

Alnus incana in Europe: distribution, habitat, usage and threats

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The grey alder (*Alnus incana* (L.) Moench) is a relatively small short-lived deciduous tree that can be found across the Northern Hemisphere. Normally associated with riparian areas, it is extremely frost tolerant and can be found up to the treeline in parts of northern Europe. Like the common alder (*Alnus glutinosa*), it is a fast-growing pioneer and it is also able to fix nitrogen in symbiotic root nodules, making it useful for improving soil condition and for reclaiming derelict or polluted land.

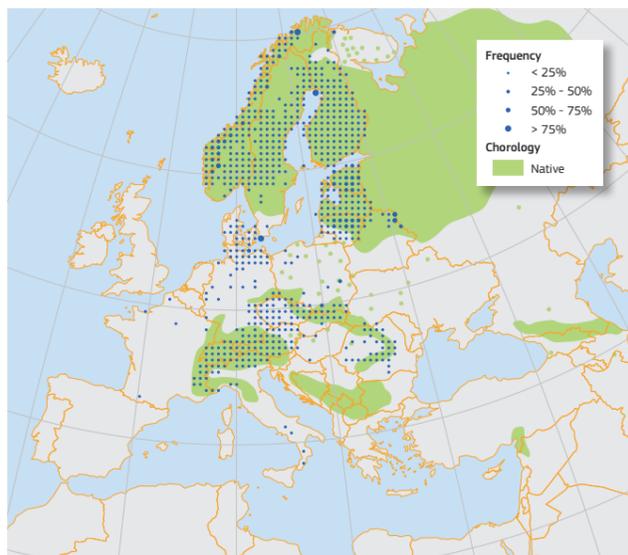
Alnus incana (L.) Moench, or grey alder, is a short lived, small to medium sized deciduous tree. It lives for around 60 years¹ and can reach a height of around 24m² but often also occurs as a multi-stemmed shrub³. It is generally smaller than the common alder (*Alnus glutinosa*)¹. The bark is smooth and deep grey, developing fissures with age^{2,4}. The leaves are oval to oval-lanceolate and deeply toothed with pointed tips, matt green above and grey and downy underneath². It is a **monoecious** and wind pollinated species⁵. It flowers from late February to May before the leaves open. The yellow male catkins are 5-10 cm long and occur in clusters of three or four, while the female catkins are woody and resemble small cones 1-2 cm long, growing in clusters of 2 to 6. Both male and female catkins are formed during the previous growing season. The seeds are small flat **obovate samaras** which ripen and disperse between September and November, usually by wind or water⁵⁻⁷.

Distribution

Grey alder is native to most of central Europe, extending westwards towards France and east into Russia, the Caucasus and western Siberia^{3,6}. It is widespread in Scandinavia and has been introduced in Britain⁶. Two subspecies (subsp. *rugosa* and *tenuifolia*) are native to northern parts of the United States and Canada and a third subspecies (subsp. *hirsuta*) is found in central and northeast Asia^{3,8}. Its European range overlaps with that of the common alder (*Alnus glutinosa*) but it extends further north. Conversely, its southern extent is less than that of the common alder and it is absent from the UK⁸ except as an introduced species.

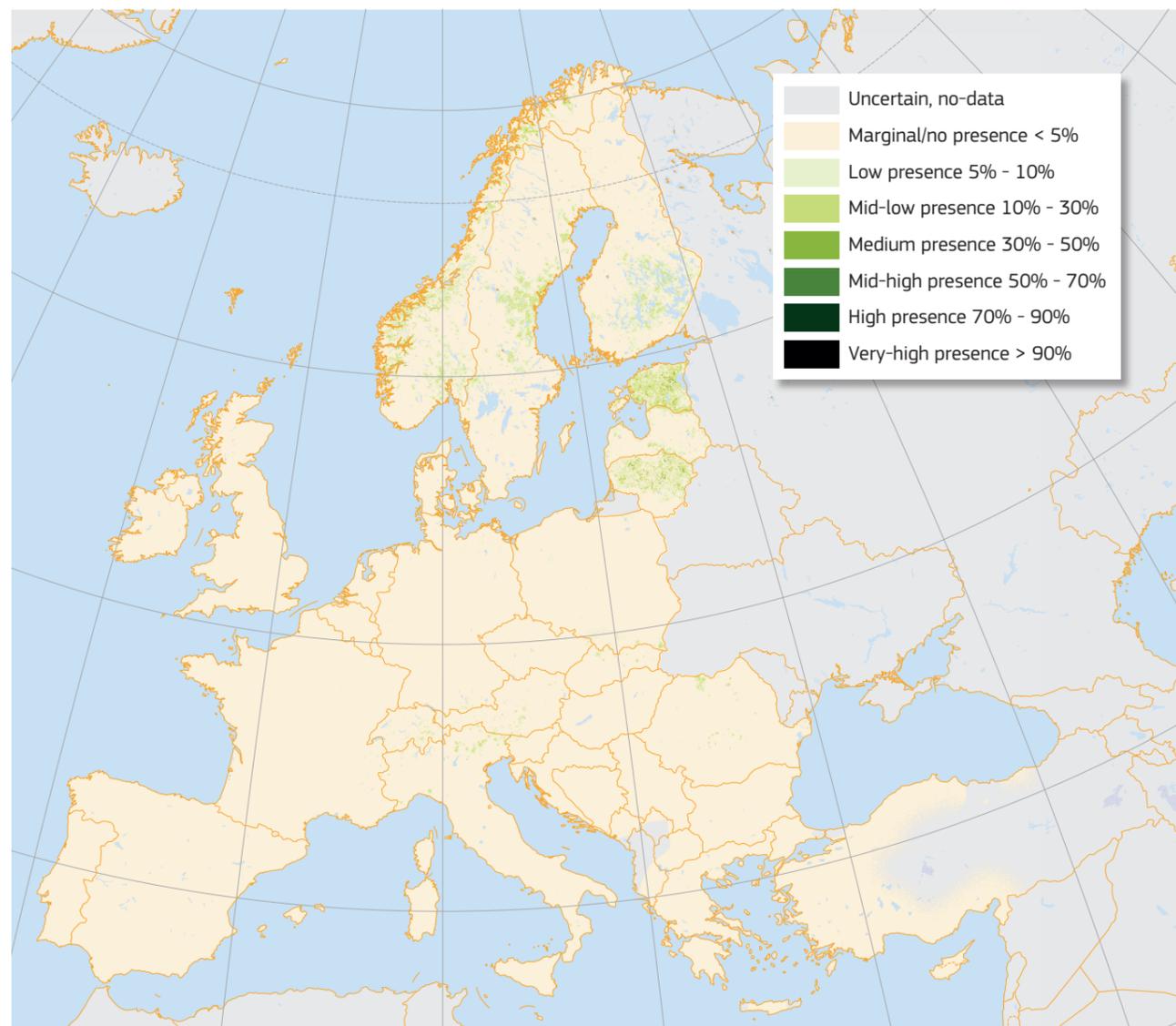
Habitat and Ecology

Grey alder can be found on stream banks, lake shores and damp meadows and also in bogs and nutrient-rich swamp communities³. It prefers **mesic** and moist conditions and it is tolerant of acid soils, able to stand pH levels of 3.5-4.0 without problems, but it is able to grow on a wide range of soil types,



Map 1: Plot distribution and simplified chorology map for *Alnus incana*. Frequency of *Alnus incana* occurrences within the field observations as reported by the National Forest Inventories. The chorology of the native spatial range for *A. incana* is derived after Meusel and Jäger²¹.

moisture and texture classes^{9,10}. In the Caucasus it can be found at elevations of up to 1800m¹¹. It replaces the common alder (*Alnus glutinosa*) at higher elevations in central Europe¹², and it is frost tolerant so it can grow up to the northern forest border in Scandinavia and European Russia, limited only in areas of permafrost¹. Able to withstand direct sunlight, it is a pioneer species, quickly colonising open disturbed areas and able to regenerate rapidly from root suckers¹; at its northern and elevational limits this is its main method of reproduction¹³. Where it overlaps with the common alder, they may occasionally form hybrids, although this is not common as the two species flower at slightly different times: the grey alder around a week earlier than the common alder^{14,15}.



Map 2: High resolution distribution map estimating the relative probability of presence.



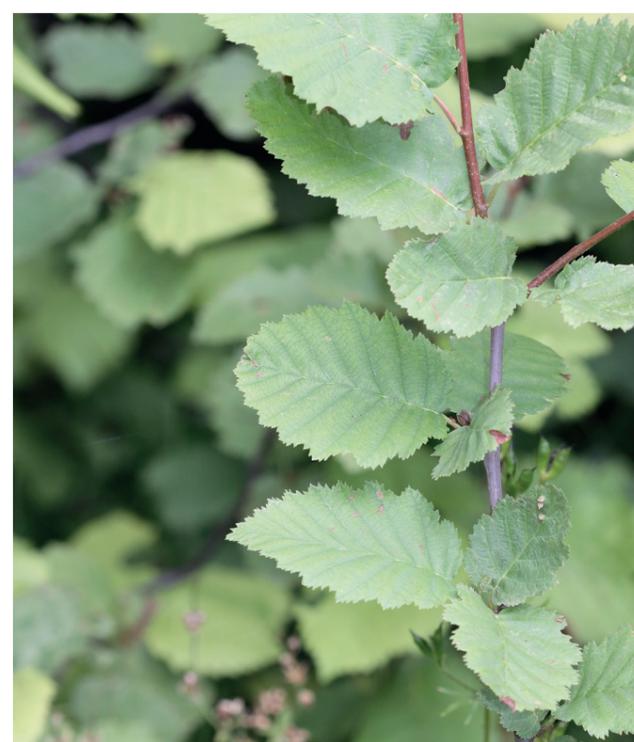
Green cones grouped in 3-4 in each stem. (Copyright Vassil, commons.wikimedia.org; PD)



Old dry cones with new spring leaves. (Copyright Free Photos, www.flickr.com; CC-BY)

Importance and Usage

The timber of the grey alder has little commercial value except as fuel wood, although it is suitable for carpentry and turning and is reported to make good charcoal for drawing¹¹. It has several advantages as a short-rotation crop. It is relatively untroubled by grazing animals and has few pests and diseases, it has modest site requirements, coppices easily and combines fast growth with the ability to improve soil fertility^{5,10,13,16,17}. It is now increasingly being considered for biomass production in several countries^{18,19}, as well as a potential suitable alternative species for reforestation of former noble hardwood areas¹⁸. It is also useful for restoration of disturbed sites including old mines, for consolidating the ground in wet woods, river-banks and on unstable slopes^{3,9}, and it is suitable for planting on polluted sites¹⁰. It has been historically used for medicinal purposes for a range of ailments from sprains and bruises to urinary problems and anaemia^{3,20}.



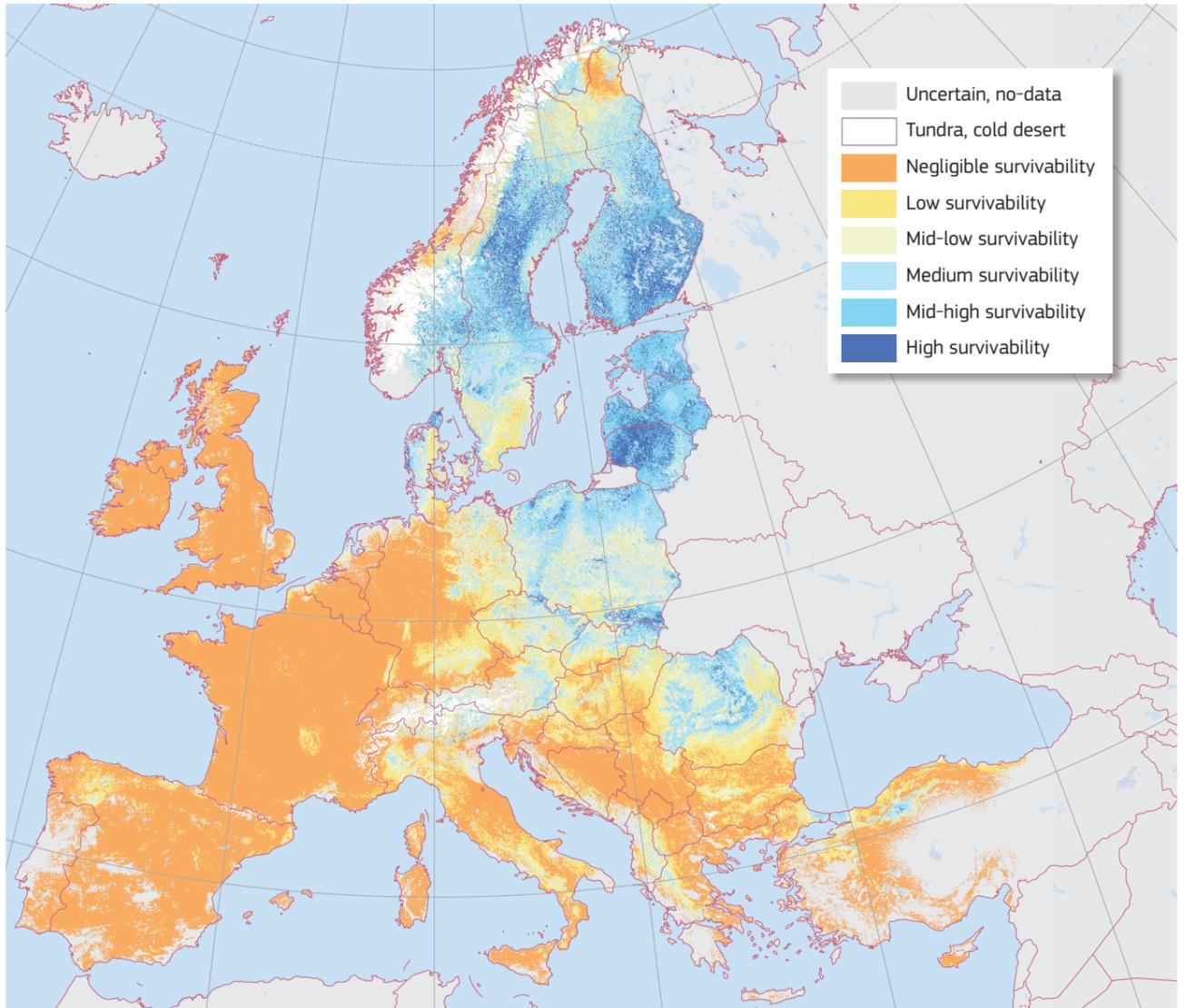
Ovate leaves with toothed margins. (Copyright Free Photos, www.flickr.com; CC-BY)



Male catkins maturing before leaf development. (Copyright Magnus Manske, commons.wikimedia.org; PD)

Threats and Diseases

Grey alder has relatively few major threats in the way of pests and diseases, although older stems are prone to decay by a number of fungus species¹⁸. It is more resistant than other European alders to the oomycete *Phytophthora alni*^{3,6}.



Map 3: High resolution map estimating the maximum habitat suitability.



Isolated grey alders in swamp areas in Rheinhessen-Pfalz (Germany). (Copyright AnRo002, commons.wikimedia.org; CC0)



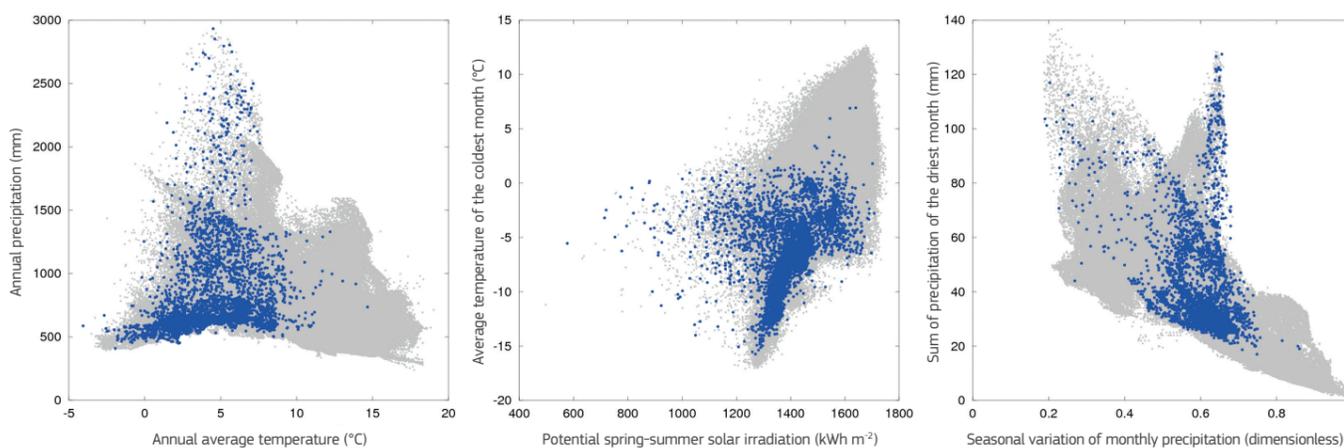
Juvenile smooth grey bark: it develops fissures with age. (Copyright AnRo002, commons.wikimedia.org; CC0)

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Field data in Europe (including absences) ● Observed presences in Europe ●

Autoecology diagrams based on harmonised field observations from forest plots.



This is an extended summary of the chapter. The full version of this chapter (revised and peer-reviewed) will be published online at <https://w3id.org/mtv/FISE-Comm/v01/e01ff87>. The purpose of this summary is to provide an accessible dissemination of the related main topics.

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Please, cite as:

Houston Durrant, T., de Rigo, D., Caudullo, G., 2016. *Alnus incana in Europe: distribution, habitat, usage and threats*. In: San-Miguel-Ayanz, J., de Rigo, D., Caudullo, G., Houston Durrant, T., Mauri, A. (Eds.), *European Atlas of Forest Tree Species*. Publ. Off. EU, Luxembourg, pp. e01ff87+

