

Alnus glutinosa

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Fagales	Betulaceae

Common name sticky alder (English), swartels (Afrikaans), common alder (English), black alder (English), alder (English), European black alder (English), European alder (English)

Synonym *Alnus alnus* , (L.) Britt.
Alnus rotundifolia , Miller
Betula alnus glutinosa , L.
Betula glutinosa , L. Lam.
Alnus barbata , C.A. Mey.

Similar species

Summary *Alnus glutinosa* is a member of the birch family (Betulaceae) and is native to Eurasia and the northern part of Africa. Members of the *Alnus* genus are commonly known as alders; *A. glutinosa* is known as black alder. It can grow up to 50 feet high. It is often cultivated for erosion control, to improve soil and as an ornamental. *A. glutinosa* is fast growing and can grow in a wide range of soils; this trait increases its invasiveness in susceptible environments. Association with species of the genus *Frankia* enable *A. glutinosa* to fix nitrogen (*Frankia* is a genus of nitrogen fixing filamentous bacteria that live in symbiosis with actinorhizal plants and form root nodules, similar to *Rhizobia*). *A. glutinosa* invades damp ecosystems near water sources, wetlands and riparian zones.



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Species Description

Alnus glutinosa is a member of the birch family (Betulaceae); members of the genus *Alnus* are commonly known as alders; *A. glutinosa* is commonly known as black alder. *A. glutinosa* is quick growing tree, with a relatively short life span - up to 160 years. Trunk may be single or multi-stemmed, with a smooth greyish-green bark that turns a speckled grayish-brown, with warty horizontal stripes and irregular, shallow fissures. Flowers appear before the emergence of leaves, in early spring; *A. glutinosa* is monoecious. Male flowers are catkins that are slender, reddish-brown and 2.5 - 3.8 cm in length, while females flowers are reddish-brown cone-like catkins around 4 mm, and cluster near branch tips in groups of 2 - 5. Leaves, when young, are gummy, and develop into leathery, dark green, oval-to-orbicular shape, with serrated edges. Leaves are blunt-tipped and are 5 - 12.5cm x 5 - 10cm in dimension. Fruit form in autumn, initially as green, cone-like woody catkins around 2cm long. These ripen to brown and contain many, small, winged nutlets. The root system is nodulated and dense, and can be fairly shallow. (Cao 2009; Claessens *et al.* 2010; Funk 2005; McVean 1953; USDA Forest Service 2006).

Lifecycle Stages

Alnus glutinosa have the potential to immediately germinate, however, stratification (six weeks) increases germination success. The optimum conditions for *A. glutinosa* seed germination occur at pH 4 and 25 °C in either light or dark. Once germinated, seedlings are susceptible to low soil oxygen status and drought. Maturity takes 3 - 30 years, depending on ecotype and environment. *A. glutinosa* is relatively short-lived, with a lifespan of up to 160 years. (Alaska Natural Heritage Program 2005; Claessens *et al.* 2010; McVean 1953)

Uses

Alnus glutinosa has various environmental uses, including erosion control, soil improvement and as an ornamental. It is also used for building materials (wood) and as a traditional medicine. (USDA-ARS 2010). Alders have been recommended for afforestation of disturbed areas throughout much of the temperate world. Establishing European alder on mined sites apparently improves their suitability for earthworm habitat. (Funk 2005). *A. glutinosa* can be used as a nurse crop for high-value species that are sensitive to nitrogen input to increase nitrification of the soil, e.g. black walnut (*Juglans nigra*) in Illinois, U.S.A (Bohanek & Groninger 2005). The nurse crop (i.e. *A. glutinosa*) can also be thinned from plantations, and sold for commercial gain. It assists with water filtration and purification in waterlogged soils (Peterjohn and Correll, 1984; Pinay and Labroue, 1986; Schnitzler and Carbiener, 1993), and the root system helps to control floods and stabilize riverbanks (Piégay *et al.*, 2003). It is also thought to be a suitable species in the restoration of functional alluvial ecosystems (Schäfer and Joosten, 2005), for example in transforming spruce and poplar plantations to more natural stands. Claessens *et al.* 2010. In the Netherlands, *A. glutinosa* protects river banks from erosion and also aids in maintaining water nutrient status and temperature (Claessens *et al.* 2010).

In its native range, *A. glutinosa* is valuable for wildlife. It can contribute to biodiversity by providing habitats for a specific flora and fauna both on the tree itself and in the flooded root system (Dussart, 1999). In addition, both the leaves and the cones are a food source for animals. Seed-eating birds rely on the tree over the winter, as the cones open gradually over winter, releasing seed (Funk 2005). *A. glutinosa* also provides food for deer, rabbits and hares is recommended as shelter for pheasants (Alaska Natural Heritage Program 2005; Funk 2005).

Habitat Description

Alnus glutinosa is able to grow in a variety of habitats and in most soils. While tolerating dry soils, it prefers moist, damp conditions, especially near water sources. It commonly grows in riparian zones, wetlands, along ponds and lakes. It also grows in forests (including early successional forests, forest edges), forest wetlands and in urban areas. Association with species of the genus *Frankia* enable *A. glutinosa* to fix nitrogen (*Frankia* is a genus of nitrogen fixing filamentous bacteria that live in symbiosis with actinorhizal plants and form root nodules, similar to *Rhizobia*). Its ability to fix nitrogen means it can grow on poor soils with low nutrient status. *A. glutinosa* can also grow on both acidic and basic soils, with a pH range of 4.2 - 7.5. Mature trees are frost hardy (to -54 °C), but 130 frost-free days are required for successful reproduction and growth. It is not very tolerant of shade and prefers full sunlight. (Claessens *et al.* 2010; Funk 2005; McVean 1953; USDA Forest Service 2006).

Reproduction

While *Alnus glutinosa* can reproduce sexually and vegetatively, reproduction occurs predominately by seed (Alaska Natural Heritage Program 2005). Once alders mature - 3 - 30 years (depending on ecotype and environment) they produce prolific amounts of seed every three or four years, with an average of 240,000 per tree (Claessens *et al.* 2010). Cut stump are known to resprout, and fallen green branches have been observed to take root in soft, swampy wetland areas (McVean 1953). Additionally, *A. glutinosa* can be readily propagated by tissue culture (Tremblay *et al.* 1984, in Funk 2005). Root suckers are rare (Alaska Natural Heritage Program 2005).

General Impacts

Alnus glutinosa can form dense monospecific stands fairly quickly (< 10 years) that exclude other species. In the wetlands, it creates a higher degree of shade that can inhibit the growth of some native species. The dense root network can increase the accumulation of sediments and alter water flow.

A. glutinosa can alter soil nutrient status. A symbiosis exists between *A. glutinosa* and *Frankia* sp. (*Frankia* is a genus of nitrogen fixing filamentous bacteria that live in symbiosis with actinorhizal plants and form root nodules, similar to *Rhizobia*); allowing *A. glutinosa* to fix atmospheric nitrogen (Bond *et al.* 1954). The ability to provide its own source of nitrogen enables *A. glutinosa* to grow on a wide range of soils and increases its invasiveness. Nodulation can occur in most of these soil conditions, but occurs best at pH 5.5 – 7.2 (Griffiths & McCormick 1984). This nitrification process increases the nitrogen status of the soil, which is also contributed to by leaf fall and decomposition (Claessens *et al.* 2010). The availability of phosphorous in the soil is also increased (Giardina *et al.* 1995).

A. glutinosa readily hybridises with other alder species, and known hybrids include *A. glutinosa* x *A. rubra*, *A. cordata* x *A. glutinosa* and *A. glutinosa* x *A. orientalis* (Funk 2005).

While several diseases and pests associated *A. glutinosa* exist, one of the most notable is the fungus *Phytophthora alni*, which has been spreading through alder populations in Europe since the 1990's (Claessens *et al.* 2010; Funk 2005). Trees present on river banks and near water are the most susceptible, as the presence of free water is necessary for the development and transport of *P. alni* (Chandelier *et al.*, 2006; Gibbs *et al.* 1999). Symptoms of the disease include dead roots, dead bark, small yellow-ish leaves and tar-coloured spots on trunk bases, and over the following years, branches die and death of the tree can occur (Claessens *et al.* 2010).

Management Info

Alnus glutinosa can be successfully controlled by a combination of physical and chemical means. Trees are often felled and the stumps treated with herbicides. However, follow-up procedures are necessary as *A. glutinosa* is known to resprout. *A. glutinosa* is not affected by low rates of the pre-emergence herbicide pendimethalin but is damaged by higher concentrations (2.0 kg a.i. ha⁻¹) and above), as well as by napropamide. Other effective herbicides include glyphosate (stump treatment) and triclopyr triethylamine (foliar application). (Champion *et al.* 2008; Funk 2005; Kelly & Southwood 2006a,b; Willoughby *et al.* 2007).

Pathway

Erosion control

Principal source:

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ALIEN RANGE

[4] AUSTRALIA

[1] CHILE

[1] SOUTH AFRICA

[1] CANADA

[7] NEW ZEALAND

[7] UNITED STATES

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