 11, 12</sup>.

### Habitat and Ecology

Italian alder occurs in the Mediterranean sub-mountain and mountain belt. Unlike other alders, it is less dependent on riparian habitats and is more drought tolerant, although it still tends to concentrate in water accumulation zones and needs climates with an annual precipitation of at least 1000mm per year<sup>13</sup>. It is a **heliophilous** species, but can be shade-tolerant under favourable rainfall regimes<sup>5, 11</sup>. It grows in on most kinds of soils, including degraded, but preferring calcareous. The root system promotes a symbiosis with the nitrogen-fixing bacterium *Actinomyces alni* (*Frankia alni*) improving soil fertility<sup>1, 11</sup>. In optimal habitats this alder is fast-growing and behaves as a pioneer species, forming pure stands beside Turkey oak (*Quercus cerris*) and beech (*Fagus sylvatica*) woods<sup>5, 13</sup>. It also tends to colonise open woods such as black pine (*Pinus nigra*) plantations in wetter conditions and abandoned chestnut (*Castanea sativa*) orchards<sup>5, 10, 13</sup>. It can be found as first-stage species in bare soils after wildfires or landslides<sup>13</sup>.



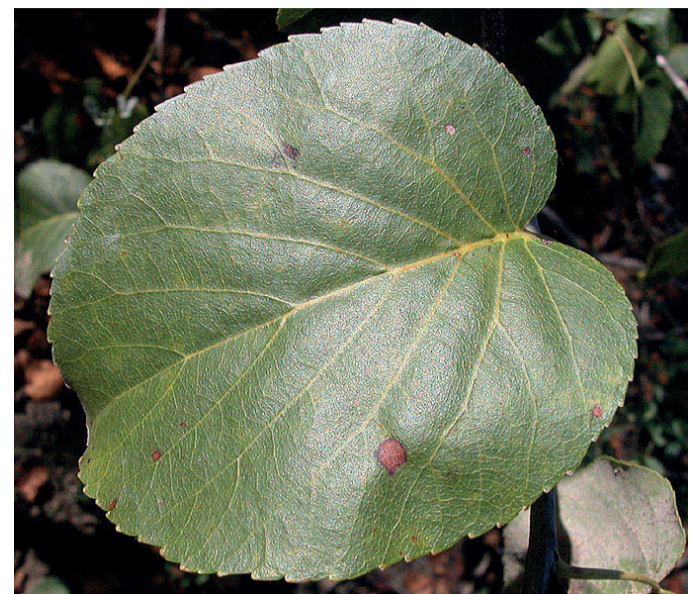
Map 1: Plot distribution and simplified chorology map for *Alnus cordata*. Frequency of *Alnus cordata* occurrences within the field observations as reported by the National Forest Inventories. The chorology of the native spatial range for *A. cordata* is derived after EUFORGEN<sup>19</sup>.

### Importance and Usage

In mountainous areas, Italian alder has been widely used for soil protection and wind breaks, as an ancillary species associated with walnut (*Juglans regia*), wild cherry (*Prunus avium*), English oak (*Quercus robur*) and other noble hardwoods for high-quality timber plantations. In fact it stimulates the growth of associated species thanks to its nitrogen-fixing root capacity, and to its nitrogen-rich and easily degradable leaves which improve the litter<sup>1, 5, 10, 11</sup>. In France it has also been used for biomass production<sup>5</sup>. Stands can be managed as coppice with rotations of 15-20 years, but also as high forest with cuts every 70-80 years<sup>13</sup>. Timber quality is similar to other alders and hybrid poplars, used traditionally for firewood and also for turning and carving as well as for carpentry, furniture, panelling, plywood and paper pulp<sup>1, 5, 11, 14</sup>. Like other alders, the wood is degraded rapidly when exposed to air or soil, but is more durable when immersed in water<sup>1, 5</sup>.

### Threats and Diseases

Despite its limited natural range, Italian alder is not considered an endangered species, because it grows over a wide range of elevations and can spread very rapidly<sup>5</sup>. Diseases are



Dark green heart-shaped leaf with toothed margins. (Copyright Franco Caldararo, www.actaplantarum.org; AP)

more frequent on plantations outside the natural area range, even if in general pathogens affecting the Italian alder are of limited importance<sup>11</sup>. Root system damage is reported by fungi *Armillaria* spp., *Phytophthora alni* and *Cryphonectria parasitica*<sup>11, 15-17</sup>. In northern Europe a new species of genus *Phytophthora* is affecting foliage and causing bark necrosis, recently also spreading in the Mediterranean region<sup>11, 18</sup>. Insect pests *Cossus cossus*, *Zeuzera pyrina* and *Saperda scalaris* affect the cortical zones of plants in precarious health conditions<sup>1, 11</sup>. In natural ranges actually the main threats endangering Italian alder are the reduction of clear cutting in mixed forests and in protected areas, heavy and unauthorised grazing in forests, and the isotherm shift in the Mediterranean regions. The possibly increase in temperature due to climate change may force alder ecosystems to shift to higher elevations in restricted areas<sup>5</sup>.



Maturing catkins during mid summer: they appear in early summer, are dormant in winter and are fully functional at the end of winter. (Copyright Franco Caldararo, www.actaplantarum.org; AP)

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Old woody fruits (pseudo-cones) which persist on the plant while new ones are maturing. (Copyright Franco Caldararo, www.actaplantarum.org; AP)



Italian alder in the Soar valley, Leicestershire, UK. (Copyright Peter Smith, www.naturespot.org.uk; AP)

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