September 1964 Information Sheet 863

MISSISSIPPI STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION
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STATE COLLEGE MISSISSIPPI

IMPROVEMENT CUTTING BETTERS GROWTH AND QUALITY OF HARDWOODS

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Improvement cuttings can speed growth and development of hardwood stands on rundown slackwater sites in the Mississippi Delta. This statement summarizes 20-year results of a study begun on the Delta Experimental Forest in 1940. When the study started, the stand was typical of much of the second growth timber in the Delta. It consisted of an uneven-aged aggregation of mixed hardwoods that had been repeatedly logged for the best trees, cut over for fuelwood, and burned frequently since the original logging about 1913.

The objective of the improvement cuttings was to eliminate culls and reduce the number of trees of undesirable species, thus giving trees of good form and species room to grow. Complete fire protection was also provided.

As represented by uncut check plots, the stand consisted mainly of Nuttall oak, but also included willow oak, water oak, overcup oak, and bitter pecan. Volume in trees of sawtimber size (14 inches or more in diameter) was 1,815 board feet by the International ¼-inch rule. About one-third of the sawtimber-size trees were culls, as were one-fifth of the pole-size stems (6 to 12 inches in diameter).

One improvement cut was termed heavy. It consisted of cutting or deadening all pole and sawtimber trees that did not contain an actual or potential grade-2 factory log. The other cut was very heavy, and took out all trees except those containing at least one actual or potential grade-1 factory log. Each treatment — heavy cutting, very heavy cutting, and no cutting—was applied on three 10-acre plots.

The stand being what it was, both treatments approximated clear-cuttings. Each left the equivalent of a little more than two sawtimber trees per acre, containing about 325 board feet. The main difference was in pole-sized stems, where the heavy cut left nearly twice as many trees as did the very heavy cut.

Foresters often describe stands in terms of basal area—that is, the total cross-sectional area of the stems of all trees, measured 4-½ feet above ground. After the very heavy cut, the stands had a basal area of 12 square feet per acre in trees 6 inches or more in diameter. The plots that had received the heavy cut had only 18 square feet, despite their greater stocking of pole trees. The check plots had 63 square feet per acre.

A second cut in the spring of 1956 removed 284 board feet per acre from the heavily cut plots, 179 board feet from those given a very heavy cut, and, by mistake, 42 feet from the check plots. The main reason for cutting was to salvage large, overmature trees that were dying.

Conclusions

The 20-year results demonstrate that a heavily cut hardwood forest can develop into an acceptable commercial stand. By today's standards, the cuts probably were too severe. But they certainly were much better than no cutting, for now the cut plots surpass the checks in both basal area and volume of high-quality trees. In the future, they will outperform the checks.

Results

After 20 years the check plots continued to have more and bigger trees and more basal area and volume, but the cut plots had produced more growth and had more desirable growing stock.

In pole-size trees, the two sets of cut plots were equal to each other (table 1). They had less total basal area than did the check plots, but surpassed them in basal area of desirable growing stock. Thus, basal area of desirable pole timber averaged 17 square feet per acre on the cut plots and 15 feet on the checks. In volume and number of desirable pole-size growing-stock trees, the cut plots were also slightly ahead of the check.

Sawtimber comparisons changed the most. By 1960, the cut stands had about 2,400 board feet per acre in desirable growing stock, as compared to 1,700 for the check plots. Undesirable growing stock averaged less than 800 board feet per acre on the cut plots and 3,600 on the check plots. The plots receiving the very heavy cut had a little less desirable growing stock, but also less undesirable growing stock, than the heavy-cut plots. About 20 percent of the saw-lot volume on the cut plots was factory grade 1, whereas less than 10 percent of the volume on the check plots was of this grade. Again in terms of desirable trees, the cut plots had one-third more trees than the checks and half again as much basal area. Volume on the check plots was about equally divided between the 14- to 20-inch and the 21- to 29-inch d.b.h. groups, whereas two-thirds of the total volume of cut plots was in the 14- to 20-inch group.

The cutting prescriptions tended to favor species—chiefly Nuttall oak and other water oaks, sweetgum, green ash, and cottonwood—rather than to take or leave trees on their individual merits. Today the cut plots have slightly more volume in these species than the check plots, and a higher proportion of the volume is in

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grade 2 or better lots. Specifically, 96 percent of the volume on the cut plots is in trees of the favored species, as compared to 57 percent on the check plots. The remaining volume on the check plots is predominantly in overcup oak, bitter pecan, hackberry, and soft and cedar elm. Nuttall oak is the most frequently occurring species, accounting for about a third of the sawtimber trees on the check plots, two-thirds on the heavy-cut plots, and one-half on plots that received a very heavy cut.

The severe drought of 1952 to 1956 slowed stand development by killing some trees on all plots. The effects were first noticed in 1955, when pole trees on the check plots were found to be fewer than in 1950. Additional drought-caused losses were recorded in 1960. At this time the check and both sets of cut plots had fewer pole-size stems than in 1955 and the checks also showed a loss in number of sawtimber trees. Thus the drought was more damaging on the checks than on the cut plots.

Table 1. — Stocking, basal area, and volumes per acre after treatment in 1940 and in 1960.

Type of cutting and class of growing stock	Pole timber						Sawtimber					
	Trees		Basal area		Volume		Trees		Basal area		Volume	
	1940	1960	1940	1960	1940	1960	1940	1960	1940	1960	1940	1960
	No.	No.	Sq. ft.	Sq. ft.	Cu. ft.	Cu. ft.	No.	No.	Sq. ft.	Sq. ft.	Bd. ft.	Bd. ft.
Check												
Desirable growing stock[1]		34.5		15.1		279.3		8.9		14.6		1,685
Undesirable growing stock[2]		38.4		16.7		302.9		15.1		31.4		3,588
Total	76.2	72.9	28.8	31.8	503.4	582.2	17.8	24.0	34.5	46.0	1815	5,273
Heavy Cut												
Desirable growing stock		39.2		16.5		298.9		12.8		21.6		2,538
Undesirable growing stock		17.3		6.8		121.3		5.0		7.8		787
Total	38.7	56.5	14.6	23.3	267.4	420.2	2.4	17.8	3.7	29.4	316	3,325
Very Heavy Cut												
Desirable growing stock		43.8		17.0		303.2		11.8		20.3		2,336
Undesirable growing stock		16.8		5.7		98.6		3.9		6.8		732
Total	21.6	60.6	8.8	22.7	162.7	401.8	2.2	15.7	3.4	27.1	332	3,068

[1]Trees judged to be worth retaining because of a satisfactory volume or value growth.
[2]Trees likely to detract from the future value of a stand.