Nannyberry Viburnum

Nannyberry Viburnum *(Viburnum lentago)*

General Description

A large native tree-like shrub, occasionally found in North Dakota wooded areas. Attractive for its shiny foliage, red fall color and fruit display.

Leaves and Buds

Bud Arrangement - Opposite.

Bud Color - Lead gray, valvate in nature.

Bud Size - About 1/2 to 3/4 inch, long pointed, slightly curved.

Leaf Type and shape - Simple, elliptic-ovate, acuminate tipped.

Leaf Margins - Finely-toothed, petiole mostly winged with wavy margin.

Leaf Surface - Shiny foliage, glabrous or scurfy on the veins beneath.

Leaf Length - 2 to 4 inches.

Leaf Width - 1 to 2 inches.

Leaf Color - Dark green, red autumn color.

Flowers and Fruits

Flower Type - Flat cymes.

Flower Color - Creamy-white, no fragrance.

Seed Type - Drupe, 1/2 inch long.

Seed Color - Drupe turns reddish, changing to bluish-black when mature.

Form

Growth Habit - Mild suckering, becomes more open at maturity with arching branches.

Texture - Medium, summer; medium, winter.

Crown Height - 10 to 14 feet.

Crown Width - 8 to 12 feet.

Bark Color - Slightly pubescent to essentially glabrous, brownish-gray.

Root System - Shallow.

Environmental Requirements

Soils

Soil Texture - Adapted to a variety of soils.

Soil pH - 5.0 to 7.5.

Windbreak Suitability Group - 1, 2, 3, 4, 4C, 5.

Cold Hardiness

USDA Zone 2.

Water

Limited drought tolerance.

Light

Full sun to partial shade.

Uses

Conservation/Windbreaks

Medium to large shrub for farmstead windbreaks, and riparian plantings.

Wildlife

Food for wildlife, good cover.

Agroforestry Products

Products - Cut or dried flowers.

Food - Fruit used fresh, processed and dried. Native Americans ate it raw. White settlers used the bark for tea.

Medicinal - Used as diuretic, nerve sedative, for asthma and hayfever, and treatment of cramps and palpitation.

Urban/Recreational

Good for naturalizing and borders, attractive reddish fall colors are common.

Cultivated Varieties

None.

Related Species

American Cranberrybush (*Viburnum trilobum*)

Arrowwood Viburnum (*V. dentatum*)

European Cranberrybush (*V. opulus*)

Wayfaring Tree Viburnum (*V. lantana*)

Pests

Powdery mildew can be a pest under humid conditions. No major pest problems.

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Fact Sheet

NANNYBERRY

Viburnum lentago L.

Plant Symbol = VILE

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

Alternate Names
Sheepberry, wild raisin, sweet viburnum, nanny-berry

Uses
Nannyberry is a shade-tolerant, understory species useful in landscape plantings as shrub borders, taller barriers, hedges, and windbreaks. It produces good seasonal displays of flowers, fruits, and fall leaf color. The fruits are sweet and edible and are eaten by many species of birds and wildlife.

Status
Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description
General: Nannyberry is a native, deciduous, multi-stemmed shrub or small tree that may reach 36 ft. in height. The plant is also known as "sheepberry" because its fruit smells like wet sheep wool when over ripe. Nannyberry is leggy and somewhat open at maturity with an irregular to rounded crown. Suckers often form at the base. The bark is dark gray to black in a pattern of small blocks. Leaves are simple, opposite, and ellipse to egg-shaped with finely toothed margins. They are 2-4" long and hairless, or nearly so, on both sides. The ½-1" petiole has a wavy, mostly winged margin. Mature foliage is dark glossy green, becoming deep maroon to red in the fall. Small, creamy-white, bisexual flowers in flat-topped clusters appear May-June. The ½" berry-like fruits (drupes) are blue-black and form hanging clusters from July - September.

Adaptation and Distribution
Nannyberry is adaptable to a wide range of sites, but is commonly found natively in moist areas with rich loam to clay-loam soil, such as low woods, swamp borders, or near stream banks. It also occurs on moist, wooded slopes, but tolerates drier sites. Although quite shade-tolerant, it achieves relatively larger size in more open areas.

Nannyberry is distributed throughout the north and northeastern United States. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

Establishment
Nannyberry seed requires alternating temperatures and a cool moist period to germinate (Dirr, 1990). The plant can be readily propagated by softwood cuttings. Hanging branches may also root, or layer, where they touch the ground. Nannyberry has fibrous roots and is easily transplanted and established.

Management
Although nannyberry grows naturally as a multi-stemmed shrub, it can be maintained as a small tree by pruning stems and removing suckers at the base.

Pests and Potential Problems
Powdery mildew, which may affect leaves in late summer, decreases aesthetic value but will not kill the plant. The viburnum leaf beetle (*Pyrrhalta viburni)*, first a problem in Quebec and Ontario in 1978, has moved to New York and Maine and is now a concern in urban landscapes and nurseries. *V. lentago* leaves can be damaged or skeletonized by the adults and larvae, although *V. opulus* is the beetle's preferred host. The beetle larvae hatch in early May, feed for about 4-5 weeks then pupate in the soil. Adults emerge by mid-July, feed, mate, and lay over-wintering eggs on viburnum twigs. Chemical control

is best applied to young larvae. Over-wintering eggs should be pruned out and destroyed before hatching.

Cultivars, Improved, and Selected Materials (and area of origin)
Nannyberry cultivars are not readily available.

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

Kathy Davis
USDA NRCS National Plant Materials Center
Beltsville, Maryland

Species Coordinator:
Gerald Guala
USDA, NRCS, National Plant Data Center, Baton Rouge, Louisiana

Edited: 24Jul2002 JLK; 060818 jsp

Bur Oak

Bur Oak
(Quercus macrocarpa)

General Description

A large long-lived tree on good sites, with stout limbs forming a broad crown at maturity. Scrubby forms can be found on very dry sites. Native throughout all but the northwest corner of the state. Difficult to transplant because of a deep taproot. Bur Oak is also called Mossycup Oak. Once established trees grow one to two feet per year on favorable sites. The largest tree in North Dakota is 85 feet tall with a canopy spread of 61 feet.

Leaves and Buds

Bud Arrangement - Alternate.

Bud Color - Pale pubescence covering entire bud, grayish-brown.

Bud Size - Imbricate, conical to broadly-ovate, 1/8 to 1/4 inch.

Leaf Type and Shape - Simple, deeply and irregularly lobed, center lobes cut nearly to the midrib.

Leaf Margins - Cuneate or rarely rounded at the base. Lower portion of leaf with 2 or 3 pairs of lobes.

Leaf Surface - Semi-glossy above, variably pubescent below.

Leaf Length - 4 to 10 inches.

Leaf Width - 2 to 4½ inches.

Leaf Color - Dark green and lustrous above, grayish to whitish-green below; yellow to tannish-brown fall color.

Flowers and Fruits

Flower Type - Catkins.

Flower Color - Male is yellow-green, female is reddish.

Fruit Type - Acorn, oblong, enclosed 1/2 to 3/4 by a fringed cup.

Fruit Color - Brown, downy at the apex.

Form

Growth Habit - Very stout branches, informal spreading to rounded with age.

Texture - Medium-coarse, summer; coarse, winter.

Crown Height - 40 to 70 feet.

Crown Width - 35 to 60 feet.

Bark Color - Dark gray, with rough, deep ridges and furrows.

Root System - Deep taproot, spread is usually twice tree height.

Sensitive to construction and transplanting injury.

Environmental Requirements

Soils

Soil Texture - Grows best in fertile loam, but will do well in a wide variety of soils.

Soil pH - 5.5 to 8.0.

Windbreak Suitability Group - 1, 1K, 3, 4, 4C, 5.

Cold Hardiness

USDA Zone 2.

Water

Drought tolerant, but prefers moist well-drained soils.

Light

Full sun preferred, but is moderately shade tolerant.

Uses

Conservation/Windbreaks

Medium to tall tree for farmstead and field windbreaks. Slow growing particularly if under stress.

Wildlife

Excellent tree for wildlife food and cover.

Agroforestry Products

Wood - Used for dimension lumber, veneer, firewood and fence posts.

Food - Native Americans used acorns for food after leaching away tannins and astringent properties with wood ashes.

Medicinal - Used to treat dysentery and as an antiseptic and an astringent by Native Americans.

Urban/Recreational

Excellent for landscaping, yards, and parks. Sensitive to root compaction. Used on boulevards but acorns may be messy.

Cultivated Varieties

None.

Related Species

English Oak (*Quercus robur*) - Lacks sufficient winter hardiness in North Dakota, but NDSU has hardy hybrid selections under consideration for introduction.

Mongolian Oak (*Quercus mongolica*)

Pests

Common diseases include leaf and twig anthracnose, leaf curl, and stem decay. Commonly damaged by rodents, rabbits, and deer. Leaf and twig galls are commonly found, but rarely damage the tree.

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Fact Sheet

BUR OAK

Quercus macrocarpa Michx.

Plant Symbol = QUMA2

Contributed by: USDA NRCS Plant Materials Program

Photo by Joe Scianna, USDA-NRCS, Bridger, Montana

Uses

Windbreaks and Shelterbelts: Bur oak is recommended as a medium to tall component in windbreak and shelterbelt systems. Although modest in growth rate, especially in the western U.S., it is a strong-wooded and long lived species.

Riparian Forest Buffers: Bur oak can be used in riparian forest buffer plantings and may be a suitable substitute, depending on site conditions, for green ash (*Fraxinus pennsylvanica*) and Russian olive (*Elaeagnus angustifolia*).

Woody Draw Restoration: Bur oak is a natural component of woody draws in the central and western Great Plains. Seedlings grown in containers are preferred over bareroot stock and direct sowing.

Timber: The wood of bur oak is quite valuable and is often marketed as "white oak." It is used in the manufacture of cabinets, barrels, hardwood flooring, and fence posts.

Ornamental: Bur oak makes an excellent landscape specimen, and is well suited to drought tolerant landscapes. Its strong branches make it a good choice for street trees provided it has ample space to accommodate its wide spreading basal branches.

Wildlife: Bur oak is an excellent source of food for many wildlife species including deer, turkeys, squirrels, rabbits, raccoons, and rodents. As it reaches maturity it provides roosting, loafing, and nesting for numerous species of birds.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

Description

Bur oak or mossycup oak is a medium- to tall-stature deciduous tree widely distributed across the United States. Bur oak has several desirable attributes including strong branches, drought tolerance, winter hardiness, and freedom from serious insects or diseases.

On good sites, bur oak has a spreading habit with a broad crown; massive bole; and low, large branches. It is capable of reaching heights over 80 feet and individual trees up to 100 feet are found on good sites. At the far western edge of its range, heights of 50 feet can be considered about the upper limits of growth.

Adaptation and Distribution

Bur oak has a large native range extending from Nova Scotia, west to Manitoba, south through Kansas to Texas, east to Alabama, and northeast to Virginia and New England. Landscape specimens can be found in many western states outside of its native range. Most references list bur oak as hardy in USDA Winter Hardiness Zones 4 to 8, although Zone 2 is given in at least one source. Bur oak is considered only moderately shade tolerant.

Although favoring rich alluvial bottomland, bur oak grows well on rocky hillsides, limestone soils, droughty soils, clayey sites, and other marginal sites -- given full sun conditions. This species performed better than most others tested on coal-mine spoils of pH 5.6 in eastern Kansas. In the western United States, bur oak is considered a pioneer species and is capable of invading

prairie grasslands. In the eastern Great Plains it occurs primarily along stream bottoms and stream terraces in association with green ash, boxelder (*Acer negundo*), and cottonwood (*Populus sp.*). Bur oak is, however, intolerant of flooding.

For a current distribution map, please consult the Plant Profile page for this species on the PLANTS web site.

Establishment
Cross pollination between individual trees appears to be favored. Acorns ripen in one year, falling as early as August or as late as November depending on the tree and location. Acorns usually germinate immediately without pretreatment, but may require cold:moist stratification when collected from northern sources. Average minimum seed-bearing age of forest trees is approximately 35 years with best production typically between 75 to 150 years. Good crops usually occur every two to three years. It may be necessary to check seed-bearing trees regularly in order to assure harvesting the acorns before the wildlife do. Under fallow, dryland conditions in Bridger, Montana, bur oak trees began producing substantial amounts of seed by 10 years of age.

Bur oak is considered moderately tolerant to intolerant to shade. Initial height growth is normally slow for the first three to five years, then moderate as the plant becomes established. Seedlings produce a vigorous and aggressive taproot that allows this species to utilize sub-surface moisture and tolerate drought. Container produced seedlings, cultivated in tall, narrow pots and at least two years of age are the preferred stock type.

Management
Protection from wildlife is highly recommended for all bur oak plantings as this species is preferred browse for deer and rabbits. Its slow initial growth warrants the use of weed barrier or other forms of vegetation control for reducing plant competition. Supplemental water may result in modest increases in seedling survival and biomass production on droughty sites. Supplemental fertility is not considered necessary for most conservation plantings in the northern Great Plains and Intermountain West.

Pests and Potential Problems
Reported insect problems include oak webworm, oak skeletonizer, leaf miner, variable oakleaf caterpillar, oak lacebug, and June beetles. Oak lacebug can be a serious problem in shelterbelt plantings, especially during drought conditions. Serious insect and disease problems are relatively limited for bur oak in the western United States.

Cultivars, Improved, and Selected Materials (and area of origin)
'Lippert' bur oak, released in 1994 by the Manhattan, Kansas Plant Materials Center, is a seed propagated cultivar recommended for conservation use in multi-row windbreaks, reforestation for watershed protection, and wildlife habitat plantings.

'Boomer' bur oak was released by the James E "Bud" Smith Plant Materials Center in Knox City, Texas. It is recommended for conservation use in windbreaks, as a landscape plant for urban and recreational areas, and for wildlife food and shelter.

Ekalaka Germplasm bur oak is a Selected Class pre-varietal selection of bur oak released by the Bridger, Montana Plant Materials Center in 2009 for improved rate of height growth, percentage seedling survival, and vigor rating. It is recommended for various conservation applications such as windbreaks, shelterbelts, riparian forest buffers, Xeriscapes®, woody draw restoration projects, and wildlife plantings.

Bur oak seed is readily available through commercial seed sources in the central and western United States. Seedlings can be purchased from both state and commercial nurseries. Foundation seed of Plant Materials Program selections is available by contacting the releasing Plant Materials Center or respective Plant Materials Specialist.

Prepared By & Species Coordinator:
Joseph D. Scianna
Research Horticulturist
USDA-NRCS
Bridger, Montana

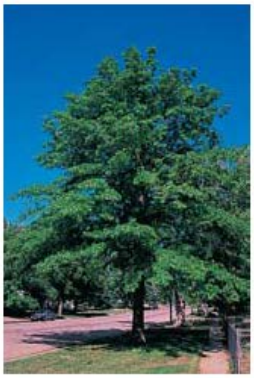
Published November, 2009

Edited: 28Aug09JSJ

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

Bur oak

Quercus macrocarpa



Growth Form: globular
Crown Density: moderate
Size: to 75 feet high
Drought Resistance: excellent
Cold Hardiness: excellent
Growth Rate: slow
Life Span: very long
Elevational Range: to 7,000 feet
Soil Conditions: tolerates alkaline well
Possible Insect Problems: scales, gall wasps
Wildlife Value: excellent: acorn food value for birds and mammals
Seasonal Color: not conspicuous
Miscellany: can live more than 200 years

Taken from: Trees for Conservation, a buyer's guide, Colorado State Forest Service

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

NORTHERN RED OAK

Quercus rubra L.

Plant Symbol = QURU

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

Alternate Names
Red oak, common red oak, eastern red oak, mountain red oak, gray oak

Uses
Industry: Northern red oak is an important source of hardwood lumber. The wood is close-grained, heavy, and hard; it machines well and accepts a variety of finishes. It is used for furniture, veneer, interior finishing, cabinets, paneling, and flooring as well as for agricultural implements, posts, and railway ties.

Wildlife: Northern red oak provides good cover and nesting sites (including cavities) for a wide variety of birds and mammals. Deer, elk, moose, and rabbits commonly browse leaves and young seedlings and the acorns are eaten by a wide variety of large and small mammals and birds.

Ethnobotanic: The acorns of red oak (and other oak species) were an important food source for Native Americans. To remove bitter tannins, they were boiled, leached with ashes, soaked for days in water, or buried over winter. Some tribes used red oak bark as a medicine for heart troubles and bronchial infections or as an astringent, disinfectant, and cleanser.

Conservation: Northern red oak is commonly planted as a landscape tree in eastern North America and Europe -- used as a shade tree on lawns, parks, campuses, golf courses, etc, where space is sufficient. It is fast growing, easy to transplant, tolerant of urban conditions (including dry and acidic soil and air pollution), the abundant nuts attract wildlife, and the leaves develop a brick-red fall color. It has been used in various rehabilitation projects, including revegetation of coal mine spoils in states of the east central United States (Ohio, Indiana, Illinois, Kentucky, and Pennsylvania).

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 often reaching 20–30 m tall, less commonly up to 50 m; bark dark gray or black, shallowly furrowed into broad hard scaly ridges, inner bark reddish to pink; generally developing a strong taproot and network of deep, spreading laterals. Leaves are deciduous, alternate, elliptic, 10–25 cm long and 8–15 cm wide, divided less than halfway to midvein into 7–11 shallow wavy lobes with a few irregular bristle-tipped teeth, sinuses usually extending less than 1/2 distance to midrib, glabrous and dull green above, light dull green below with tufts of hairs in vein angles. Male and female flowers are borne in separate catkins on the same tree (the species monoecious), the staminate catkins in leaf axils of the previous year's growth, the pistillate in 2–many-flowered spikes in the leaf axils. Acorns maturing in the second year, about 15–30 cm long, with a broad usually shallow cup, borne singly or in clusters of 2–5. The common name is in reference to the red fall foliage color, red petioles, and reddish interior wood. This is a different species from "southern red oak" (*Q. falcata*).

Northern red oak is a member of the red oak subgroup (subg. *Erythrobalanus* = sect. *Lobatae*). It hybridizes with related species, including scarlet oak (*Q. coccinea*), northern pin oak (*Q. ellipsoidalis*), shingle oak (*Q. imbricata*), scrub oak (*Q. ilicifolia*), blackjack oak (*Q. marilandica*), swamp oak (*Q. palustris*), willow oak (*Q. phellos*), Shumard oak (*Q. shumardii*), and black oak (*Q. velutina*).

Variation within the species: There are different interpretations of variation patterns among trees of northern red oak. A single species without formally variants is sometimes recognized, or two varieties may be recognized.

Quercus rubra var. *ambigua* (A. Gray) Fernald
SY= *Q. borealis* Michx. f.
SY= *Q. rubra* var. *borealis* (Michx. f.) Farw.

Quercus rubra var. *rubra*
SY= *Q. maxima* (Marsh.) Ashe
SY= *Q. borealis* var. *maxima* (Marsh.) Ashe

Var. *rubra* has a shallow cup, to 3 cm wide, enclosing 1/4–1/5 of the nut. Var. *ambigua* has a deeper cup, to 2 cm wide, enclosing 1/3 of the nut. McDougal and Parks (1984, 1986) found evidence of correspondence between morphological types and flavonoid chemotypes but the evolutionary status and geographic distribution of these have not been worked out in detail.

Distribution
Northern red oak is widely distributed throughout much of the eastern United States and southeastern Canada. It grows from Quebec, Ontario, Nova Scotia, and New Brunswick southward to southwestern Georgia, Alabama, northern Mississippi, northern Arkansas, and eastern Oklahoma. Northern red oak extends westward through Minnesota and Iowa, south through eastern Nebraska and Kansas to eastern Oklahoma. It occurs locally in eastern and southwestern Louisiana and western Mississippi. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Establishment
Adaptation: Northern red oak commonly grows on mesic slopes and well-drained uplands, less commonly on dry slopes or poorly drained uplands, at (0-) 150–1800 meters in elevation. It typically grows on lower and middle slopes, in coves, ravines, and on valley floors, most commonly on N- and E-facing slopes and on clay, loam, and sandy or gravelly soils. Best growth is in full sun and well drained, slightly acidic, sandy loam. It occurs as a dominant in many natural communities, including mixed mesophytic and pine-oak.

Northern red oak is intermediate in shade tolerance but generally unable to establish beneath its own canopy. Seedlings usually do not reach sapling or pole size unless gaps are created in the canopy. Northern red oak is often replaced by more shade-tolerant species such as sugar maple and American basswood.

Flowering occurs in April–May, during or before leaf development, while fruiting (August–) September–October.

General: Northern red oak generally first bears fruit at about 20–25 years, although most trees do not produce acorns in abundance until 40–50 years. Good crops are produced every 2–5 years. In most years, birds, mammals, and insects commonly destroy up to 80% of the crop and nearly the entire crop can be eliminated in poor years. Seeds on the soil surface are particularly vulnerable to rodent predation, and germination frequencies are much higher when a layer of leaf litter covers acorns. Under natural conditions, acorns generally germinate in the spring after over-wintering breaks dormancy.

Germination and seedling establishment may be successful in full and partial shade, but early growth is reduced by shade, poor soil, and competing herbaceous vegetation. Seedlings in mature stands may be present in large number, but few survive more than a few years or grow to more than 15–20 cm in height. Under optimal conditions, northern red oak is fast growing and trees may live up to 500 years.

Seedlings, saplings, and small poles of northern red oak can sprout if cut or burned. Although young oaks typically stump sprout readily, older and larger individuals also may sprout.

Management
The tight, relatively thin bark of northern red oak makes the trees more susceptible to fire damage than in species of oak with rougher, corkier bark. Apart from immediate mortality, damaged basal cambial tissue permits the entry of insects and heart-rot decay that may ultimately kill the tree. Even so, northern red oak is adapted to periodic fire, which is integrally associated with oak forests. Older, larger individuals often survive fire and seedlings, saplings, and pole-sized individuals commonly sprout vigorously from the stumps or root collar after being top-killed by fire. Increased fire suppression has favored more shade-tolerant hardwoods and resulted in a decrease in oaks.

Acorns can maintain viability in controlled storage for up to 2–3 years. They should be stratified at 1-3° C for several months; those from northern populations require the longer period. Growth is best

when sown as soon as ripe into permanent position or in an outdoor seedbed protected from predation. Cuttings obtained from young trees can be rooted if treated with hormones. Transplants of bare root stock are best done in spring. Because of its usefulness and popularity, northern red oak is commonly available in ball-and-burlap and in containers.

The gypsy moth and numerous other insects can attack northern red oak, occasionally causing serious damage. Numerous caterpillars enjoy oak foliage, but feeding damage is usually not severe. Oak decline is a serious disease of northern red oak and has affected the species throughout much of the central Appalachian region.

Oak wilt

Northern red oak is susceptible to oak wilt, a fungal disease that invades the water-conducting vessels and plugs them. As water movement is slowed, the leaves wilt and rapidly drop off the tree. The disease begins with a crinkling and paling of the leaves, followed by wilting and browning from the margins inward. Necrosis may be strongest along the veins or between them. The symptoms move down branches toward the center of the tree and the tree may die within 1–3 months, although some diseased trees may survive up to a year. The disease may be spread by insects (primarily beetles) or pruning tools, but most of the tree loss in oak wilt centers results from transmission through root spread between adjoining trees. A trench (dug and then immediately filled) between neighboring trees severs the roots and prevents fungus spread. Dead and infected trees must be destroyed – once a tree has become infected, there is little chance to save it. The wood may be used for firewood provided it is debarked or covered and sealed during the spring and summer (Johnson and Appel 2000; Roberts 2000; Wisconsin Dept. of Natural Resources 2000; City of Austin 2000).

This disease most seriously infects species of the red oak group (including black and live oaks). Overcup oak, bur oak, white oak, and other members of the white oak group are not as susceptible and can be planted in oak wilt centers. Oak wilt has reached epidemic proportions in Texas and in the mid-West from Iowa and Minnesota through Michigan and Wisconsin into Ohio, West Virginia, and Pennsylvania.

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

These plant materials are somewhat available from commercial sources. 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

Auburn University 1999. *Trees of Alabama and the southeast web site*. 001207. School of Forestry and Wildlife Science, Auburn, Alabama. <http://www.forestry.auburn.edu/samuelson/dendrology/>

City of Austin 2000. *The oak wilt suppression program*. Austin Parks and Recreation, Austin, Texas. <http://www.ci.austin.tx.us/oakwilt/> Accessed September 2000.

Johnson, J. & D. Appel 2000. *Eight step program to oak wilt management*. Department of Plant Pathology & Microbiology, Texas A&M University, College Station, Texas. <http://cygnus.tamu.edu/Texlab/oakwilt.html> Accessed September 2000.

McDougal, K.M. & C.R. Parks 1986. *Environmental and genetic components of flavonoid variation in red oak, Quercus rubra*. Biochem. Syst. Ecol. 14:291–298.

McDougal, K.M. & C.R. Parks 1984. *Elevational variation in foliar flavonoids of Quercus rubra L. (Fagaceae)*. Amer. J. Bot. 71:301–308.

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. <http://hua.huh.harvard.edu/cgi-bin/Flora/flora.pl?FLORA_ID=12395> Accessed September 2000.

Roberts, D.L. 2000. *Oak wilt: A threat to red oaks*. Michigan State University Extension Website. <http://www.msue.msu.edu/reg_se/oakwilt/> Accessed September 2000.

Sander, I.L. 1990. *Quercus rubra L. Overcup Oak*. Pp. 727-733, IN: R.M. Burns and B.H. Honkala. *Silvics of North America. Volume 2. Hardwoods*. USDA Forest Service Agric. Handbook 654, Washington, D.C. <http://willow.ncfes.umn.edu/silvics_manual/Volume_2/quercus/rubra.htm> Accessed September 2000.

Tirmenstein, D.A. 1991. *Quercus rubra*. IN: W.C. Fischer (compiler). *The fire effects information system [database]*. USDA Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Missoula, Montana. <http://www.fs.fed.us/database/feis/plants/tree/querub/> Accessed September 2000.

Wisconsin Dept. of Natural Resources 2000. *Oak wilt in Wisconsin: Biology and management*. Wisconsin DNR Website. <http://www.dnr.state.wi.us/org/land/forestry/fh/diseases/oakwilt.htm> Accessed September 2000.

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

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

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

SWAMP WHITE OAK

Quercus bicolor Willd.

Plant Symbol = QUBI

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

Robert H. Mohlenbrock
USDA, NRCS, Wetland Science Institute
@ PLANTS

Uses

Industry: The wood of swamp white oak is light brown, close-grained, heavy, and hard. It is similar to that of white oak (*Q. alba*) and usually is cut and sold under that name, but the amount of lumbered swamp white oak is a small fraction of the total for 'white oak.' Also, because the lateral branches of swamp white oak tend to persist (compared to white oak), the wood is knottier and less valuable. The wood is used for furniture, cabinets, veneers, interior finishing, and flooring, as well as for boxes, crates, fence posts, railroad ties, and beams and boards for general construction. As in white oak, the wood provides tight cooperage and was once widely used in making barrels and kegs.

Conservation: Swamp white oak is planted on highway rights-of-way and is frequently used as a shade tree for large lawns, golf courses, parks, and naturalized areas. The crown shape and bi-colored leaves (dark above, lighter beneath) are attractive features; fall color is yellow, with occasional red-purple. The trees can grow well in areas that are dry, poorly drained and wet, or even occasionally flooded, and they will tolerate significant soil compaction.

Wildlife: Trees of swamp white oak provide cover for birds and mammals. The acorns are sweet and are an important food for wildlife such as squirrels, mice, white-tailed deer, beaver, black bear, and a variety of birds, including ducks and turkey.

Ethnobotanic: Native Americans and pioneers have eaten the acorns raw or cooked. They have been ground into a powder and used as a thickening in stews etc or mixed with cereals for making bread. Roasted acorns have been ground and used as a coffee substitute. Bitterness of the tannins is removed by leaching in running water.

Oak galls, caused by the activity of the larvae of various insects, can be used as a source of tannin and dye. They also are strongly astringent and can be used in the treatment of hemorrhages, chronic diarrhea, and dysentery. Some Native Americans used swamp white oak to treat cholera, broken bones, and consumption. Mulch of the dead leaves is reported to repel slugs, grubs, and various insects.

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 commonly growing to 15–20 m, sometimes to 30 m, the lateral branches relatively persistent (slow in self-pruning), with an open, irregularly shaped crown; bark dark gray, scaly or flat-ridged, often peeling off in large, ragged, papery curls. Leaves are deciduous, alternate, obovate to narrowly elliptic or narrowly obovate, (8–)12–18(–21) cm long, (4–)7–11(–16) cm wide, usually with regularly spaced, shallow, rounded teeth, or toothed in distal half only, or moderately to deeply lobed, upper surfaces dark green and glossy, lower surfaces lighter green to whitish, softly hairy. Male and female flowers are borne in separate catkins on the same tree (the species monoecious) on the current year's branchlets. Acorns maturing the first year, ovoid-ellipsoid or oblong, mostly 1.5–3 cm long, single or clustered in groups of 2–4, on a stalk (peduncle) 3-8 cm long; cup enclosing 1/3–1/2 of the acorn, scales closely appressed, finely grayish tomentose, those near rim of cup often with a short, stout, irregularly recurved spinose tip. The common name is from its typical habitat and its membership in the white oak subgroup.

Swamp white oak is a member of the white oak subgroup (subgenus *Quercus*) and hybridizes with related species, including white oak (*Q. alba*), overcup oak (*Q. lyrata*), and bur oak (*Q. macrocarpa*). Swamp white oak is distinguished from all similar native species by its long-stalked acorns.

Variation within the species: Formal variants are not recognized.

Distribution
Swamp white oak occurs mainly in the Midwestern states from Iowa, Missouri, eastern Kentucky, and southern Wisconsin east to New York, Pennsylvania, Connecticut, and Massachusetts. Isolated populations occur northward in Minnesota, other New England states, and Quebec and Ontario, and southward to Tennessee, Virginia, and North Carolina. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Establishment
Adaptation: Swamp white oak occurs in a variety of soils (from silty clay to silt and sandy loams) in swamp forests of river bottoms, streamsides, depressions, borders of ponds, lakes and swamps, and moist peaty flats. It also occurs on moist slopes and poorly drained uplands, at elevations of 0-1000 meters. Swamp white oak grows best in full sun in moist to wet, deep, acidic soils. Development of a 2-layer root system allows it to grow well in areas that are flooded in spring but markedly dry in summer.

Young trees of swamp white oak are tolerant of light shade but become more characteristic of full sun with maturity. Swamp white oak usually is a minor component of the forests in which it occurs, perhaps depending on local disturbance for release into the canopy. Stands of elm-ash-cottonwood will convert to oak-dominated stands that include swamp white oak. White oak forests (of which swamp white oak is a component) will progress towards hickory and beech forests if undisturbed.

Flowering occurs in May–June, during early development of the leaves, while fruiting occurs in August–October.
General: Seed production in swamp white oak begins at 20–30 years. The greatest production occurs between 75–100 years; good seed crops are produced every 3–5 years. The acorns have no dormancy and may germinate the same season as ripening and falling. The maximum age for trees of swamp white oak is 300–350 years.

Swamp white oak can sprout from the stump or root crown if damaged or top-killed.

Swamp white oak can be transplanted or propagated from seed. Young plants from containers and young trees in ball-and-burlap are best planted in early spring. Bare-root transplants also are best done in the spring, but these may be difficult because of the strong and rapid development of the taproot.

Acorns are capable of germination as soon as ripe and must be collected for storage shortly after falling from the tree. They retain viability in storage for only a few months, especially if allowed to dry, and 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. Acorns planted in the fall in permanent positions give the best results.

Management
Swamp white oak is susceptible to various insect pests, fungi, cankers, and wilts but none are serious. It is relatively resistant to oak wilt but may be affected by "oak decline;" anthracnose may sometimes be a problem. Growth in alkaline soils (with pH above 7.2) may cause iron chlorosis.

Because of the slow self-pruning habit of swamp white oak, lower branches may require pruning in areas where high clearance is necessary.

Severe fires can top-kill mature trees of swamp white oak. Fire-damaged survivors are susceptible to disease and insect attack. Moderate fires may kill seedlings and saplings, but young individuals can re-sprout following fire. Acorns are easily destroyed by fire because of high moisture content.

Cultivars, Improved and Selected Materials (and area of origin)
These plant materials are readily available from commercial sources. 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
Anonymous 1998. *1998 Urban tree of the year: Swamp white oak*. IN: *City Trees, The Journal of The Society of Municipal Arborists*. Vol. 34, No. 1. <http://www.urban-

forestry.com/citytrees/v34n1a07.html> Accessed October 2000.

Nixon, K.C. & others 1993. *Quercus*. Pp. 445-506, in Flora of North America, North of Mexico. Vol. 3. Oxford Univ. Press, New York. <http://hua.huh.harvard.edu/cgi-bin/Flora/flora.pl?FLORA_ID=12395> Accessed September 2000.

Rogers, R. 1990. *Quercus bicolor* Willd. Swamp white oak. Pp. 614-624, IN: R.M. Burns and B.H. Honkala. *Silvics of North America. Volume 2. Hardwoods*. USDA, Forest Service Agric. Handbook 654, Washington, D.C. <http://willow.ncfes.umn.edu/silvics_manual/Volume_2/quercus/lyrata.htm> Accessed September 2000.

Snyder, S.A. 1992. *Quercus bicolor*. IN: W.C. Fischer (compiler). *The fire effects information system [database]*. USDA, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory, Missoula, Montana. <http://www.fs.fed.us/database/feis/plants/tree/quebic/> Accessed September 2000.

USDA, NRCS 2000. *The PLANTS database*. <http://plants.usda.gov>. 001106. National Plant Data Center, Baton Rouge, Louisiana.

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>