

## COPPICE REGENERATION IN WATER TUPELO--DOES IT WORK?

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*ABSTRACT.--In the lower Atchafalaya Basin, water tupelo trees were cut in May and November at three stump heights to study coppice regeneration. Sprouting was extremely good after one growing season, and live sprouts grew well through the third and fourth growing seasons. However, some stumps began to deteriorate and sprouts die after the second growing season. After 6 years, only 9 percent of the stumps cut in May and 18 percent of those cut in November had live sprouts.*

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Water tupelo (*Nyssa aquatica* L.) is commonly found in the Coastal Plain swamps from southern Virginia to northern Florida and southeastern Texas, and in the Mississippi Valley northward to Illinois, western Kentucky, and Tennessee. It normally grows in dense stands with or without cypress and other tupelos, and typically has a long, clean bole strongly buttressed at the base.

Trees are either cut near the top of the butt swell, or felled and bucked to leave the basal wood. The butt swell may be from as little as 1 foot above ground line to as much as 8-10 feet, depending on flooding depth in the swamp. Water tupelo wood is valued for a number of products because of its white color, lack of odor or taste, good staining qualities, and nail holding characteristics; the wood is exceptionally clear and used for veneer, box lumber, and furniture stock. The butt swell portion has been shown to be suitable for pulpwood with the possibility of use in greaseproof papers and corregating medium (Laundrie and McKnight 1969).

Vast acreages of water tupelo in Gulf South swamps are at or near merchantable size. When these stands are cut, we need to know if we can rely on the coppice method of regeneration, and if so, what effects stump height and season of cutting have on this regeneration.

## METHODS

The study area is in Assumption Parish, about 5 miles east of Morgan City, La. Plots were located in a stand on the western edge of the cleared area of a former oil well drilling site, outside the floodway of the Atchafalaya Basin. The cleared area was about 5 acres, so trees in our plots had full access to sunlight from the east. The location is a permanently flooded swamp with water levels remaining about 12 inches deep throughout the year.

Cutting was done in May and November 1971. Trees were cut at three stump heights, approximately 6, 18, and 30 inches above water level.

Three blocks, approximately 0.3 acres each, were laid out and divided into two subplots each. Either a May or November cutting date was randomly assigned to a subplot. One cutting height was randomly assigned each tree within a subplot. Five trees were cut at each height, a total of 15 trees per subplot or 45 trees per cutting date. All trees in a plot not used as study trees were cut when the study was installed.

A split plot design with three replications was used for this study. Variables measured after the first, second, fourth, and sixth growing seasons were survival (percent of stumps with at least one live sprout), number of sprouts per stump, sprout heights and diameters. Analyses were made at the 0.05 level of probability.

## RESULTS AND DISCUSSION

Sprouting was extremely good after one growing season for both the May and November cuts (Table 1). There was no statistical difference between the percent of stumps sprouting because of time of cut or stump height. Averaged over all trees, 77 percent of the trees cut in May and 67 percent of those cut in November had produced sprouts after one growing season. Of trees cut in May, those cut 6 inches above the water level averaged 80 percent sprouting, ones cut 18 inches high averaged 78 percent, and those cut 30 inches high had 73 percent sprouting after one growing season. In 1974, after 4 years, the 30-inch stumps for both cutting dates had significantly higher survival than the 6- and 18-inch stumps. However, after 6 years (1976) these differences had disappeared. DeBell (1971) also reported good sprouting (63 percent) on high cut stumps (25 inches high) in swamp tupelo (*Nyssa sylvatica* var. *biflora* (Walt.) Sarg.) after one growing season. Stumps that had been cut 6 inches high (low stumps) had only 13 percent sprouting. He did not report results beyond the first growing season.

The number of sprouts in this study ranged from 1 to 18 with an average of 5 per stump. There was no apparent relationship between stump diameter and sprouting ability.

Sprouts originated near the top or cut surface of the stumps regardless of stump height. This follows data reported by Hook and DeBell (1970) for seedlings of swamp and water tupelo and DeBell (1971) for mature trees of swamp tupelo, where they reported that sprouts usually originated high on the stump near the cut surface.

Sprout heights and diameters through six growing seasons are shown in Table 1. Sprouts averaged about 3 feet of height growth and 0.6-0.7 inches of diameter growth annually through four growing seasons (1974) for trees cut in May. Trees cut in November averaged slightly over 3 feet of height growth and 0.6 inches of diameter growth annually through three growing seasons (1974). It appeared that the sprouts were growing fast enough to sustain themselves and the stumps, but survival dropped drastically between 1972 and 1974.

In this study, some stumps began to deteriorate and sprouts die after the second growing season. After 6 years, only 9 percent of the stumps from the May cutting and 18 percent from the November cutting had live sprouts when averaged over all cutting heights. These trends are the same as observed by foresters in the Atchafalaya Basin where trees were cut for canal right-of-ways.<sup>1/</sup> In the study by DeBell (1971), when one block of stumps was remeasured after four growing seasons, 45 percent of the sprouts that had been observed at 1 year had died.<sup>2/</sup> Thus, only about one out of three stumps had live sprouts after 4 years. The present study found that stumps that had live sprouts after 6 years were badly deteriorated and the sprouts had a stunted, rosette appearance. However, this appearance could have been caused by defoliation nearly every year by the forest tent caterpillar. Stumps that did not have live sprouts had deteriorated until they were very difficult to find and identify. Our results are similar to those of Allen (1962),

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<sup>1/</sup> Personal communication with Mr. Hugh Brown, Vice President for Timber, Lands, and Oil, Williams, Inc., New Orleans, La.

<sup>2/</sup> Personal communication with Mr. O. Gordon Langdon, Project Leader, U.S. Forest Service, Charleston, S.C.; and unpublished data on file at Charleston, S.C.

who reported that black willow (*Salix nigra* Marsh.) dominated a baldcypress-tupelo swamp 8 years after clearcutting. Tupelo coppiced vigorously from high on some stumps throughout the whole area, but its reproduction and that of baldcypress (*Taxodium distichum* (L.) Rich.) was patchy and insufficient to start a new stand.

Hook et al. (1967) reported on coppicing of water tupelo 30 years after logging in the Wateree Swamp in South Carolina. Vigorous sprouts persisted on stumps of all sizes and were intermixed with trees of seed origin. In certain areas this mixture predominated while in other areas stump sprouts and trees of seed origin were intermingled with remnants of the parent stand. Hook did not note what percentage of the stand was of sprout origin.

#### CONCLUSIONS

Coppice regeneration of water tupelo in the Atchafalaya Basin does not appear to be a satisfactory method to regenerate this species. Some sprouts may survive, but not enough to fully utilize the site. In this study only 9-18 percent of the stumps had live sprouts after six growing seasons, and it appears as reported by Allen (1962), that tupelo reproduction would be patchy and insufficient.

Other researchers have reported good reproduction with coppice tupelo, but flood water depths and duration may have been different in their studies. Water in their areas was usually moving and non-stagnant, whereas water in this study was stagnant, which could have a tremendous effect on the trees. In the lower Atchafalaya Basin, flood waters reach depths of 8-10 feet annually, much of the swamp does not dry out in summer, and drainage patterns have been altered by dredging and levee construction. Under these conditions, it appears that planting water-tolerant species such as green ash (*Fraxinus pennsylvanica* Marsh.), red maple (*Acer rubrum* L.), water tupelo, baldcypress, and black willow would have to be employed to supplement coppice regeneration if the site is going to be fully stocked and productive.

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Table 1.--Average diameters, heights, and survival by cutting dates and stump height

Stump height	1971			1972			1974			1976		
	Diameter	Height	Sprouting									
<i>in.</i>	<i>in.</i>	<i>ft.</i>	<i>%</i>									
<i>May cutting</i>												
6	0.5	3.4	80	0.5	4.3	40	2.1	10.3	7	0	0	0
18	0.7	4.5	78	1.2	7.2	87	2.7	13.0	7	2.9	13.1	7
30	0.6	4.1	73	1.1	7.8	67	2.0	11.1	33	2.2	10.7	20
<i>November cutting</i>												
6				0.7	4.8	67	1.6	8.4	27	2.0	9.0	7
18				0.8	5.5	60	1.7	8.9	27	2.2	12.5	13
30				0.8	6.4	73	1.9	10.7	60	2.2	11.7	33