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Introductory

SPECIES: Quercus shumardii

AUTHORSHIP AND CITATION :

Sullivan, Janet. 1993. Quercus shumardii. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2008, February 8].

ABBREVIATION :

QUESHU

SYNONYMS :

Quercus texana Buckl. [25]

SCS PLANT CODE :

QUSH

COMMON NAMES :

Shumard oak

Shumard's red oak Shumard red oak spotted oak Schneck oak southern red oak swamp red oak Texas oak Texas red oak Spanish oak

TAXONOMY :

The currently accepted scientific name for Shumard oak is Quercus shumardii Buckl. It is a member of the red oak group (subgenus Erythrobalanus) [11,25]. There are no accepted subspecies or forms. Some authorities recognize the following varieties [11,25,38]:

Quercus shumardii var. shumardii Quercus shumardii var. texana (Buckl.) Ashe (Texas oak) Quercus shumardii var. schneckii (Britt.) Sarg. (Schneck oak)

A new variety, Q. s. var. stenocarpa, with very narrow and shallow acorn cups, has been reported in the Midwest [24]. Maple-leaf oak, which was formerly accepted as a variety of Shumard oak (as Q. s. var. acerifolia), has been elevated to species status as Q. acerifolia Stoynoff & Hess [34,50].

Shumard oak forms hybrids with nine other species of oaks $[\underline{11}, \underline{25}, \underline{45}]$. It is most closely related to blackjack oak (Q. marilandica) and black oak (Q. velutina), as determined by electrophoresis $[\underline{17}]$.

LIFE FORM : Tree

FEDERAL LEGAL STATUS : See OTHER STATUS

OTHER STATUS : Shumard oak is listed as vulnerable in Ontario [<u>51</u>].

Quercus acerifolia is treated as a distinct species and therefore not discussed in the write-up. It is, however, listed as a Category 2 plant under the former name Q. shumardii var. acerifolia [49].

DISTRIBUTION AND OCCURRENCE

SPECIES: Quercus shumardii

GENERAL DISTRIBUTION :

Shumard oak occurs on the Atlantic Coastal Plain from North Carolina south to northern Florida; west to central Texas; north to central Oklahoma, eastern Kansas, Missouri, southern Illinois, western and southern Ohio, Kentucky, and Tennessee. It occurs locally north to southern Michigan, and southern Pennsylvania [9,11,25]. Specimens have been collected from extreme southwestern Ontario and the eastern Niagara peninsula [38].

The status of Shumard oak in Maryland is uncertain. It has been reported in Maryland by reliable sources [9], but specimens were not located by the U.S. Department of Agriculture, Fish and Wildlife Service survey [47].

ECOSYSTEMS :

- - -

FRES12	Longleaf - slash pine
FRES13	Loblolly - shortleaf pine
FRES14	Oak - pine
FRES15	Oak - hickory
FRES16	Oak - gum - cypress
FRES17	Elm - ash - cottonwood
FRES18	Maple - beech - birch
FRES32	Texas savanna
FRES39	Prairie

STATES :

AL	AR	FL	GA	ΙL	IN	ΚY	KS	LA	MD
MI	MS	MO	NC	OH	OK	PA	SC	TN	ТΧ
VA	WV	ON							

BLM PHYSIOGRAPHIC REGIONS :

14 Great Plains

KUCHLER PLANT ASSOCIATIONS :

K084 Cross Timbers K086 Juniper - oak savanna K099 Maple - basswood forest K100 Oak - hickory forest K101 Elm - ash forest K111 Oak - hickory - pine forest K112 Southern mixed forest

K113 Southern floodplain forest

SAF COVER TYPES : 26 Sugar maple - basswood 40 Post oak - blackjack oak 52 White oak - black oak - northern red oak White oak 53 62 Silver maple - American elm Ashe juniper - redberry (Pinchot) juniper 66 67 Shin (Mohrs) oak 75 Shortleaf pine 76 Shortleaf pine - oak 80 Loblolly pine - shortleaf pine 81 Loblolly pine Loblolly pine - hardwood 82 Swamp chestnut oak - cherrybark oak 91 93 Sugarberry - American elm - green ash 94 Sycamore - sweetgum - American elm

SRM (RANGELAND) COVER TYPES :

NO-ENTRY

HABITAT TYPES AND PLANT COMMUNITIES :

Shumard oak is usually widely spaced and never occurs in pure stands $[\underline{33}]$. It occurs with the more prominent southern oaks included in the oak-hickory forest region described by Braun $[\underline{46}]$.

Common tree associates not previously mentioned include white ash (Fraxinus americana), shagbark hickory (Carya ovata), shellbark hickory (C. laciniosa), mockernut hickory (C. tomentosa), bitternut hickory (C. cordiformis), water hickory (C. aquatica), Delta post oak (Quercus stellata var. paludosa), willow oak (Q. phellos), water oak (Q. nigra), southern red oak (Q. falcata var. falcata), blackgum (Nyssa sylvatica), winged elm (Ulmus alata), magnolia (Magnolia grandiflora), yellow-poplar (Liriodendron tulipifera), American beech (Fagus grandiflora), and spruce pine (Pinus glabra) [<u>11</u>].

MANAGEMENT CONSIDERATIONS

SPECIES: Quercus shumardii

WOOD PRODUCTS VALUE :

Shumard oak wood is close-grained, hard, strong, and heavy $[\underline{45}]$. This wood is superior to that of other red oaks; it is marketed as "red oak", and is not distinguished commercially from red oak species. The wood is used for veneer, cabinets, furniture, flooring, interior trim, and lumber $[\underline{11}, \underline{45}]$.

IMPORTANCE TO LIVESTOCK AND WILDLIFE :

In Texas, Shumard oak is preferred browse for white-tailed deer in Ashe juniper (Juniperus ashei) woodlands $[\underline{3}]$.

Shumard oak acorns are excellent food for wildlife; they are consumed by songbirds, wild turkeys, waterfowl, white-tailed deer, and various species of squirrels [11].

PALATABILITY :

Shumard oak acorns were intermediate in palatability to fox squirrels when compared with those of eight other southern oaks [30].

NUTRITIONAL VALUE :

Nutritional values (percent dry weight) for Shumard oak acorns are as follows [8]:

crude fat	9.8
total carbohydrates	29.3
total protein	3.8
phosphorus	0.06
calcium	0.27
magnesium	0.06

COVER VALUE : NO-ENTRY

VALUE FOR REHABILITATION OF DISTURBED SITES :

Shumard oak had one of the highest survival rates of nine oak species planted on minespoils in Illinois [4]. It exhibited outstanding growth on cast overburden in Illinois and Indiana [37]. In Mississippi, reforestation of agricultural lands to bottomland hardwoods was successful with direct-seeded Shumard oak (in addition to other species). Sites were seeded without preparation. Weeds were controlled on one site, where Shumard oak had better growth and survivorship than at the other sites [1].

Shumard oak seedlings have been planted successfully in reforestation projects on eroded ridgetops in Mississippi [14].

OTHER USES AND VALUES :

Shumard oak is planted as an ornamental [38].

Shumard oak acorns are bitter, but are edible if the tannins are leached out. They can be ground and used as flour, roasted and ground to make coffee, or eaten whole [12,22]. Native Americans had many uses for the bark and acorns of oaks, probably including Shumard oak [22].

OTHER MANAGEMENT CONSIDERATIONS :

Shumard oak can be successfully direct seeded or planted as seedlings Soil fertilization does not improve establishment success [20, 39].[39]. Height growth of direct-seeded Shumard oaks is slow compared to that of planted stock; growth rates are sufficient to achieve wildlife habitat management objectives but not for timber production $[\underline{1}]$.

Acorns with a moisture content below 20 to 30 percent are not likely to germinate [48]. Seed moisture for Shumard oaks can be measured by using microwave ovens [7].

Diseases of Shumard oak include oakleaf blister, oak wilt, and various wood rotting fungi (Fomes spp., Polyporus spp., and Stereum spp.) [11].

Insect defoliators that attack Shumard oak, but are not species specific, include June beetles, orange-striped oakworms, cankerworms, forest tent caterpillars, yellow-necked caterpillars, variable oakleaf caterpillars, and red-humped oakworms [11]. Shumard oak acorns are subject to attack by acorn weevils [26].

BOTANICAL AND ECOLOGICAL CHARACTERISTICS

SPECIES: Quercus shumardii

GENERAL BOTANICAL CHARACTERISTICS :

Shumard oak is a large, deciduous, native tree. It ranges up to 120 feet (40 m) in height, with trunk diameters of up to 80 inches (200 cm) [9,33,38,45]. The crown is open and wide spreading, with massive, ascending branches. The trunk of older trees is heavily buttressed. The bark is furrowed, with broken ridges [38]. The leaves are five-lobed to nine-lobed. Shumard oak acorns are egg-shaped, approximately 1 inch (2.5 cm) long, and enclosed in a thick, flat, saucer-shaped cup with pubescent scales [11].

Shumard oak is long-lived; the oldest Shumard oak found on a blue ash (Fraxinus quadrangulata) savanna was 480 years of age [<u>10</u>].

RAUNKIAER LIFE FORM :

Phanerophyte

REGENERATION PROCESSES :

Minimum seed-bearing age for Shumard oak is 25 years. Optimum seed production occurs at about 50 years of age. Good seed crops are produced every 2 to 3 years [11]. The acorns are frequently multiseeded (an unusual trait). Seeds are dispersed by seedhoarding mammals (mainly squirrels) [11]. Acorns exhibit internal dormancy, which is broken by cold, moist conditions. Moist stratification at 36 degrees Fahrenheit (2 deg C) for 8 to 12 weeks breaks dormancy. The acorns typically contain about 40 percent moisture at maturity [8]. Factors affecting seed germination and seedling establishment include microclimate conditions, soil moisture, and stand variables. The limiting factor appears to be seed supply, which may be affected by seed predation [11,26]. Full light is required for good seedling establishment and

growth [<u>11</u>].

Shumard oak sprouts from the roots when top-killed $[\underline{3}]$. This ability is more pronounced in younger individuals. Shumard oak is not a prolific sprouter on moist sites; more sprouts are found on dry sites. It is difficult to propagate by cuttings $[\underline{26}]$.

SITE CHARACTERISTICS :

Shumard oak grows best on moist, well-drained loamy soils on terraces, colluvial sites, and adjacent bluffs associated with large and small streams. Shumard oak also occurs in Coastal Plains hammocks [26]. Shumard oak is intolerant or only weakly tolerant of flooding [2,19], and does not usually occur on the lowest river bottoms [18]. It is fairly drought tolerant, and is tolerant of alkaline soils and their associated nutrient deficiency [11]. It can be planted in soils with pH greater than 7.5 [2,21]. In central Texas, it occurs on dry, low limestone hills. In the south-central United States, it occurs on dry uplands and ridges [26].

SUCCESSIONAL STATUS :

Facultative Seral Species

Shumard oak is intolerant of shade but is rare in early successional stands. It often occurs in climax forests. Since Shumard oak is shade intolerant and requires openings in which to establish, it is not considered a true climax species [11]. Monk [27] classifies Shumard oak as a climax exclusive: a species which occupies specific environmental situations in the climax community and is rarely encountered in successional stands. It is likely that Shumard oak colonizes gaps in In Florida, Shumard oak occurs in climax magnolia-beech mature forests. forests [15]. In Missouri, it occurs as an overstory associate on river bottom ridges occupied by sugar maple (Acer saccharum), pawpaw (Asimina triloba), sweetgum (Liquidambar styraciflua), and swamp chestnut oak (Quercus michauxii). There were no Shumard oak seedlings or saplings in these stands [31]. In Texas, Shumard oak was found in 47-year-old bottomland hardwood stands and undisturbed adjacent forest, but not in early successional stands [29].

It is likely that mature Shumard oak produces allelopathic substances [11].

SEASONAL DEVELOPMENT :

Shumard oak flowers from March to April, and as late as June in some parts of its range [9,11]. Acorns ripen from September to October of

their second year [11].

FIRE ECOLOGY

SPECIES: Quercus shumardii

FIRE ECOLOGY OR ADAPTATIONS :

Specific information on the relationship of Shumard oak and fire was not found in the literature. Shumard oak occurs in bottomland hardwood forests which are dependent on fire exclusion [43]. It also occurs in post oak (Quercus stellata)-blackjack oak communities which, though they can be damaged by fire, are fire resistant [42]. Shumard oak occurs in blue ash savannas, which are maintained by a combination of factors including fire [10].

Shumard oak is probably moderately resistant to immediate fire damage, but, like many hardwoods, is subject to attack by disease when wounded by fire. Basal wounding usually results in at least top-kill of such trees, either by girdling the tree or by creating avenues for infection by wood-rotting fungi. Top-killed Shumard oak produce root sprouts [40].

Shumard oak is not usually found in early seral communities and is therefore unlikely to colonize early postfire communities.

POSTFIRE REGENERATION STRATEGY :

Tree with adventitious-bud root crown/soboliferous species root sucker

FIRE EFFECTS

SPECIES: Quercus shumardii

IMMEDIATE FIRE EFFECT ON PLANT :

Information concerning fire severity and damage to Shumard oak is lacking in the literature. Mature trees are probably intermediate in resistance to low- and moderate-severity fires. Severe fires would probably top-kill or kill mature trees. Seedlings and saplings are likely to be killed by any fire.

DISCUSSION AND QUALIFICATION OF FIRE EFFECT : NO-ENTRY

PLANT RESPONSE TO FIRE :

Hot fires will stimulate root sprouting in Shumard oak, presumably after top-kill [3, 40].

DISCUSSION AND QUALIFICATION OF PLANT RESPONSE : NO-ENTRY

FIRE MANAGEMENT CONSIDERATIONS :

Management of Shumard oak as deer browse in Ashe juniper woodlands includes prescribed burning of previously chained sites. These sites should be burned with hot fires, with intervals of at least 7 to 10 years between fires [3]. Prescribed fire on chained Ashe juniper sites removed dead Ashe juniper debris and killed young Ashe juniper trees. Over 10 years, Shumard oak was one of three dominant secondary species which provided browse and cover for game birds and white-tailed deer [40].

Shumard oak occurs in bottomland hardwood forests, which are not usually subjected to prescribed fires since the risk of fire damage is high. It also occurs on sites where pines, particularly loblolly pine (Pinus taeda) and shortleaf pine (P. echinata), are the desired species. Prescribed fire is used to control hardwoods on these sites when the pines have reached pole size or larger [43].

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SPECIES: Quercus shumardii

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