

BUR OAK

Quercus macrocarpa Michx.

Plant Symbol = QUMA2

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



Nobel Foundation Plant Image Gallery
© Samuel Roberts Noble Foundation

Alternate Names

Blue oak, mossycup oak, mossy-overcup oak

Uses

Industry: Bur oak wood is used for cabinetry, barrels, hardwood flooring, and fence posts. Main sources of trees for timber are Iowa and Illinois bottomlands. The wood is sometimes marketed as 'white oak.'

Ethnobotanic: Native Americans made a bark decoction with astringent properties used to treat diarrhea, wounds and sores, hemorrhoids, poison oak, and insect bites. The large, sweet acorns have been eaten boiled and raw.

Wildlife: The acorns are eaten by many birds and mammals, including squirrels, rabbits, ground squirrels, mice, deer, wood ducks, and blue jays. They are dispersed by rodents and blue jays, which frequently cache the acorns for later use. The foliage is eaten by deer and cattle. Red-tailed hawks, screech owls, fox squirrels, and flying squirrels nest in large trees of bur oak.

Conservation: Bur oak is tolerant of city smoke and other air pollutants and of soils that are compacted, sandy, and/or of high pH – it is commonly planted as a shade tree in many urban areas of the United States.

The trees become large and are suited for lawns and other open areas, including golf courses, parks, large islands, and fields. They also are useful in rehabilitation of degraded sites and have been widely planted in shelterbelts because of their drought tolerance. A deep tap root system penetrates to lowered water tables during the dry periods.

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: Beech Family (Fagaceae). Native trees growing to 25 m tall, with a broad, rounded crown, sometimes shrubby; branches and branchlets with corky-winged projections; bark light gray, thick, rough, furrowed into scaly plates and vertical flattened ridges. Leaves deciduous, alternate, obovate, shaped like a fiddle, tapering to a wedge-shaped base, 10–25 cm long and 6–12 cm wide, widest above the middle, with 2–3 rounded lobes on upper half of leaf and 5–7 deeper lobes on lower half of leaf, dark green above, gray-green below, turning yellow or brown in fall. Male and female flowers are borne in separate catkins on the same tree (the species monoecious) on the current year's branchlets. Acorns maturing in the first year, 2.5–5 cm long and wide, with a deep, thick, fringed cup covering 1/2 to 3/4 of the acorn, the scales knobby, long-pointed with narrow free tips. The common name (bur) is in reference to the cap-covered acorn.

Variation within the species: Three varieties are commonly recognized within the species.

Var. *depressa* (Nutt.) Engelm. (*Q. mandanensis* Rydb.) – mostly along the western margin of the Great Plains; small trees or shrubs with smaller and less fringed cups and corky twigs.

Var. *macrocarpa* – over most of the species range; trees with large thick cups.

Var. *oliviformis* (Michx. f.) A. Gray – Iowa, Minnesota, South Dakota, and North Dakota; trees with thinner and smaller cups. This is sometimes considered within the typical variety.

Bur oak is a member of the white oak subgroup (subgenus *Lepidobalanus*) and hybridizes with various related species, including northern pin oak (*Q. ellipsoidalis*), white oak (*Q. alba*), swamp white oak (*Q. bicolor*), overcup oak (*Q. lyrata*), swamp chestnut oak (*Q. michauxii*), chinkapin oak (*Q. muehlenbergii*), post oak (*Q. stellata*), live oak (*Q. virginiana*), and Gambel's oak (*Q. gambelii*).

Distribution

Bur oak is grows natively throughout much of the north-central United States and the eastern Great Plains. It occurs from southern New Brunswick and New England westward to the Dakotas and southeastern Montana, and south to Tennessee, Arkansas, and the central prairies of Texas – with rare outliers in Louisiana, Mississippi, and Alabama. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

Bur oak grows in a range of habitats and moisture regimes – from prairies to valley floors and upland woods. It is a pioneer or early seral species at prairie margins, but bur oak savannas have declined due to grazing and fire suppression. It grows quickly on moist, rich bottomlands but is relatively intolerant of flooding during the growing season. At the north and west ends of its range, where bur oak occurs on rocky bluffs with thin soil and where repeated fire also may be common, it commonly grows as small trees or thickets of low shrubs. Young plants grow well in full sun to partial sun.

Flowering occurs from April through June, just after leaves develop, while fruiting occurs from August to November.

Establishment

Minimum seed-bearing age is 35, with optimum seed production occurring between 75–150 years, and trees are known to produce seed up to 400 years. Abundant acorns are produced every 2–3 years, with light crops in the intervals. Most natural seed germination occurs during the fall (directly after maturation) and unless germination is rapid, few seeds survive predation by insects, small birds, and mammals. Litter-covered acorns appear to be more vulnerable to rodents, insects, and fungus.

The taproot of young bur oaks rapidly penetrates into the soil, sometimes growing more than one meter deep in the first growing season. This early root development, along with high water-use efficiency, may explain why bur oak can pioneer on droughty

sites and can successfully establish itself in competition with prairie shrubs and grasses. The trees are slow-growing but long-lived and may reach ages approaching 1000 years.

Management

Bur oak may be transplanted or it is easily propagated from seed. Seed should be stored over winter in a cool, moist place at 1–4° C. Germination frequency may be enhanced by stratifying 30–60 days at 1–5° C. but stratification is not required for germination, except for var. *oliviformis*, which typically germinates during the spring. Most natural seed germination occurs during the fall (directly after maturation) but seed may be planted in either the spring or fall. Seeds should be planted 1.2–2.5 centimeters deep, in groups of 2–3, spaced at roughly 2 meter intervals.

Although strong and rapid development of the taproot contribute to difficulty in transplanting, bur oak saplings can be obtained in ball-and-burlap and they may be transplanted as young plants from containers. Transplants are best made in spring.

Bur oak bark is thick and fire-resistant and larger trees often survive fire. Grass fires often kill only seedlings and young trees, but even seedlings may survive unless fires occur at short intervals or with enough intensity of heat. Top-killed smaller trees (or those mechanically damaged) sprout vigorously from the stump or root crown after fire. In areas of frequent fire and strong herbivore browsing, the underground portions may be much older and more extensive than the continually resprouting aerial portions. Where fire suppression is prevalent, bur oak communities may be replaced by more shade-tolerant maple-basswood forests.

Few insects or diseases cause serious damage to bur oak. Oak lacebug (*Corythucha arcuata*) may heavily defoliate bur oaks in shelterbelt plantings, especially during dry weather. Oak wilt (*Ceratocystis fagacearum*) is a less serious problem in bur oak than in species of red oak, but the disease sometimes spreads through root grafts of adjacent trees, and entire groves have been killed by the gradual expansion of the disease from one center of infection.

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

Contact your local Natural Resources Conservation Service (formerly Soil Conservation Service) office for more information. Look in the phone book under "United States Government." The Natural Resources

Conservation Service will be listed under the subheading "Department of Agriculture."

References

Johnson, P.S. 1990. *Quercus macrocarpa* Michx. Bur Oak. Pp. 686-692, IN: R.M. Burns and B.H. Honkala. *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/quercus/macrocarpa.htm>

Nixon, K.C. and others 1993. *Quercus*. Pp. 445-506, IN: *Flora of North America, North of Mexico. Vol. 3*. Oxford Univ. Press, New York, New York. SEP00.
<http://hua.huh.harvard.edu/cgi-bin/Flora/flora.pl?FLORA_ID=12395>

Samuel Roberts Nobel Foundation 1999. *Noble foundation plant image gallery*. Ardmore, Oklahoma. 29nov2000.
<<http://www.noble.org/imagegallery/index.html>>

Tirmenstein, D. 1988. *Quercus macrocarpa*. IN: W.C. Fischer (compiler). *The fire effects information system* [Database]. USDA Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Missoula, Montana. SEP00.
<<http://www.fs.fed.us/database/feis/plants/tree/quemac/>>

Prepared By

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

Species Coordinator

M. Kat Anderson
USDA, NRCS, National Plant Data Center, c/o Plant Sciences Dept., Davis, California

Edited: 19jun02 jsp; 29may03 ahv; 060809 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<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, sex, 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 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

Read about [Civil Rights at the Natural Resources Conservation Service](#).