

## **Alnus nepalensis**

alder

D. Don

Betulaceae

### LOCAL NAMES

Burmese (maibau); Chinese (meng-zi-qi-mu,han-dong-gua); English (Nepalese alder,Nepal alder,Indian alder,alder); Hindi (piak); Nepali (uttis,utis); Trade name (alder)

### BOTANIC DESCRIPTION

*Alnus nepalensis* is a deciduous or semi-deciduous tree with a straight trunk, up to 30 m in height and 60 cm (rarely to 2 m) in diameter; twigs ribbed, glabrescent; bark dark grey, often with yellowish patches and slightly raised lenticels.

Leaves alternate, elliptical, ovate to oblong, 6-21 cm long, 4-10 cm wide, entire, denticulate or sinuate, shallowly crenate to subentire, rounded or cuneate at the base, with 12-16 pairs of lateral veins, top surface dull or shiny dark green, under surface pale with dotlike, yellow-brown scales; petiole strong, 1.5-2 cm long.

Narrowly cylindrical clusters of tiny flowers or catkins occur in autumn as males or females, separate on the same or different twigs; male catkins grouped in a terminal panicle up to 16 cm long; catkins yellow, 10-16 (25 max.) cm long, hanging in clusters at the end of twigs; female inflorescence grouped in a short, axillary raceme of 3-8 catkins; catkin 1-1.7 x 0.6-0.7 cm, erect, woody, occurring on branching side twigs; peduncle 3-6 mm long.

Fruits, which resemble the cones of the pine family, are dark brown, upright on short stalks, elliptical, composed of many spreading, hardwood scales; seeds light brown, circular and flat with 2 broad, membranous wings, more than 2 mm across.

'Alnus' is the classical Latin name for alder.

### BIOLOGY

The catkins are produced in September and October in India and China, and from September to November in Nepal. The new cones appear between December and March (Nepal) and the seeds ripen in December in Yunnan (China).



Natural stand of *A. nepalensis*, middle hills at 1 200 m near Pakribhas, eastern Nepal. (Colin E. Hughes)

**ECOLOGY**

*A. nepalensis* is a pioneer species; it grows well in full light but will also tolerate shade. At lower altitudes it occurs in moist sites, such as near rivers, but it will colonize rocky sites exposed by landslides or land abandoned after cultivation. It occurs naturally in both pure and mixed stands and is common in streambeds, near streams, in ravines and in drier forests. It is found naturally in moist, cool, subtropical monsoon climates with a dry season of 4-8 months; it also grows in humid, cool or subtropical mountain areas in tropical zones with high rainfall.

**BIOPHYSICAL LIMITS**

Altitude: 500-3000 m, Mean annual temperature: 13-26 deg. C, Mean annual rainfall: 500-2500 mm

Soil type: Prefers moist and well-drained soils, including loam and loamy sand gravel, sand and clay. It does not require high soil fertility but prefers permeable soils. Grows well on soils with a high water content but not on waterlogged soils. It does poorly on dry, exposed ridgetops.

**DOCUMENTED SPECIES DISTRIBUTION**

Native: Bhutan, Cambodia, China, India, Japan, Laos, Myanmar, Nepal, Thailand, Vietnam

Exotic: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Costa Rica, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Indonesia, Kenya, Lesotho, Liberia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mozambique, Namibia, Niger, Philippines, Rwanda, Sao Tome et Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, US, Zambia, Zimbabwe



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

---

**PRODUCTS**

**Fodder:** The foliage is of low to moderate value as fodder for sheep and goats; it is not suitable for cattle.

**Fuel:** Wood has a low calorific value of 18230 kJ/kg. It dries easily, burns well and is an important source of firewood and charcoal.

**Fibre:** In the Philippines, kraft pulping of wood of *Alnus* spp. gives a pulp yield of 47.6%, and bleaching improves the brightness to 76%. It is suitable for the manufacture of high-quality paper.

**Timber:** Although not among the best construction timbers, *A. nepalensis* has an even grain, seasons fairly well, and is easy to saw and finish by hand or machine. The wood preserves fairly well but is perishable if subjected to alternately wet and dry conditions. It is also subject to discolouration by oxidation and fungal sap stain. It is suitable for boxes, splints and matches, poles, general carpentry, furniture parts, turnery and newsprint.

**Tannin or dyestuff:** The bark of *A. nepalensis* has been used occasionally for tanning and dyeing.

**SERVICES**

**Erosion control:** A well-known species that gives some stability to slopes that tend to slip and erode. Its seeds have been broadcast to stabilize landslides area.

**Shade or shelter:** *A. nepalensis* is interplanted with annual crops and used as a shade tree for greater *Cinchona officinalis* and *Eletaria subulatum*.

**Reclamation:** Effectively used to reforest abandoned taungya areas because it grows as a pioneer in degraded habitats with low fertility soils. It is also planted to improve the stability of slopes liable to erosion and landslides, and for mine reclamation.

**Nitrogen fixing:** *A. nepalensis* forms a symbiosis with nitrogen-fixing actinomycetes of the genus *Frankia* and is therefore able to improve degraded lands.

**Soil improver:** Considerable quantities of nutrients are recycled through the litter of *Alnus* spp. Leaf and twig litter of *A. nepalensis* may produce 3-6 t/ha litter annually, containing N 3.4-3.7 g, P 0.08-0.1 g, K 0.6-0.7 g and Ca 0.2 g per 100 g dry matter.

**Intercropping:** On terraced slopes, the species is commonly pollarded for poles and interplanted with crops like maize, barley, chili and pumpkin. The cultivation of large cardamom (*Amomum subulatum*) or *Cinchona* spp. trees in combination with *A. nepalensis* is a common practice in the central Himalayas.

**TREE MANAGEMENT**

A spacing of 2.5 x 2.5 m is commonly used for plantations, although closer spacing is desirable for a fuelwood crop. *A. nepalensis* is pollarded for posts. On good sites, poles and fuelwood can be harvested after 5 years. Small-diameter timber can be harvested in less than 10 years. Longer rotations are needed for ordinary saw timber. *A. nepalensis* coppices after cutting, but successful regrowth seems to depend on seasonal and locality variations, with wet season felling and moist localities being best. Trees develop an extensive lateral root system and are fast growing. A mean annual diameter increment of 2 cm is common, and annual increments of 2.7 m in height and 2.9 cm in diameter have been recorded in Nepal. *Alnus* species are very susceptible to wind damage.

**GERMPLASM MANAGEMENT**

*A. nepalensis* seed is collected between November and March, depending on locality, when the cone-like fruits turn yellowish-brown and begin to open, but before the seeds have been dispersed by the wind. The seeds display orthodox storage behaviour. Viability is maintained for 15 months in hermetic storage at 4-5 deg. C with 5-10% mc. There are (min. 1.6) 2.3-3.5 million seeds/kg.

**PESTS AND DISEASES**

*A. nepalensis* is highly vulnerable to attack by defoliators *Anomala* spp. and *Oreina* spp. The stem borers *Batocera* spp. and possibly *Zeuzera* spp. may also become pests. An aphid, *Eutrichosiphum alnifoliae*, is a pest of economic importance, and ants usually attack young plants.

## **Alnus nepalensis**

alder

D. Don

Betulaceae

---

### **FURTHER READNG**

Faridah Hanum I, van der Maesen LJG (eds.). 1997. Plant Resources of South-East Asia No 11. Auxillary Plants. Backhuys Publishers, Leiden, the Netherlands.

Hong TD, Linington S, Ellis RH. 1996. Seed storage behaviour: a compendium. Handbooks for Genebanks: No. 4. IPGRI.

Kayastha BP. 1985. Silvics of the trees of Nepal. Community Forest Development Project, Kathmandu.

Little EL. 1983. Common fuelwood crops. Communi-Tech Association, Morgantown, West Virginia.

MacDicken GK. 1994. Selection and management of nitrogen fixing trees. Winrock International, and Bangkok: FAO.

National Academy of Sciences. 1980. Firewood crops. National Academy Press. Washington D.C.

NFTA. 1990. *Alnus nepalensis*: a multipurpose tree for the tropical highlands. NFTA 90-06. Waimanalo.

### **SUGGESTED CITATION**

Orwa C, A Mutua, Kindt R , Jamnadass R, S Anthony. 2009 Agroforestry Database:a tree reference and selection guide version 4.0 (<http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>)