

## Oak: Shade tree with character

by Douglas Chapman, Dow Gardens

*Quercus*—a genera with one of the greatest geographic ranges—is the most important hardwood timber group in the United States. It should be one of the most important shade tree genera in production.

Many of the individual species—such as red oak, scarlet oak and white oak—have native ranges from southern Ontario to Texas with many provenances and morphological variation. When considering optimal growing, oak species are adapted to conditions varying from droughty upland sites to flood plains. *Quercus* species are variably tolerant of urban stress, air pollutants (ozone and sulfur dioxide), salt and various diseases.

The oak is botanically "accepted" in two groups—white and red oaks.

A few in the white oak group include white oak (*Quercus alba*), swamp white oak (*Quercus bicolor*) and bur oak (*Quercus macrocarpa*). This group exhibits resistance to oak wilt, being adapted to a wide-range of sites. Generally, the lobes in the leaves are obtuse, or oval, for the entire group.

### White oak

White oak is a long-lived climax forest tree (800 years). It is native to an extensive geographic range, which includes all areas east of the Great Plains. The plant is valuable for its lumber as well as an exciting landscape specimen.

It is a rapid tyloses former, thus a good compartmentalizer which calloses over quickly. The leaves are bluish-green throughout the summer, varying from a rich burgundy to a brown in fall.

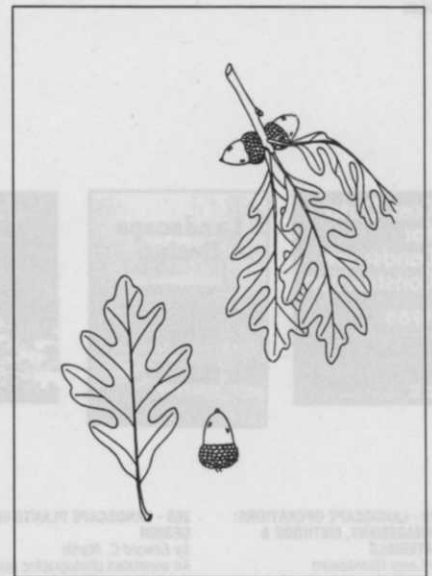
White oak transplants easily when young (under 1½ inches in diameter) into fertile, well-drained soils. When considering growing from seedlings, it is particularly important that nurserymen select seed from local sources as provenance.

Flooding, even for a short period of time, can cause root death and/or decline. The Morton Arboretum reported general decline of white oak throughout the Chicago area due to extremely wet periods early in the 1970s.

Research at the University of Illinois noted that white oak has a very shallow fibrous root system which does not compete well with turf. This indicates that white oak is not a good in-lawn species but would be a good companion plant for pachysandra or myrtle as a ground cover.

White oak is outstanding as a specimen tree which should be grown in full sun. It can be used in parks, on golf courses, or in institutional landscapes.

Advantages of white oak include resistance to ice breakage, good tolerance to sodium chloride (highway salt), a high degree of resistance to oak wilt, good longevity and relatively



White Oak

low maintenance requirements. This is such a low-maintenance tree that no more than one or two corrective prunings are needed for the life of the plant.

The main disadvantage of *Quercus alba* includes extreme susceptibility to anthracnose and a slight susceptibility to ozone and sulfur dioxide. Some white oaks are rarely affected by anthracnose. Therefore, selection and introduction of resistant cultivars would be important.

### Swamp white oak

Swamp white oak (*Quercus bicolor*) is native from southern New England to the Great Lakes. It grows well in rich, acid, wet low-oxygen soils, found in flood plains. Swamp white oak has very shallow roots. Although anthracnose can be a severe problem, spraying during mid-May can dramatically reduce infection.

The summer leaf is dark green with a slightly gray-silver underside. Swamp oak is better in large-area landscapes or parks and not as street trees. In fact, swamp white oak is extremely sensitive to sodium chloride, thus should not be planted near the coast or near highways where salt is used for snow removal.

### Bur oak

Bur oak (*Quercus macrocarpa*) is one of my favorite trees for growing in fine

### OAK TREE GROWING HABITS

Type	Height at maturity (feet)	Canopy Shape
White Oak	50-80	oval
Swamp white oak	50-60	round
Bur oak	80-90	oval
Black oak	50-60	oval
Scarlet oak	60-75	oval
Northern red oak	60-70	round
Pin oak	60-75	pyramidal

turf situations. It is native from western New York to the Dakotas and south to central Texas, but is found most frequently on the Great Plains. It adapts well to urban conditions, being tolerant of highway salts and ozone. It thrives in calcareous, well-drained, almost droughty soils.

Bur oak does have a tap root and is extremely drought resistant. When considering use, *Quercus macrocarpa* is most effective in large-area landscapes, such as parks, golf courses and commercial situations. Bur oak does not transplant easily; therefore, the smaller the plant, the greater are your chances for success. The foliage is dark green on the upper surface with a white tomentose on the underside. The dark blue-green of summer turns yellow to brown during late fall. The massive trunk is covered with a thick (four-inch) layer of bark, making it very fire resistant—a survival mechanism.

In its native range, a tree of the Great Plains, it carries most of the desirable characteristics of white oak. It thrives in urban conditions, requiring little maintenance.

Generally, the white oak group contains trees that are slow growing. Many are difficult to find in the nursery trade. These oaks should be used more in large-area commercial landscapes. They have few catastrophic insect or disease problems, require little or no pruning, and are tolerant of a wide range of conditions, filling niches from calcareous soils to clay loams.

### Red oak

The red oak group includes black oak (*Quercus Ylina*), scarlet oak (*Quercus occinea*), northern red oak (*Quercus rubra*), English oak (*Quercus robur*), and northern pin oak (*Quercus pluristris*).

In general, this group grows more rapidly with a shorter life span. In addition, it is quite susceptible to oak wilt, as compared to the white oak group.

### Black oak

Black oak (*Quercus velutina*) has a broad native range, all areas east of the Great Plains, excluding only a small portion of Texas and Florida. *Q. velutina*'s dark green leaves of summer make it a valuable specimen. It is a rapid grower in well-drained, upland sites.

In addition, it transplants with relative ease in sizes up to two inches in trunk diameter. It is intolerant; that is, a species that must grow in full sun. It can be used in large institutional grounds, parks or golf courses.

In native conditions, black oak is often found associated with scarlet oak and hybridizes readily. It exhibits many of the environmental tolerances that scarlet and northern red oak have. It should become a more valuable tree for the landscape.

### Scarlet oak

Scarlet oak (*Quercus coccinea*) is a rapid growing (2 to 2½ feet per year) upland tree species. It grows well in moist, yet well-drained soils. *Q. coccinea*, while young, has a rather upright habit of growth, becoming upright at maturity. The foliage is a glossy lime-green throughout the summer which becomes an effective scarlet to burgundy. It transplants quite easily as it has a rather shallow, fibrous root system.

Among scarlet oak's advantages are that it is rapid growing and tolerant of ozone and sodium chloride. *Q. coccinea* is effective as a street tree as well as a specimen in commercial or institutional landscapes. The disadvantages include frequent pruning (every three to four years), relatively short life span (70 to 80 years) and susceptibility to oak wilt.

### Northern red oak

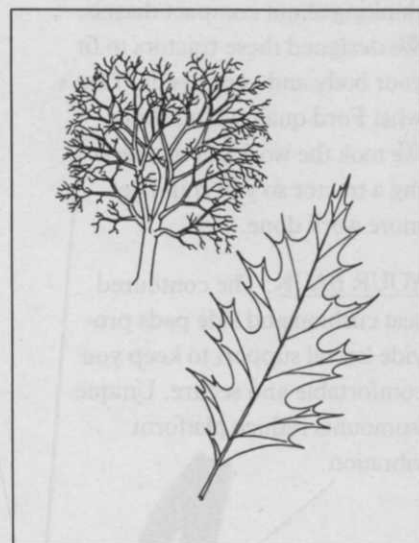
Northern red oak (*Quercus rubra*) is also a good street tree or specimen plant for park, golf course, or industrial landscapes. Its foliage is a shiny brilliant green throughout the summer, becoming a scarlet-red during the fall.

Red oak transplants readily. It grows best in moist, yet well-drained soils. *Q. rubra* is tolerant of many urban conditions, including low-oxygen soils, sodium chloride, ozone and sulfur dioxide. The main disadvantage of red oak is its susceptibility to oak wilt. When using this tree in the landscape, it should be limited to less than five percent of the street tree population to avoid catastrophic disease problems.

### Pin oak

Pin oak (*Quercus sp. lustris*) displays an upright habit of growth when young. This tree has a strong central leader and horizontal branches which at maturity become heavy and can hang down. Pin oak is a relatively short-lived tree, when considering oaks, rarely living over 60 to 80 years in the landscape or 80 to 90 years in native conditions.

Pin oak thrives in acid, clay/loam soils. It is easy to transplant and grows well as a street tree if one has acid soils. Pin oak is extremely exciting as a specimen tree in golf courses and parks or commercial landscapes, but should not be used in landscapes



Northern Red Oak

where the soil has been disturbed. Disturbed soil usually results in iron chlorosis problems and ultimate decline of the tree.

Pin oak's main disadvantages include iron chlorosis, oak wilt, and slight susceptibility to ozone and salt. (Ohio State University has reported iron citrate implants overcome the problem of iron chlorosis but, considering other maintenance requirements and disease susceptibility, this ornamental, although aesthetically exciting, should be low on the recommended list of shade trees.)

The oaks are an exciting genera which should be used more extensively in the landscape. Their native range is extensive throughout the entire eastern United States. Further, they grow in soils ranging from heavy clay to fertile, yet well-drained. Generally, many of the plants display good tolerance to urban conditions.

Most oaks are poor competitors with turf; therefore, ground covers should be used around them, such as pachysandra, myrtle or lily-of-the-valley. Bur oak (*Q. macrocarpa*) is a rare exception. It is outstanding as a tree growing in fine turf. Many of the oak species are not readily available in the trade because of reported difficulty in transplanting.

Research is appropriate to study transplanting, mycorrhiza relations, and new propagation techniques. In addition, cultivars should be selected for resistance to anthracnose or adaptation to local areas, like the Great Lakes or New England states.

We must continually remind ourselves as landscape managers that provenance (local adaptation) plays an important role in the survival of many oaks. Oak should highlight the landscape architect's palette of desirable adaptive native trees. **LM**