WHITE OAK RESISTANCE TO WILT COMPARED TO RED OAK COLOR, SPEED

By Douglass Chapman, Horticulturist, Dow Gardens, Midland, MI.

Oak *(Quercus)*, a sun-loving tree, is the most important hardwood timber genera in the United States. It should be one of the most important shade tree groups in production today. When considering optimal growing, oak species are adapted to conditions varying from droughty upland sites to flood plains. Quercus species are variably tolerant to urban stress, air pollutants (ozone and sulfur dioxide), salt (chlorides), and disease. I would like to discuss the oak in two accepted groups — red and white oak.

The red oak group includes Scarlet Oak *(Quercus coccinea)*, Northern Red Oak *(Quercus rubra)*, Black Oak *(Quercus velutina)*, Pin Oak *(Quercus palustris)*, and English Oak *(Quercus rubur)*. In general, this group grows more rapidly with a shorter life span while showing acute susceptibility to oak wilt when compared to the white oak group.

Scarlet Oak *(Q. coccinea)* is a rapid growing (2-3 feet per year) upland tree species. It grows well in moist, well-drained soil. *Q. coccinea* has an upright, oval habit of growth, reaching 60-75 feet in the landscape. The foliage is a glossy green throughout the summer with an effective soft red yet variable fall color. It transplants easily as it exhibits little or no tap root. When considering advantages, Scarlet Oak is the most rapid growing oak and shows moderate tolerance to ozone and highway salts. *Q. coccinea* is effective as a street tree as well as a specimen in golf courses and institutional grounds. Its disadvantages include a relatively short lifespan (70-80 years), extreme susceptibility to oak wilt, and high maintenance requiring pruning every 3-4 years.

Red Oak *(Q. Rubra)* is a good street, park, golf course, industrial, and home landscape specimen tree. Its foliage is shiny green throughout the summer, becoming bright red in the fall. This rounded tree ultimately reaches 60-70 feet in height, with some individuals in the wild reaching over 110 feet in height. Red Oak transplants readily into moist, yet well-drained soil. *Q. rubra* is tolerant of urban conditions, e.g., salt, ozone, and sulfur dioxide. The main disadvantage of Red Oak is its extreme susceptibility to oak wilt, which should limit the use of it in areas where this disease is active. Further, when using this tree in the landscape, it should be limited to less than 5% of the street trees in any one locale, thus avoiding catastrophic problems similar to those of American Elm.

Black Oak *(Q. Velutina)* is second only to White Oak in a broad native range which is essentially from the Great Plains - East, excluding small parts of Texas and Florida. It has a broad oval crown, reaching 50-60 feet in height. *Q. velutina's* dark green leaf of summer makes it a valuable specimen. It grows rapidly in well-drained, upland sites, while transplanting with relative ease up to 2 inches in diameter. It is shade intolerant; therefore, is a good specimen tree in full sun. It can be used in institutional grounds, parks, or in golf courses. Black Oak is often found associated with Scarlet Oak and hybridizes readily. It exhibits many of the same environmental tolerances as Scarlet and Red Oak. It should become a more valuable tree in the trade.

Pin Oak *(Q. palustris)* displays a pyramidal habit of growth, reaching 60-70 feet in height. This tree, with a strong central leader and horizontal branches (rarely over 20 feet in length) has great eye appeal for individual home landscapes. This is a relatively short-lived tree, when considering oaks rarely live over 80 to 90 years. Pin Oak thrives in very poorly-drained, acid soils. It has been used as a street tree but is almost always a disappointment. Pin Oak may have a place as a native tree in golf courses, parks, and industrial grounds, but should not be used in the home landscape or as a street tree. Its disadvantages include extreme susceptibility to oak wilt, moderate susceptibility to ozone and salt spray and iron chlorosis (deficiency) on disturbed sites, which include almost every landscape. Dr. Smith at Ohio State University has reported iron citrate implants overcoming the problem of iron chlorosis but considering the high maintenance requirements, disease susceptibility, and urban environment intolerance, this ornamental should be very low on one's recommended list of trees.

English Oak *(Q. robur)* is a pyramidal tree when young, reaching 70 to 80 feet at maturity with a rounded crown. The foliage is a rich dark green throughout the summer with little or no fall color. This oak transplants readily into well-drained fertile soil. It is a good specimen tree for parks, institutional grounds, golf courses, in the home landscape, and as a street tree. It is tolerant of urban conditions, especially air pollution, salt, and anthracnose. *Q. robur* is less susceptible to oak wilt than Scarlet Oak, but more susceptible than White Oak. This is a relatively low maintenance tree, but it grown on marginal sites (heavy soil), borers can become a problem (reported by Michigan State University). Although there are many native trees which thrive under the varying conditions, English Oak fills an interesting niche intermediate between red and white oaks.

The white oak group includes White Oak *uercus alba)*, Swamp White Oak *(Quercus bicolor)*, and Bur Oak *(Quercus macrocarpa)*. This group is long-lived (White Oak being reported 750 years old), fairly resistant to oak wilt, and adapts to a wide range of sites. Generally, the lobes on the leaves are obtuse or oval for the entire white oak group.

White Oak *(Q. alba)* is native to an extensive geographic range in all areas east of the Great Plains. This plant is valuable for its lumber as well as an exciting landscape specimen. The habit is pyramidal when young, becoming an 80-foot oval at maturity. The leaves are a bluish-green throughout the summer and change to rich red to brown in fall. White Oak transplants easily when young (under 1½ inches in diameter) into fertile, well-drained

Scarlet Oak *Quercus coccinea* is the most rapid growing oak and transplants well, requires pruning every three to four years.

Bur Oak *Q. macrocarpa* has the benefits of a white oak and is a promising low maintenance tree if transplantability can be improved.

soil. Flooding, even for a short period of time, can cause decline in White Oak, as in the Chicago area due to extremely wet periods during the early 1970's. Researchers at the University of Illinois report that White Oak has a very shallow fibrous root system which doesn't compete favorably with grass. This indicates that a good companion plant for White Oak or, in fact, many of the oak would include pachysandra or myrtle as a ground cover rather than turf. White Oak is a good specimen tree which should be grown in full sun, in parks, golf courses, or on institutional grounds. It is the state tree of Illinois. The advantages of White Oak include resistance to ice breakage, good tolerance to highway salt, high degree of resistance to oak wilt, longevity, and low maintenance. This is such a low maintenance tree that no more than one or two prunings are needed for the life of the planting. The main disadvantages of *Q. alba* include oak anthracnose (Gnomonia species) and a slight susceptibility to ozone and sulfur dioxide as reported by Davis and Gerhold. White Oak should still be considered a high value, low maintenance specimen for large area landscapes.

Swamp White Oak *(Q. bicolor)* adapts well to rich, acid-wet soils found in flood plains. It is outstanding as a specimen for golf courses, institutional grounds, parks, and the home landscape. *Q. bicolor* has a somewhat open, round crown which reaches 50 to 60 feet in height. The summer leaves are dark green on the upper surface with a dull or silver-green lower surface. Swamp White Oak is sensitve to highway salts and is not easy to transplant in larger sizes, but comes with all the advantages of White Oak while tolerating high moisture soils. It certainly should be used more extensively in large area landscapes.

Bur Oak *(Q. macrocarpa)* has an oval habit, reaching 80 to 90 feet in height. The plant adapts well to urban conditions, being tolerant of highway salts and ozone. It adapts well to many soil types while thriving in calcerous, well-drained, almost droughty soil. It does have a pronounced tap root, therefore, does not transplant easily. Research should be initiated to understand and improve ease of transplantability for this otherwise outstanding tree. The foliage is dark green on the upper surface with a white tomentose on the underside, turning yellow to brown during late fall. The trunk is massive with a thick bark (4 inches), which makes it very fire resistant—a survival factor in its native range of the Great Plains. It is one tree which competes well with grass for nutrients and water; therefore, it can easily grow in fine turf areas. It carries most of the desirable characteristics of White Oak, thrives in urban conditions, and is a low maintenance tree (requiring little pruning after establishment).

Oaks are an exciting genera which could be more effectively used in the landscape. Their native range is extensive throughout the entire Northeastern and Eastern United States. They grow in soils ranging from heavy clays to well-drained. Generally, many of the plants display good tolerance to urban conditions and are aesthetically outstanding. Most oaks are poor competitors with turf; therefore, ground covers, such as pachysandra or myrtle, would be good companion plants. All oak types have not been readily available from the trade because of their difficulty in transplanting. Research is appropriate in the areas of mychorrhizae, transplant ability, propagation by cuttage of selected cultivars, and the development of area trees, e.g., Great Lakes or New England States White Oaks. We must realize that provenance, local adaption, plays an important role in the survival of many oak transplants. Oak should headline the list of desirable adaptive trees for landscape architects, nurserymen, and urban foresters. **WTT**