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Shumard Oaks Successfully Planted on High pH Soils

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SUMMARY

Shumard oak was successfully planted on high pH (7.8-8.0) Mississippi River alluvium soils where some other planted red oaks had failed. Survival and growth have been good through ages 10, 11, and 25 years in three separate plantings. Shumard oak on high pH soils, in addition to producing timber, would allow a consistent mast-producing tree on sites normally void of oaks.

Additional keywords: *Quercus shumardii*, alluvial soils, riverfront, artificial regeneration.

INTRODUCTION

Oaks have long been the mainstay of the southern hardwoods lumber industry and their acorns a primary source of food for wildlife. However, many Mississippi riverfront soils are devoid of oak forests. This may result from lack of seed source or from adverse site conditions related to the high pH of these soils. On soils with pH's ranging from 7.5 to 8.0, some red oaks, particularly Nuttall (*Quercus nuttallii* Palmer), cherrybark (*Q. falcata* var. *pagodifolia* Ell.), and water (*Q. nigra* L.) oaks, do not survive and grow well (Kennedy 1984), but they have been successfully planted on soils with pH's ranging from 5.0 to 6.5 (Broadfoot 1976, Francis 1983). This paper summarizes three small, successful plantings of Shumard (*Q. shumardii* Buckl.) oak on high pH (7.8-8.0) soils along the Mississippi River.

METHODS

Shumard oak was planted in 1959 at Archer Island, Washington County, Mississippi, on Robinsonville sandy loam and at Huntington Point, Bolivar County, Mississippi, in 1974 and 1975 on Commerce silt loams. The areas had been cleared of a natural, mixed hardwood stand and prepared for planting by shearing, root raking, and disking. Oaks had not been present in the original forest. Nursery-grown, 1-0 bareroot seedlings were handplanted at 10- by 10-foot spacings on 1/10-1/2 acre plots. Plantings were clean cultivated during the first growing season, but no intensive weed control was applied afterwards. Survival, diameters, and heights were periodically measured.

RESULTS AND DISCUSSION

Survival at Huntington Point was 80 percent after the 11th growing season in one planting and 73 percent after 10 growing seasons in the other. Early survival data for the planting at Archer Island are not available, but survival averaged 86 percent after the 12th and 25th growing seasons. Most mortality at Huntington Point occurred during the first two or three growing seasons, with only an occasional tree dying later (table 1). Soil pH at the three locations is 7.8-8.0.

Diameters and heights are shown in table 1. Diameter growth averaged about 0.5 inch per year at all three plantings, while height growth averaged 3.0-4.0 feet per year (fig. 1). Growth, especially at Huntington Point, started the first year of planting and has remained fairly consistent. Experience with some oak plantings, primarily Nuttall, water, cherrybark, and swamp chestnut oaks, has shown slow seedling growth during the first 2-4 years after planting, as little as 0.5-1.0 foot. Later the seedlings may average up to 3 feet of height growth each year for a number of years.

In another study (Kennedy 1984), Nuttall, water, and cherrybark oaks were planted at Huntington Point. The study area is within 200 feet of one of the Shumard oak

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Table 1.—*Survival and growth of Shumard oak seedlings at three planting sites*

Location	Age (years)										
	1	2	3	4	5	6	7	10	11	12	25
Archer Island											
Survival (%)	---[1]	--	--	---	---	---	---	----	---	86	86
Diameter (in)	--	--	--	---	---	---	---	----	---	6.4	12.0
Height (ft)	--	--	--	---	---	---	---	----	---	50	78
Huntington Point 1											
Survival (%)	87	82	82	81	80	80	80	----	80	--	---
Diameter (in)	--	--	--	1.3	2.0	2.9	3.5	----	5.7	--	---
Height (ft)	2.2	5.4	8.6	13.4	17.6	22.5	25.8	----	42.7	--	---
Huntington Point 2											
Survival (%)	89	80	77	77	76	76	---	73	---	--	---
Diameter (in)	--	--	0.5	0.9	1.4	1.8	---	3.9	---	--	---
Height (ft)	1.8	4.4	7.7	12.4	15.7	17.9	---	35.1	---	--	---

[1]---- = Measurements not made or not available.

plantings and about one-fourth mile from the other. In the first and each successive year, oak leaves would begin to yellow in these three species within 3 to 4 weeks after the growing season began. Yellowing increased as the growing season progressed, and by late summer leaves were brittle with a brown, burnt appearance around the edges. After four growing seasons, trees had grown very little and survival ranged from only 10 to 40 percent. Those oak failures were probably due to high soil pH of 8.0 which made the iron unavailable for tree uptake. The yellowing of leaves did not occur in the Shumard oak plantings. Leaves remained dark green with lush growth throughout the growing season, an indication that Shumard oak can extract the iron needed for good growth and survival even at a high soil pH.

These plantings, and others reported in the literature (Francis 1983, Johnson 1984), demonstrate Shumard oak's adaptability to a wide range of sites. The species also tolerates flooding during the dormant and early growing season after the initial growing season. Flooding the first year after outplanting, particularly if seedlings are completely submerged, could cause mortality. The Mississippi River has flooded the sites at Archer Island and Huntington Point four or five times during the life of the plantings. Flood depths ranged from a few inches to several feet and extended into June on some occasions. Flooding occurred from as early as the second year in plantings to as late as the 25th year. High water at the start of the 3rd growing season at Archer Island killed an adjacent cherrybark oak planting of the same age.

An advantage of Shumard oak on high pH sites, in addition to timber production, would be its role as a good mast-producing tree on sites normally void of oaks (Broadfoot 1976). Olson (1974) reported seed-bearing age of Shumard to be 25 years. Good seed crops occur every 2–3 years. However, some seeds were collected from the Archer Island planting at about age 15–16 years.

Figure 1.—*Planted Shumard oak midway through its 12th growing season on Mississippi River alluvium.*

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