

BLACK COTTONWOOD

Populus balsamifera ssp.
trichocarpa (Torr. & Gray ex
Hook.) Brayshaw
plant symbol = POBAT

Contributed By: USDA, NRCS, National Plant Data Center & the Biota of North America Program



Brother Alfred Brousseau
© St. Mary's College
@ CalPhotos

Alternate names

Common black cottonwood, balsam cottonwood, western balsam poplar, California poplar; *Populus trichocarpa* Torr. & Gray

Uses

Black cottonwood is a commercially valuable tree. Primary products include particle board, plywood, veneer, and lumber. The wood is light colored and light in weight; it is diffuse-porous (indistinct growth rings), with a fine, even texture. The light weight, good nailing characteristics, and light color of the lumber are ideal for manufacture of pallets, boxes, and crates. It also is used in concealed parts of furniture. The fibers are short and fine, making the wood useful in production of pulp for tissues and high-grade book and magazine paper.

Black cottonwood provides food and cover for a variety of wildlife species, including deer, elk, and beaver. Large birds use the crowns for nesting sites and various animals rely on the trunk cavities, which commonly result from heart rot in most stands nearing maturity. The rotten trunks of black cottonwood provide an important wildlife habitat otherwise scarce, especially of the Cascades.

Disinfectant properties of resin from buds were discovered by Native Americans, who used the resin to treat sore throats, coughs, lung pain, and rheumatism. It is still used in some modern natural health ointments. Soap was produced from the inner bark. The wood was used to make friction fire sets.

Black cottonwood is a very fast-growing and potentially large tree, easy to establish, and useful for shade and ornament. Black cottonwood also has been planted as windbreaks and shelterbelts and it is commonly used for screening along motorways in Europe. The aggressive root systems of black cottonwood are effective soil stabilizers and make the species useful in restoration of riparian areas, where it also provides protection for the aquatic environment, especially in helping to maintain low water temperatures through shading. The high nitrate uptake and extensive rooting of these trees make them useful for buffer or "filter" planting along streams in agricultural areas.

Poplar hybrids, particularly *Populus trichocarpa* x *P. deltoides*, are currently the subject of much research into their genetics and physiology. These are extremely fast-growing and biomass-productive when grown as short-rotation coppice or single stems. On good sites, hybrid poplars grow faster than any other northern temperate region tree and hybrids are usually more widely adaptable than the parents. They are easily propagated from stem cuttings, but because of quick re-sprouting, replanting after harvesting may be unnecessary, especially for short harvest cycles. These trees have great potential for conservation and ornamental plantings, paper, and lumber and plywood. The wood is similar to that of native black cottonwood, and branches and tops left from pulp harvests can be converted to pelletized fuel for use in power stations and home heaters.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as state noxious status and wetland indicator values.

Description

General: Willow Family (Salicaceae). These are native trees up to 30-60 m tall, usually with a straight, branch-free trunk for more than half its length, forming a broad, open crown in open sites; bark gray to gray-brown on mature trees, deeply furrowed into flat ridges on older portions. The leaves are deciduous, simple, alternate, ovate-lanceolate to deltate but variable in size and shape on same tree,

rounded or cordate at base, 7-12 cm long, 3.5-7.5 cm wide, hairless or nearly so, the margins finely toothed, dark green above and slightly paler beneath, commonly with whitish or brownish resin blotches, turning yellow in autumn, the petioles round, 3-4 mm long. Flowers male (staminate) and female (pistillate), on separate trees (the species dioecious), each type borne in pendent catkins, the female elongating to 6-8 cm long. Fruits nearly globular capsules 3-4 mm long, splitting to release the seeds; seeds ca. 2 mm long, each with a tuft of long, white, silky hairs ("cotton"), easily blown by the wind. The common name is in reference to the dark colored bark.

Black cottonwood is the largest American poplar and the largest hardwood tree in western North America.

Variation within the species: black cottonwood is most commonly and widely known as the distinct species *Populus trichocarpa* but is sometimes treated as *Populus balsamifera* var. *trichocarpa*, the western North American segment of the broader species *P. balsamifera* (Brayshaw 1965, 1976). Black cottonwood and balsam cottonwood have similar appearances, biological features, and ecology, and they hybridize and introgress where their ranges overlap. Still, they have essentially separate geographic ranges, and, like various other species of *Populus* that are separated by relatively small differences, black cottonwood and balsam poplar differ in a number of technical features, as partly summarized here.

1. Petioles 7-10 cm long, often with glands at base; terminal bud with 5 scales; staminate catkins 7-10 cm long; mature pistillate catkins 10-13 cm long; fruits ovoid, 6-7 mm long, splitting into 2 parts. *P. balsamifera*

1. Petioles 3-4 cm long, without basal glands; terminal bud with 6-7 scales; staminate catkins 4-5 cm long; mature pistillate catkins 12-15 cm long; fruits nearly globular, 3-4 mm long, splitting into 3 parts. *P. trichocarpa*

Brayshaw has recognized two varieties within "subsp. *trichocarpa*:" Var. *trichocarpa* (in central and coastal British Columbia and southward) and Var. *hastata* (Dode) Brayshaw (mainly in the Rocky Mountain region and central British Columbia) Natural hybrids occur between black cottonwood and other species: narrowleaf cottonwood (*P. angustifolia*), eastern cottonwood (*P. deltoides*),

Fremont's cottonwood (*P. fremontii*), and rarely even aspen (*P. tremuloides*).

Distribution

The range of black cottonwood extends from Alaska, including various islands, through coastal regions of western Canada (Yukon, British Columbia, and Alberta) into the northwestern US (Washington, Oregon, Montana, Idaho, and Nevada; rare in North Dakota, Wyoming, Utah, and California) and as far south as Baja California Norte. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

Black cottonwood grows on alluvial sites, riparian habitats, and moist woods on mountain slopes, at elevations of 0–2100(–2750) meters. It often forms extensive stands on bottomlands of major streams and rivers at low elevations along the Pacific Coast, west of the Cascade Range. In eastern Washington and other dry areas, it is restricted to protected valleys and canyon bottoms, along streambanks, and edges of ponds and meadows. It grows on a variety of soils from moist silts, gravels, and sands to rich humus, loams, and occasionally clays.

Black cottonwood is a pioneer species that grows best in full sunlight and commonly establishes on recently disturbed alluvium. Seeds are numerous and widely dispersed because of their cottony tufts, enabling the species to colonize even burn sites, if conditions for establishment are met. Seral communities dominated or codominated by cottonwood are maintained by periodic flooding or other types of soil disturbance. Black cottonwood has low drought tolerance; it is flood-tolerant but cannot tolerate brackish water or stagnant pools.

Flowering occurs in late March to May (-June), just before or during leaf emergence and fruiting occurs in late May to early or mid-July.

Establishment

Black cottonwood begins producing seed at about 8-10 years – abundant seed is usually produced every year. Seeds under natural conditions are short-lived, usually for less than a month. Seed will readily germinate on a variety of favorable sites, particularly where mineral soil has been exposed or new soil deposited. High germination rates and seedling survival depend on continuously moist conditions, such as in fresh alluvium, during the first month.

Maximum height and size are usually reached in 60-75 years although some may continue to grow well past that. Maximum age is at least 200 years.

Black cottonwood sprouts readily from the stump and roots as well as from branches and logs that are left after logging. Small shoots with green leaves abscise naturally and either root where they fall or are water-transported some distance before they root.

Management

In urban sites, the aggressive root systems of black cottonwood can invade and damage drainage systems and also may heavily draw available moisture from gardens and building foundations, especially in clay soil. Root suckers also may be considered a maintenance problem, and the profuse production of cottony seed from female plants can be a minor nuisance. The shallow root system of black cottonwood, especially on wet soils, make the species susceptible to damage from ice storms, heavy snow, and wind. Unseasonably early or late frosts may damage saplings, but in dormancy, it is one of the most frost-resistant trees in the northwestern USA.

Black cottonwood is susceptible to fire damage because of its thin bark and shallow root system. Seedlings and saplings are usually killed by fire of any intensity, and all trees may be killed by high-intensity fire. Even relatively cool fires may wound older trees and open the way to heartwood decay. Repeated fire at short intervals may permanently exclude black cottonwood. Even so, post-fire regeneration may be effective and rapid in black cottonwood. Thickened bark on lower portions of the trunk after 10-20 years affords better fire protection, and moist soil contributes to the survival of underground parts. Trees can quickly sprout from the stump and roots following top-kill or damage by fire. Abundant production of seeds and their wide dispersal enable black cottonwood to rapidly colonize large areas of moist soil after burns, which provide ideal conditions of maximum light and bare mineral soil.

Collect seeds for propagation as capsules begin to open (late May to mid July). Place in paper bags and allow them to finish opening in warm area. They need to be sown within a few days of ripening; otherwise they may be kept viable for up to a year by drying and storing cold in an air-tight container. In a cold frame, sow on the surface or lightly cover the seeds. Plant into permanent positions either in late summer or the following spring, depending on growth of the young plants.

Cuttings of twigs of the current season's growth, 20-45 cm long and 1-3 cm diameter, taken during the dormant season and with healthy axillary buds, can be placed in a sheltered outdoor bed or directly into permanent positions. Plant with one bud above the surface. Cuttings grown in a mist-propagator also root easily. Nursery- or container-grown seedlings and rooted cuttings establish easily and grow rapidly on moist well-drained soils in full sun. Live stakes should be 3.5 cm diameter and 1.2 m long, stuck directly into ground on-site.

Cultivars, Improved and Selected Materials (and area of origin)

Please check the Vendor Database, expected to be on-line through the PLANTS Web site in 2001 by clicking on Plant Materials.

References

Authors 2000. *Hybrid poplar research program*. Dept. of Energy, Biofuels Program, Washington State University, Puyallup, Washington. SEP00. <<http://www.puyallup.wsu.edu/poplar/hybridpoplar/poplar.htm>>

Brayshaw, T.C. 1965. *The status of the black cottonwood (Populus trichocarpa Torrey and Gray)*. *Canad. Field-Naturalist* 79:91-95.

Brayshaw, T.C. 1976. *Catkin bearing plants of British Columbia*. Occas. Pap. No. 18. The British Columbia Provincial Museum, Victoria, British Columbia, Canada.

DeBell, D.S. 1990. *Populus trichocarpa Torr. & Gray, black cottonwood*. Pp. 60-69, IN: R.M. Burns and B.H. Honkala (tech. coords.). *Silvics of North America. Volume 2. Hardwoods*. USDA, Forest Service Agric. Handbook 654, Washington, D.C. SEP00. <http://willow.ncfes.umn.edu/silvics_manual/volume_2/populus/trichocarpa.htm>

DeBell, D.S., C.A. Harrington, G.W. Clendenen, M.A. Radwan, & J.C. Zasada 1997. *Increasing the productivity of short-rotation Populus plantations*. Final Report, USDA, Forest Service, Pacific Northwest Research Station, Olympia, Washington. <<http://bioenergy.ornl.gov/reports/debell/contents.html>> Accessed September 2000.

Dickmann, D.I. & K.W. Stuart 1983. *The culture of poplars in eastern North America*. Michigan State

University, Department of Forestry, East Lansing, Michigan.

Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

Eckenwalder, J.E. 1977. *North American cottonwoods Populus (Salicaceae) of sections Abasco and Aigeros*. J. Arnold Arb. 58:193-207.

Galloway, G., & J. Worrall 1979. *Cladoptosis: A reproductive strategy in black cottonwood?* Canad. J. Forest Res. 9:122-125.

Holifield, J.L. 1990. *Populus trichocarpa*. IN: W.C. Fischer (compiler). *The fire effects information system* [Data base]. USDA, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory, Missoula, MT.
<[http://fire.org/feis/plants/tree/poptri/Final Report](http://fire.org/feis/plants/tree/poptri/Final%20Report)>
Accessed September 2000.

Johnson, J.D., T.M. Hinckley, & H.D. Bradshaw 2000. *Disease resistance, its physiology and genetics of short-rotation black cottonwood*. Dept. of Energy, Biofuels Program, Washington State University, Puyallup, Washington. SEP00.
<<http://www.puyallup.wsu.edu/poplar/rschprojects/rsch1.htm>>

Prepared By

Guy Nesom
BONAP, North Carolina Botanical Garden,
University of North Carolina, Chapel Hill, North Carolina

Species Coordinator

James Henson
USDA, NRCS, National Plant Data Center, Baton Rouge, Louisiana

Edited: 13nov00.jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS <<http://plants.usda.gov>> and Plant Materials Program Web sites <<http://Plant-Materials.nrcs.usda.gov>>.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and