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University of Idaho College of Natural Resources

Oaks

Yvonne C. Barkley

Long-lived and majestic, oaks (*Quercus* spp.) have been venerated and worshipped by the ancient people of both Old and New worlds. Oaks form a large genus of about 500 species of trees and shrubs, with 58 species of oaks native to the United States and Canada.

Owing to their impermeability to liquids, strength, and durability, wood from the white oak group is favored for wine barrels. The wood from all oaks is prized for its hardness, resistance to abrasion, smooth finishing qualities, and good nail holding capacities. Oak is used to make beautiful furniture, cabinets, and flooring. Red and gray squirrels, white-tail deer, wood ducks, wild turkey, and a variety of woodpeckers, jays, and nuthatches all benefit greatly from the food provided by oaks.

Biology and Silvics

Oaks are widely distributed throughout the temperate regions of the northern hemisphere and at higher elevations in the tropical climates of Columbia, North Africa, and Indonesia. In the United States, oaks are found in a wide variety of habitats and climates. Form and size varies, from scrubby species that reach 20 feet in height and live a mere 200 years to grand, stately species that can reach 100+ feet in height and live 400 to 500 years.

The *Quercus* genus is divided into two groups. The white oak group includes: true white oaks, such as white oak (*Q. alba*) and bur oak (*Q. macrocarpa*): chestnut oaks, such as swamp chestnut oak (*Q. michauxii*) and chinkapin oak (*Q. muehlenbergii*); and live oaks, such as live oak (*Q. viginiana*) and blue oak (*Q. douglasii*). This group has leaves that lack a spiny tip and acorns with sweet seeds and thick, scaly cups that mature in one year. Acorns of the white oak group germinate in fall, which often presents a problem in northern regions where the ground freezes before young emerging roots can become established.

The red and black oak group includes: true red and black oaks such as northern red oak (*Q. rubra*), scarlet oak (*Q. coccinea*), and pin oak (*Q. palustris*); willow oak (*Q. phellos*); laurel oak (*Q. hemisphaerica*); water oak (*Q. nigra*); and western live oaks such as interior live oak (*Q. wislizeni*) and coast live oak (*Q. agrifolia*). This group has leaves with spiny tips or lobes and acorns with bitter seeds and thin cup scales. Acorns in this group mature at the end of two growing seasons and are borne on the previous year's branches. Germination does not take place until the spring following seed fall and many acorns can be destroyed by insects.

Oaks in general are deep-rooted and at the end of the first growing season can have three to four inches of slender top growth with a ¼ - ½ inch diameter taproot that extends a foot or more into the ground. Most species of oaks are classed as intermediate to intolerant of shade, and have the ability to complete multiple cycles of growth, meaning that tops can decline and die back while roots remain alive and increase in size and stored energy. Oaks are prolific stump sprouters and sprouts can respond favorably to release, producing trees of excellent form and quality. Oaks readily hybridize and, in mixed stands, are sometimes difficult to tell apart. Recognized as either white oak or red oak in the lumber industry, each type includes wood of a number of species from each group.

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Establishment

Site selection. Although oaks grow in a wide range of soils and climates, all species will do well on sites with deep, well-drained soils with pH values between 5.5 and 7.0. Overall, oaks tend to be fairly drought-tolerant. In Idaho, they will do best on gentle north- to east-facing slopes or flat, well-drained bottomlands, though species such as swamp white oak and pin oak will tolerate poorly drained soils. Oaks leaf out later than other hardwood species and because of this escape all but the latest of spring frosts.

Planting densities. Oak plantations can be planted at eight by 14 foot spacing. We have found that planting oak closer together within the rows encourages a straighter form, development of a single leader, and less basal and bole sprouting than more generous spacings.

Planting stock. As oaks have such a wide native range and readily hybridize, it is important to purchase trees from known seed sources. Seedlings from more northern seed sources are preferred for Idaho.

Culture and Management

Pruning. Oaks are prolific sprouters and sprouts are easiest to remove as they are emerging in the spring by rubbing them off with your gloved hand. Experience has shown that not only is this the most efficient way to remove multiple sprouts, but it also seems to inhibit subsequent sprouting for the rest of that growing season. Continued removal of sprouts, as well as limbing up branches annually, will ensure future log quality.

Thinning. As trees mature, a commercial thinning can take place at approximately year 20. Every other tree can be removed to open the plantation up to a 16 by 14 foot spacing. Trees taken can be used for specialty products such as turned bowls and vases, spoons, furniture, and flooring. The remaining trees can then be left to grow into larger, veneer quality logs.

Excellent wood qualities, adaptability to a wide range of growing conditions, superb wildlife value, and vivid fall coloration all make the *Quercus* species attractive selections for alternative tree crops for Idaho.

At a glance …

White oak group

Species: *Quercus alba*
Common names: white oak, stave oak.
Native range: eastern United States.
Hardiness: USDA Zone 3 to 9.
Soil type: wide variety of soils and sites; will tolerate dry soils, mildly alkaline pH, and moderate soil compaction; growth good on all but rocky, wet, or poorly-drained sites.
Shade tolerance: intolerant.
Form: large, semi-formal tree; 50 to 80 feet tall.
Regional insect & disease problems: oak wilt; anthracnose.
Objectionable characteristics: difficult to transplant.
Other: nuts provide mast for wildlife; wood very valuable, used for furniture and barrels.

Species: *Quercus bicolor*
Common names: swamp white oak.
Native range: northeastern United States; found in both upland and wet areas subject to flooding, though not in areas permanently under water.
Hardiness: USDA Zone 3 to 8.
Soil type: tolerates poorly drained soils.
Shade tolerance: intermediate.
Form: long-lived, medium-sized tree; 50 to 70 feet tall with an irregular, open crown.
Regional insect & disease problems: anthracnose, oak wilt.
Objectionable characteristics: does not tolerate extended drought.
Other: wood similar to white oak in character and value; acorns provide food for wildlife; good species for low-lying areas subject to standing water or flooding.

Species: *Quercus gambelii*
Common names: Gambel's oak, Rocky Mountain white oak.
Native range: central Rocky Mountains.
Hardiness: USDA Zone 2 to 8.
Soil type: wide variety of soils and sites; on dry

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foothills, canyons, and lower slopes from 5,000 to 9,000 foot elevation.
Shade tolerance: intermediate.
Form: multi-stemmed trunk reaching 15 to 30 feet in height; rounded crown; often forms thickets.
Regional insect and disease problems: no serious threats.
Objectional characteristics: none.
Other: wood is hard, heavy, and close grained, though not often used commercially it is used locally for firewood. One of the most drought tolerant of the oaks.

Species: *Quercus macrocarpa*
Common names: bur oak, mossycup oak, mossy-overcup oak, and scrub oak.
Native range: eastern North America, with extensions into south-central United States, where it is a pioneer species and frequently planted in windbreaks.
Hardiness: USDA Zone 2 to 8.
Soil type: from moist bottomlands to dry hillsides, mainly in limestone soils.
Shade tolerance: intermediate.
Form: medium to tall tree; 65 to 130 feet tall, with a broad, spreading crown.
Regional insect & disease problems: oak wilt.
Objectional characteristics: will not tolerate flooding.
Other: resistant to injury by fire; very drought resistant; large seed crops produced every two to three years offer excellent food supplies to a wide variety of wildlife; wood is very hard, heavy, strong, and durable - usually marketed as white oak.

Species: *Quercus robur*
Common names: English oak.
Native range: England; escaped widely in the United States.
Hardiness: USDA Zone 4 to 8.
Soil type: thrives in clays soils, but adapts well to lighter, stonier soils.
Shade tolerance: intermediate.
Form: large tree; 150 feet tall or more, with a wide-spreading crown rising from a sturdy, fairly short trunk.
Regional insect and disease problems: oak wilt.
Objectional characteristics: some seed sources have poor form when young.
Other: many English ships have been constructed from English oak, as were countless interiors of castles and churches; the preferred wood for wine barrels.

Red\black oak group

Species: *Quercus coccinea*
Common names: scarlet, black, red, Spanish oak.
Native range: eastern United States, from southwestern Maine west to southern Michigan and south to central Mississippi; found up to 5,000 foot elevation in Appalachian Mountains; native range within humid region.
Hardiness: USDA Zone 4 to 9.
Soil type: on dry, sandy sites; will tolerate a wide variety of soils; low to moderate moisture requirements.
Shade tolerance: very intolerant.
Form: medium-sized tree; 60 to 80 feet tall with an open, rounded crown.
Regional insect & disease problems: oak wilt, cankers, tent caterpillar.
Objectionable characteristics: susceptible to fire damage, sunscald.
Other: lumber mixed and sold with other red oak species.

Species: *Quercus palustris*
Common names: pin oak, swamp oak, water oak, and swamp Spanish oak.
Native range: middle Atlantic and central United States.
Hardimess: USDA Zone 4 to 8.
Soil type: primarily a low-land tree that thrives in poorly drained, claypan soils typical of floodplains; grows well in deep, well-drained soils; becomes chlorotic in alkaline soils.
Shade tolerance: intolerant.
Form: fast-growing, short-lived, medium sized

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tree; 50 to 80 feet tall with a broad, pyramid shaped crown.

Regional insect & disease problems: oak wilt.

Objectional characteristics: iron chlorosis in alkaline soils.

Other: transplants well; tolerates short periods of flooding; good for use in areas too wet to support other species; large acorn crops every two to three years valuable for wildlife, especially ducks; wood is coarse-grained, hard, heavy, and is used in general construction as posts and for firewood; an ornamental favorite; one of the best oaks for fall color.

Species: *Quercus rubra*

Common names: northern red oak, eastern red oak, mountain red oak, gray oak.

Native range: eastern United States; only native red oak extending into Nova Scotia.

Hardiness: USDA Zone 4 to 8.

Soil type: will tolerate moist or dry soils; does well in alkaline conditions, with moderate irrigation.

Shade tolerance: intolerant.

Form: large, semi-formal tree; 60 to 90 feet tall with a spread of 40 to 60 feet.

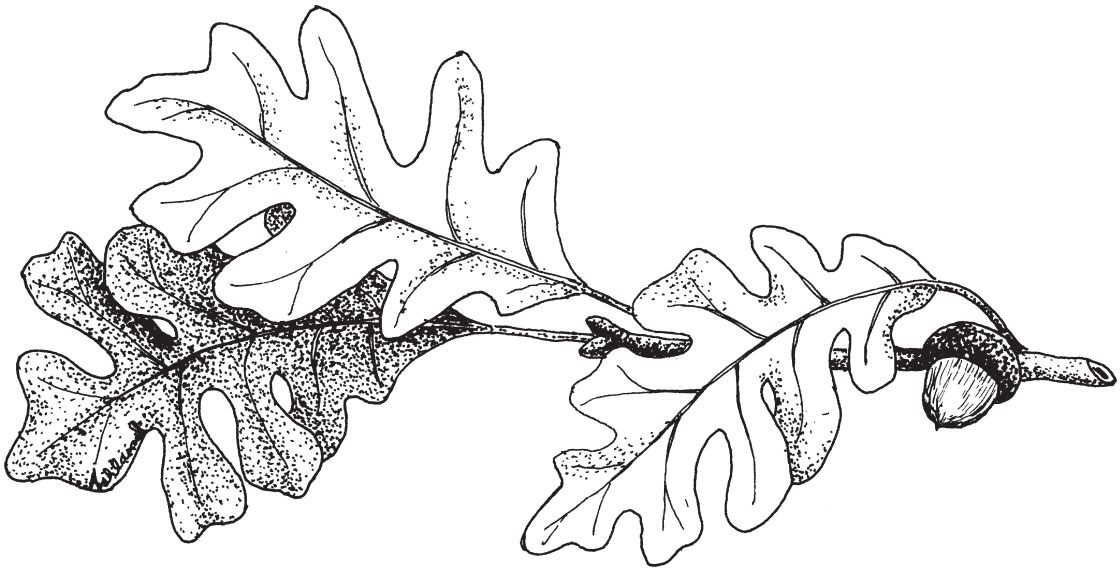
Regional insect & disease problems: oak wilt.

Objectionable characteristics: susceptible to damage from fire.

Other: less difficult to transplant than most oaks; tolerates air pollution, compacted soils; hardy throughout Idaho; nuts provide important food for squirrels, turkeys, mice, and other mammals and birds.

About the Author: *Yvonne C. Barkley* is an Associate Extension Forester with University of Idaho Extension.

Graphic artist: *Lorraine Ashland.*



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