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, wetalnds and riparian zones.

view this species on IUCN Red List

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 tipes 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 is 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 fot 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:

Compiler: IUCN SSC Invasive Species Specialist Group (ISSG) with support from the Auckland Regional Council (ARC)

Review:

Pubblication date: 2010-08-27

ALIEN RANGE

[4] AUSTRALIA
[1] CHILE
[1] SOUTH AFRICA
[1] CANADA
[7] NEW ZEALAND
[7] UNITED STATES

BIBLIOGRAPHY
59 references found for **Alnus glutinosa**

Managment information
ACT Parks, Conservation and Lands (ACT PCL) 2009. Weeds & invertebrate pests management guidelines 2009-10.
Summary: Available from: http://www.tams.act.gov.au [Accessed 20 August 2010]

Chambers, F. M. and L. Elliott, 1989. Spread and Expansion of *Alnus* Mill. In the British Isles: Timing, Agencies and Possible Vectors. Journal of Biogeography, Vol. 16, No. 6 (Nov., 1989), pp. 541-550
Champion, P. D.; James, T. K.; Carney, E. C., 2008. Evaluation of Triclopyr Trithylamine for the Control of Wetland Weeds. New Zealand Plant Protection. 61 2008. 374-377.
Christchurch City Council (CCC) 2010. Canterbury weed guide - Alder.
Summary: Available from: http://ccc.govt.nz [Accessed 19 August 2010]
Eckel, P. M., 2003. Two problems in Betulaceae along the Niagara River: *Alnus glutinosa* and *Betula cordifolia*. Reprinted from Clintonia 18(4): 3-4. 2003.
Summary: Available from: http://www.mobot.org/plantscience/ResBot/Repr/Clintonia_Alnus_2003.pdf [Accessed 9 August 2010]
Funk D.T. 2005. *Alnus glutinosa* (L.) Gaertn. European Alder. USDA Forest Service, Northeastern Area, State and Private Forestry.
Summary: Available from: http://www.na.fs.fed.us/ [Accessed 19 August 2010]
Heenan, P. B.; de Lange, P. J.; Rance, B. D.; Sykes, W. R.; Meurk, C. D.; Korver, M. A., 2009. Additional records of indigenous and naturalised plants with observations on the distribution of *Gunnera tinctoria*, on Stewart Island, New Zealand. New Zealand Journal of Botany. 47(1). MAR 2009. 1-7.
Hiebert, Ronald D. & James Stubbendieck, 1993. Handbook for Ranking Exotic Plants for Management and Control. Natural Resources Report NPS/NRMWRO/NRR-93/08 July 1993 U. S. Department of the Interior National Park Service Natural Resources Publication Office Denver,
Summary: Available from: http://especes-envahissantes-outremer.fr/pdf/methode_hierarchisation_hiebert.pdf [Accessed 9 August 2010]
Higman & Campbell 2009. Meeting the challenge of invasive plants: A framework for action
Kelly A. & Southwood R.R., 2006. Restoration of the littoral margin by removing trees around Hoveton Great Broad, Norfolk, England. Conservation Evidence (2006b) 3, 75-76
Summary: Available from: http://www.conservationevidence.com/Attachments/PDF436.pdf [Accessed 9 August 2010]
Kelly A. & Southwood R.R., 2006. Restoration of the littoral margin by removing trees from the lake edge at Cockshoot Broad, Norfolk, England. Conservation Evidence (2006) 3, 71-72
Summary: Available from: http://www.conservationevidence.com/Attachments/PDF434.pdf [Accessed 9 August 2010]
Morse, L.E., J.M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Non-Native Plants for Their Impact on Biodiversity. Version 1. NatureServe, Arlington, Virginia, USA.
Summary: Available from: http://www.natureserve.org/getData/plantData.jsp [Accessed 9 August 2010]
NatureServe, 2005. Invasive Species Impact Ranks (I-Ranks) developed by NatureServe using An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity. (Morse, *et. al.*, NatureServe, 2004).
Summary: Available from: http://www.natureserve.org/getData/plantData.jsp [Accessed 9 August 2010]
Northland Regional Council (NRC) undated. Trees for the land.
Summary: Available from: http://www.nrc.govt.nz [Accessed 19 August 2010]
Ontario Invasive Plants Working Group (OIPWG) 2000. Sustaining Biodiversity. A Strategic Plan for Managing Invasive Plants in Southern Ontario. Prepared by Donna Havinga and the Ontario Invasive Plants Working Group
Summary: Available from: http://www.serontario.org/pdfs/sustain.pdf [Accessed 9 August 2010]
Pheloung P. 2004. Weed Risk Assessment. Application to measure weed potential.
Summary: Available from: http://www.dpiw.tas.gov.au [Accessed 20 August 2010]
Robson B. & Allcorn, R.I., 2006. Rush cutting to create nesting patches for lapwings *Vanellus vanellus* and other waders, Lower Lough Erne RSPB reserve, County Fermanagh, Northern Ireland. Conservation Evidence (2006) 3, 81-83
Summary: Available from: http://www.conservationevidence.com/Attachments/PDF456.pdf [Accessed 9 August 2010]
South Australia Water (SA Water) undated. Tree Planting Guide.
Summary: Available from: http://www.sawater.sa.gov.au [Accessed 20 August 2010]
Tennessee Exotic Pest Plant Council, 2007. Tennessee s native plant alternatives to exotic invasives.
Summary: Available from: http://www.tneppc.org [Accessed 18 August 2010]
Territory & Municipal Services Australian Capital Territories (TAMS ACT) 2007. Are your garden plants going bush?
Summary: Available from: http://www.tams.act.gov.au [Accessed 20 August 2010]
USDA Forest Service 2006. Weed of the week: European Alder.
Summary: Available from: http://www.na.fs.fed.us [Accessed 18 August 2010]
Waitakere City Council (WCC) 2010. Invasive or environmental weeds of Waitakere.
Summary: Available from: http://www.waitakere.govt.nz/cnlser/pw/plantweed/pdf/weedlist-env-inv.pdf [Accessed July 15 2010]
Willoughby, I.; Dixon, F. L.; Clay, D. V.; Jinks, R. L., 2007. Tolerance of broadleaved tree and shrub seedlings to preemergence herbicides. New Forests. 34(1). JUL 2007. 1-12.
Wilson J., 2005. Nest box provision to provide additional nesting sites for bearded tits *Panurus biarmicus* at Leighton Moss RSPB Reserve, Lancashire, England. Conservation Evidence (2005) 2, 30-32
Summary: Available from: http://www.conservationevidence.com/Attachments/PDF125.pdf [Accessed 9 August 2010]
Wisconsin Department of Natural Resources (WDNR) 2009. Wildlife and Your Land: So, What Should I Plant? Trees, Shrubs and Vines with Wildlife Values.
Summary: Available from: http://dnr.wi.gov/org [Accessed 18 August 2010]

General information

Abbott B. 2008. Submission on the Wellington Regional Pest Management Strategy - 2002-2022. Five-yearly Review - 2007.
Summary: Available from: http://www.doc.govt.nz [Accessed 19 August 2010]
Adam S Davis, Roger D Cousens, Jason Hill, Richard N Mack, Daniel Simberloff, and S Raghu. 2010. Screening bioenergy feedstock crops to mitigate invasion risk. Frontiers in Ecology and the Environment (e-View)
Alaska Natural Heritage Program 2005. European alder *Alnus glutinosa* (L.) Gaerth.
Summary: Available from: http://akweeds.uaa.alaska.edu/pdfs/potential_species/bios/Species_bios_ALGL.pdf [Accessed 9 August 2010]

Bohanek, James R. and John W. Groninger, 2005. Productivity of European black alder (*Alnus glutinosa*) interplanted with black walnut (*Juglans nigra*) in illinois, U.S.A.. Agroforestry Systems (2005) 64: 99�106
Bond G., Fletcher W.W., Ferguson T.P. 1954. The development and function of the root nodules of *Alnus*, *Myrica* and *Hippopha*. Plant and Soil 5: 309-323.
Browne K., Campbell D., Bown E. 2005. Ecohydrological characterisation of Opuatia Wetland and recommendations for future management.
Summary: Available from: http://www.ew.govt.nz [Accessed 19 August 2010]
Cao L. 2010. *Alnus glutinosa*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL.
Summary: Available from: http://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=2696 [Accessed 9 August 2010]
Castro S.A., Figueroa J.A., Mu�oz-Schick M., Jaksic F.M. 2005. Minimum residence time, biogeographical origin, and life cycle as determinants of the geographical extent of naturalized plants in continental Chile. Diversity and Distributions 11: 183�191.
Chandelier A., Abras S., Laurent F., Debruxelles N., Cavelier M. 2006. Effect of temperature and bacteria on sporulation of *Phytophthora alni* in river water.Communications in Agricultural and Applied Biological Sciences 71: 873�880.
Christensen B.R. Sutton M.E. 2007. Ecology, management and research on Mokoia Island, Lake Rotorua, New Zealand. DOC Research & Development Series. Science & Technical Publishing, Wellington, New Zealand.
Summary: Available from: http://www.doc.govt.nz [Accessed 19 August 2010]
Claessens, Hugues; Oosterbaan, Anne; Savill, Peter; Rondeux, Jacques, 2010. A review of the characteristics of black alder (*Alnus glutinosa* (L.) Gaertn.) and their implications for silvicultural practices. Forestry (Oxford). 83(2). APR 2010. 163-175.
Clarkson B.R., Sorrell B.K., Reeves P.N., Champion P.D., Partridge T.R., Clarkson B.D. 2003. Handbook for Monitoring Wetland Condition. Coordinated Monitoring of New Zealand Wetlands. A Ministry for the Environment Sustainable Management Fund Project.
Summary: Available from: www.mfe.govt.n [Accessed 20 August 2010]
Csurhes S., Edwards R. 1998. Potential environmental weeds in Australia. Queensland Department of Natural Resources.
Summary: Available from: http://www.weeds.gov.au [Accessed 20 August 2010]
Dukes, Jeffrey S., 2000. Will the increasing atmospheric CO2 concentration affect the success of invasive species? Chapter 5 in: Invasive Species in a Changing World. H. A. Mooney and R. J. Hobbs, eds. Island Press, Washington, 2000.
Summary: Available from: http://globalecology.stanford.edu/DGE/Dukes/Dukes_CO2_Invasion.pdf [Accessed 9 August 2010]
Environment Canada/Canadian Wildlife Service 1999. Invasive Plants of Natural Habitats in Canada: An Integrated Review of Wetland and Upland Species and Legislation Governing their Control.
Summary: Available from: http://www.ec.gc.ca [Accessed 18 August 2010]
Giardina C., Huffmans S., Binkley D., Caldwell B. 1995. Alders increase soil phosphorus availability in a Douglas-fir plantation. Canadian Journal of Forest Research 25: 1652�1657.
Gibbs J.N., Lipscombe M.A., Peace A.J. 1999. The impact of *Phytophthora* disease on riparian populations of common alder (*Alnus glutinosa*) in southern Britain. European Journal of Forest Pathology 29: 39-50.
Global Compendium of Weeds (GCW) 2001. *Alnus glutinosa* (L.) Gaertn.
Summary: Available from: http://hear.org/gcw/ [Accessed 18 August 2010]
Griffiths A., McCormick L. 1984. Effects of soil acidity on nodulation of *Alnus glutinosa* and viability of *Frankia*. Plant and Soil 79: 429-434.
Hawke s Bay Regional Council (HBRC) 2005. Sawfly - Attachment III.
Summary: Available from: http://www.hbrc.govt.nz [Accessed 19 August 2010]
Henderson, L., 2007. Invasive, naturalized and casual alien plants in southern Africa: a summary based on the Southern African Plant Invaders Atlas (SAPIA). Bothalia 37,2: 215�248 (2007)
Summary: Available from: http://www.dwaf.gov.za/wfw/docs/Henderson,2007.pdf [Accessed 16 November 2009]
Hoffman R., Kearns K. 1997. Wisconsin Manual of Control Recommendations for Ecologically Invasive Plants. Wisconsin Department of Natural Resources.
Summary: Available from: http://dnr.wi.gov/org [Accessed 18 August 2010]
Hosking J.R., Conn B.J., Lepschi B.J. 2003. Plant species first recognised as naturalised for New South Wales over the period 2000�2001. Cunninghamia 8: 175�187.
Howell C. 2008. Consolidated list of environmental weeds in New Zealand. DOC Research & Development Series 292. New Zealand Department of Conservation.
Summary: Available from: http://www.doc.govt.nz [Accessed 20 August 2010]
Integrated Taxonomic Information System (ITIS), 2010. *Alnus glutinosa* (L.) Gaertn.
Summary: Available from: http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=19470 [Accessed 9 August 2010]
Johnson & Rogers 2003. Ephemeral wetlands and their turfs in New Zealand. Science for Conservation 230. New Zealand Department of Conservation.
Summary: Available from: http://www.doc.govt.nz [Accessed 20 August 2010]
Kodela P.G. 2005. *Alnus glutinosa* Gaertn. New South Wales Flora Online.
Summary: Available from: http://plantnet.rbgsyd.nsw.gov.au [Accessed 18 August 2010]
McVean, D. N., 1953. *Alnus glutinosa* (L.) Gaertn. Journal of Ecology, Vol. 41, No. 2 (Aug., 1953), pp. 447-466
Ricciardi A. 2006. Patterns of invasion in the Laurentian Great Lakes in relation to changes in vector activity. Diversity and Distributions 12: 425�433.
Tennessee Exotic Pest Plant Council 1996. Vegetation management manual.
Summary: Available from: http://www.tneppc.org [Accessed 18 August 2010]
USDA-ARS, 2010. Taxon: *Alnus glutinosa* (L.) Gaertn. National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland.
Summary: Available from: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?2448 [Accessed 9 August 2010]
USDA-NRCS, 2010. *Alnus glutinosa* (L.) Gaertn. European alder. The PLANTS Database (http://plants.usda.gov, 9 August 2010). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
Summary: Available from: http://plants.usda.gov/java/profile?symbol=ALGL2 [Accessed 9 August 2010]

Waipa District Council (Waipa DC) 2007. A plan for the management of peat lakes and associated reserves administered by the Waipa District Council.
Summary: Available from: http://www.waipadc.govt.nz [Accessed 19 August 2010]
World Wildlife Fund for Nature (WWF), 2006. National list of naturalised invasive and potentially invasive garden plants.
Summary: Available from: http://wwf.org.au/publications/ListInvasivePlants/ [Accessed 9 August 2010]