

# Silvical Characteristics

of

## Shumard Oak

by

Thomas Lottí





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(Quercus shumardii Buckl.)

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Thomas Lotti  
Charleston Research Center

Shumard oak (Quercus shumardii Buckl.), also known as Schneck oak, Schneck red oak, Shumard red oak, southern red oak, spotted oak, and swamp red oak, is found along the Atlantic Coastal Plain from North Carolina to northern Florida and along the Gulf of Mexico to eastern and central Texas; north in the Mississippi Valley to southwestern Oklahoma, eastern Kansas, southern Illinois, Indiana, and southern Ohio; and in localities in southern Pennsylvania, Maryland, and West Virginia (6) (fig. 1).

## HABITAT CONDITIONS

### CLIMATIC

Shumard oak grows in a climate which is primarily of a humid, temperate nature, characterized by hot summers and mild, short winters (12). Through the major part of the tree's commercial range, the growing season extends from 210 to 250 days, with average annual temperature from 60° to 70° F., and average annual precipitation from 45 to 55 inches. Within this area the annual maximum temperature is about 100° F. and the annual minimum about 15° F. Half or more of the rainfall occurs during the warm season, April through September. The tree's ability to grow in a severe climate is shown by its presence in parts of Texas and Oklahoma where the average annual rainfall is only 25 inches.

### EDAPHIC AND PHYSIOGRAPHIC

Shumard oak attains its best development in the southern forest on moist, well-drained loamy soils found on terraces, colluvial sites, and adjacent bluffs associated with large and small streams. It is also found in coastal plain hammocks, but rarely occurs on first bottom sites (9). In central Texas and Oklahoma, the tree grows on dry, low limestone hills (11). In the southern part of the Central Forest, extending into the Southern Forest and to the borders of the western prairies, it also occurs on dry uplands and ridges (11).



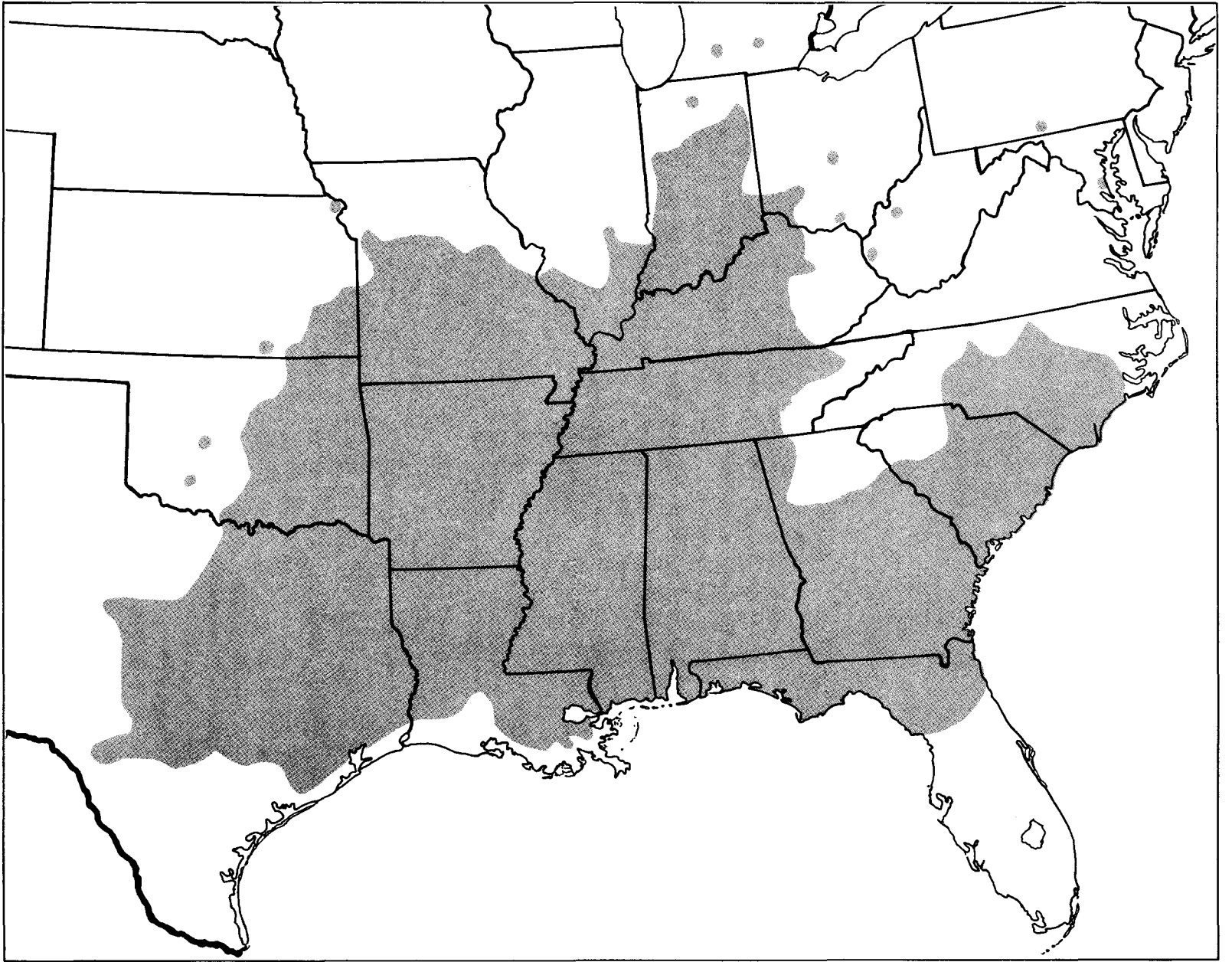


Figure 1. -- Botanical range of Shumard oak (*Quercus shumardii* Buckl.).

## BIOTIC

Shumard oak is an associate species in the swamp chestnut oak-cherrybark oak, Ashe juniper ("Mountain Cedar"), and Mohrs ("Shin") oak types of the Southern Forest; and of the post oak-black oak type of the Central and Southern Forests, according to the Society of American Foresters (11).

In the swamp chestnut oak-cherrybark oak type, Shumard oak is classed as a chief associate of the type species, along with white oak (Quercus alba), Delta post oak (Quercus stellata var. mississippiensis), blackgum (Nyssa sylvatica), white ash (Fraxinus americana), shagbark hickory (Carya ovata), shellbark hickory (Carya laciniosa), mockernut hickory (Carya tomentosa), and bitternut hickory (Carya cordiformis) (11). Shumard oak generally occurs as a single tree or in small groups, but it never makes up more than a small part of the stand over a large area (10) (fig. 2).

In the Ashe juniper type, the named conifer (Juniperus ashei) and Shumard oak may be associated with cedar elm (Ulmus crassifolia), hackberry (Celtis occidentalis), Mohrs oak (Quercus mohriana), Durand oak (Quercus durandii) and scrub live oak (Quercus virginiana var. fusiformis). After a harvest cut, the Ashe juniper is often succeeded by Shumard oak (11).

The Mohrs oak type, sometimes referred to as the "oak shinneries," in addition to the type species often includes Shumard oak, scrub live oak, hackberry, American plum (Prunus americana), and holly (Ilex sp.) (11).

Shumard oak is one of the minor associates in the post oak-black oak type; blackjack oak (Quercus marilandica) and miscellaneous hickories are more common associates of the type species Quercus stellata and Quercus velutina (11).

For stream terraces and similar lands having deep, moist, well-drained soils, some of the other common plant associates of the Shumard oak are red buckeye (Aesculus pavia), devils-walkingstick (Aralia spinosa), American hornbeam (Carpinus caroliniana), flowering dogwood (Cornus florida), witch hazel (Hamamelis virginiana), American holly (Ilex opaca), red mulberry (Morus rubra), southern bayberry (Myrica cerifera), and Carolina basswood (Tilia caroliniana) (5).

Shumard oak's place in the ecological succession has not been clearly defined. It is listed among the more prominent southern oaks included in the Oak-Hickory Forest region (2). In general, this forest is characterized by the prevalence of oak-hickory climax communities (2). One of these is the white oak climax forest association found in southeastern Oklahoma on north-facing slopes of the higher mountains and on lower upland slopes near streams; white oak is the dominant species, but one of the characteristic trees is Shumard oak (7). However, it is not definitely established that Shumard oak is a true climax species in most oak-hickory communities where it is found. On the drier habitats west of the Mississippi, where the species is seemingly more aggressive, Shumard oak shows some evidence of being a climax species.



Figure 2.--A 50-year-old Shumard oak about to be felled for saw logs. This was a single tree found in a mixed hardwood and loblolly pine stand which averaged about 10,000 board feet per acre, located on a well-drained terrace adjacent to a small stream on the Santee Experimental Forest near Charleston, South Carolina.

## LIFE HISTORY

### SEEDING HABITS

#### Flowering and Fruiting

The tree's flowers are unisexual, with the stamens in glabrous 6- to 7-inch-long aments; the pistils are borne singly or paired on pubescent stalks (4). Flowering usually occurs in March or April.

The acorn is borne solitary or in pairs: the nut is oblong-ovoid, and may be up to  $1\frac{1}{4}$  inches long and 1 inch in diameter; the cup is saucer-shaped with somewhat pubescent scales (4) (fig. 3). The seed ripens in the second year, usually in September or October, during which time the seed also falls. As in many southern oaks, the nut is subject to attack by acorn weevils, such as Curculio baculi, Curculio rectus, and Curculio pardalis (1). A reliable method of sorting weeviled acorns from sound ones, according to tests at the Santee Experimental Forest, is by color of the cup scar on the nut: a bright, light tan indicates a good acorn, while the bad ones are a dull brown.

#### Seed Production and Dissemination

Seed bearing begins at about 25 years and reaches optimum production at about 50. Good seed crops occur at intervals of 2 or 3 years, with light crops in between. Sometimes the crop is a total loss. For example, a freeze in April 1955, after flower buds opened, resulted in a complete crop failure in South Carolina in 1956. Dissemination largely depends on the hoarding activity of animals, mainly squirrels. Along terrace margins and in the hilly sections of the tree's range, as in Texas and Oklahoma, gravity dissemination may be important.

Inasmuch as acorns rate at or very near the top of the wildlife food list, there is reason to assume that the Shumard oak supplies its proportionate share of the bird and animal acorn diet. It is reported that acorns constitute over half the animal diet for white tailed deer (Odocoileus virginianus) in Texas (8). At least in the Mohrs oak and Ashe juniper types, Shumard oak acorns are probably an important source of food for the deer herd.

### VEGETATIVE REPRODUCTION

Like most southern oaks, it probably sprouts best when young. It is not a prolific sprouter on moist sites, as evidenced by the absence of other than single-stemmed trees in such locations. On dry sites, sprouting is more prolific. As is typical of the oaks, Shumard is considered difficult to propagate by cuttings.

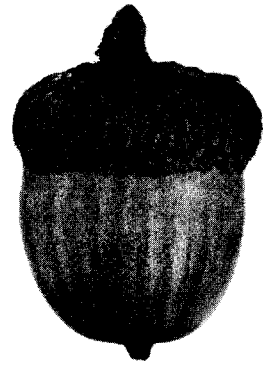


Figure 3. --Typical bark, fruit, twig and bud, and leaves of Shumard oak.





## SEEDLING DEVELOPMENT

### Establishment

Because Shumard oak is a comparatively intolerant species, reproduction is not easily obtainable except in full light. It is puzzling that this species, which grows to such large size in the coastal plain and Delta regions, should be generally so uncommon and local in its distribution. The acorn is large and highly palatable to animals and this may be one factor restricting its regeneration. Certain site requirements may be important too. For example, in the coastal plain and Delta, Shumard is seldom found except on deep, rich soils supplied with an abundance of moisture but well-drained; this is not entirely typical, as in certain localities, such as in Texas, Oklahoma, northern Mississippi, and western Tennessee, the species inhabits dry, upland sites.

### Early Growth

The possibility of regenerating Shumard oak by seeding or planting has not been fully explored. Studies in progress at the Santee Experimental Forest show an average third-year survival of 75 percent for planted 1-0 nursery stock, and 30 percent survival for direct-seeded acorns on sandy loam soils associated with terraces of small streams of the South Carolina Coastal Plain (fig. 4). Total height at the end of 3 years for the acorn sowings was fair, averaging 27 inches, and indicative of the seedling growth of natural regeneration. Average 3-year height growth attained from sowings in full sunlight was 30 inches, compared to 24 inches for those sowed under forest cover and released at end of first growing season.



Figure 4. --Planted Shumard oak (1-0 nursery stock) in middle of fourth growing season. Santee Experimental Forest.

## SAPLING STAGE TO MATURITY

### Growth and Yield

At its best, Shumard oak is one of the largest southern oaks, developing a straight, tall, clear trunk up to 4 or 5 feet in diameter, with a total height of 90 to 125 feet (4). Diameter growth is good, at least in the coastal plain and Delta regions, averaging 3 to 4 inches in 10 years (9).

Commercially, Shumard oak generally occurs singly or in very small groups. Consequently, areawise volume and yield values for the species are not available. In mixtures with other species, total volumes exceeding 8,000 board feet per acre for all trees are currently classed as heavy sawtimber stands (4). Heavy pole stands will contain over 175 stems per acre of all species 5 to 11 inches d. b. h. (9). In the old-growth forest, mixed stands containing Shumard oak totalled as much as 30,000 board feet per acre.

### Reaction to Competition

Light requirements needed to establish natural regeneration induces a heavy growth, at least on moist sites, of annual weeds, vines, briars, and brush. This competition in turn may retard the early development of Shumard oak unless released by cultural treatment.

### Principal Enemies

Shumard oak is susceptible to a number of diseases including rots, wilts, and leaf diseases. The most common wood-rotting fungi attacking this oak are species of Fomes, Polyporus, and Stereum. Oak leaf blister (Taphrina caerulescens) may be common in certain years. It is understood that oak wilt (Ceratocystis fagacearum) has killed Shumard oak in Missouri.

No insects are known to attack only Shumard oak. However, the species may be subject to attack, especially on poor upland sites, from an almost endless list of insects affecting southern oaks in general. Some of the more common are:

Defoliators. -- June beetles (Phyllophaga spp.); orange-striped oakworm (Anisota senatoria); canker worms (Alsophila pometaria and Paleacrita vernata); forest tent caterpillar (Malacosoma disstria); yellow-necked caterpillar (Datana ministra); variable oak leaf caterpillar (Heterocampa manteo); and the red-humped oakworm (Symmerista albicosta) (3).

Borers. -- Attacking healthy trees -- Red oak borer (Romaleum rufulum) (cambium and outersapwood); carpenter worms (Prionoxystus spp.) (heart and sapwood); and the Columbian timber beetle (Corthylus columbianus) (sapwood) (3).

Borers. -- Attacking weakened trees -- Two-lined chestnut borer (Agrilus bilineatus) (cambium); tile-horned prionus (Prionus imbricornis) (roots) (3).

Borers.--Attacking dying trees--Oak timberworm (Arrhenodes minuta) (3).

Scales.--Pit-making oak scale (Asterolecanium variolosum) (kills reproduction and tops on older trees) (3).

Galls.--Gouty oak gall (Callirhytis punctata); horned oak gall (Callirhytis cornigera and Andricus clavigerus) (3).

Leaf miners. --Basswood leaf miner (Baliosus ruber) (3).

### SPECIAL FEATURES

The wood of Shumard oak is similar to northern red oak (Quercus rubra) and possibly of higher quality (10). It has a mild texture and the quality is generally good, causing the tree to be closely utilized when harvested commercially (10). Its products include high-value face veneer, factory lumber, and the general run of items for which red oak is used.

### RACES AND HYBRIDS

No races of Shumard oak are known, but the check list recognizes one variety, Texas oak (Quercus shumardii var. texana) (6). This tree is found mainly in southern Oklahoma (Arbuckle Mountains) and central Texas, including Edwards Plateau. The variety probably is the Shumard oak included in the previously described Mohrs oak cover type.

The reported natural hybrids are (6):

Quercus  $\times$  egglestonii Trel. (Quercus imbricaria  $\times$  shumardii)

Quercus  $\times$  hastingsii Sarg. (Quercus marilandica  $\times$  shumardii)

Quercus  $\times$  joorii Trel. (Quercus falcata  $\times$  shumardii)

Quercus  $\times$  moultonensis Ashe (Quercus phellos  $\times$  shumardii)

Quercus  $\times$  mutabilis Palmer and Steyerl. (Quercus palustris  $\times$  shumardii)

Quercus  $\times$  neopalmeri Sudw. (Quercus nigra  $\times$  shumardii)



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