U. S. Department of Agriculture
Forest Service Research Paper SO-62

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U. S. Department of Agriculture

1970

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This paper describes the first 14 cottonwood (**Populus deltoides** Bartr.) clones selected by a team of geneticists and silviculturists from the Southern Forest Experiment Station as part of a program for improving the species' performance in Midsouth plantations. Clones were chosen primarily on the basis of rapid early growth. Their performance in replicated test plantings, one of which has reached pulpwood size, indicates that they have high potential for commercial planting and as breeding material. Both selection procedures and available data on clone performance are presented in the paper.

A program for improving cottonwood was begun by the USDA Forest Service in the early 1960's. At that time it became clear that well-known hybrid poplars from the Northeastern United States and Europe would not perform well in the Midsouth,[2] where interest in **Populus** culture was rapidly increasing. The program was headquartered at the Southern Hardwoods Laboratory in Stoneville, Mississippi. The clones described here were selected from well-adapted natural populations nearby. Parents of all the clones are located within 70 miles of the Laboratory.

Before the replicated tests, most of the clones went through a preliminary evaluation and selection process. Procedures followed in preliminary selection were summarized in a previous paper.[3] Of the 14 chosen, 11 were open-pollinated progeny of phenotypically superior trees in natural stands. The progeny had above-average first-year growth as seedlings in a progeny test and as clones in one or two preliminary tests. The remaining three clones are of unknown parentage and were not evaluated before being placed in long-term tests.

Most of the descriptive data reported in this paper were obtained from two 5-year clonal tests. Both measured performance of 79 clones, 39 selected in preliminary tests and 40 from seedlings collected randomly from sandbars.

The tests had randomized complete blocks with five replications and four-ramet row plots. One planting was established on a Commerce silt-loam soil considered excellent for cottonwood and the other on a Sharkey clay soil that, at best, is marginal for commercial cottonwood plantations. The establishment techniques outlined by McKnight and Biesterfeldt[4] were followed. Unrooted cuttings 20 inches long were planted at a spacing of 10 by 10 feet.

The plantation on the silt-loam soil was thinned after its third growing season to two ramets per plot (218 trees/acre) and again after its fifth growing season to a single ramet per plot (109 trees/acre). Diameters of all surviving trees (usually 10 ramets/clone) were measured after the fifth year and before thinning. Heights were measured on felled trees (usually five ramets per clone). Volumes were determined from measurements made at 4-foot intervals on three stems per clone.

On the clay soil one replication was thinned after the fourth growing season. The remaining four replications were thinned at the end of the fifth growing season. Mean clone diameters for the fifth year were computed from measurements of the 18 ramets per clone standing at the end of the fifth growing season. Height measurements were made on the two cut ramets per clone in each of the four replications thinned during the fifth year.

The fifth-year mean diameter of clones on the silt-loam soil was the primary basis for

[1] When this paper was prepared the authors were stationed at the Southern Hardwoods Laboratory, which is maintained at Stoneville, Mississippi, by the Southern Forest Experiment Station, USDA Forest Service, in cooperation with the Mississippi Agricultural Experiment Station and the Southern Hardwood Forest Research Group. Mohn is now Assistant Professor, School of Forestry, University of Minnesota. McKnight is Assistant Area Director, Cooperative Forest Management, Southeastern Area, State and Private Forestry.

[2] Maisenhelder, L. C. **Eastern cottonwood selections outgrow hybrids on southern sites.** J. Forest. 68: 300-301. 1970.

[3] Mohn, C. A., and Randall, W. K. **Preliminary selection of eastern cottonwood clones.** Tenth S. Forest Tree Impr. Conf. Proc. 1969: 41-48. 1969.

[4] McKnight, J. S., and Biesterfeldt, R. C. **Commercial cottonwood planting in the Southern United States.** J. Forest. 66: 670-675. 1968.

selection. Evaluation was confined to this plantation because the site is typical of those being planted commercially and because trees had reached pulpwood size. Selected clones were those that had mean fifth-year diameters in the top 25 percent of the test population. Clones that met this requirement were rejected if ramets consistently demonstrated serious defects such as low forking, extremely large persistent branches, or extremely crooked boles. The 14 clones described in this paper are those that were not rejected.

Average 5-year growth of the 14 as a group is compared with that of a control group in table 1. The controls, 40 clones selected at random, are typical of unimproved materials now being planted in the Lower Mississippi Valley. On the silt-loam site the 14 select clones exceeded the control group by approximately 20 percent in mean diameter (7.6 vs. 6.3 inches) and by 10 percent in total height (56.8 vs. 51.2 feet). Volume differences between the two groups were even larger; mean stem volume to a 3-1/2-inch top (bark included) was 6.5 cubic feet in the select group and 3.7 cubic feet in the control group.

On the clay site, differences between diameters in the select and control group were smaller than on the silt loam. Since the two sites are radically different and all variation among clone means in rate of diameter growth is not genetic, this result is not surprising. The differences found on clay were substantial, however. The select group exceeding the control by about 13 percent in diameter (3.8 vs. 3.3 inches) and by 11 percent in height (31.6 vs. 28.4 feet).

Although the data indicate that early plantation growth can be increased substantially with the selected clones, it is important that the limitations of the testing be recognized. The tests were adequately designed, but they were confined to a single geographic location. Trees were planted on only two soil types, and observed for only 5 years. These limitations reduce the accuracy with which the general performance of these clones can be predicted. Accurate predictions will require testing for at least one-half a timber rotation over a wide geographic area and on a range of soils representative of those considered suitable for commercial planting. Such tests are now being established, but 10 to 15 years will be required for their completion. In view of the potential returns from the selected stock on the extensive acreages now being planted, this delay will be unacceptable to most persons. A logical alternative is to plant partially tested materials and accept the associated risks.

These risks are small when reasonable precautions are taken. Gains can be expected in the characters for which the clones were selected. Since selection was based on growth in plantations given intensive care, the clones are likely to improve production most where cultivation and protection from insects are provided early in the life of the stand.

A mixture of at least 10 clones should be included in a plantation to insure against pest

Table 1.—**Fifth-year growth data for select and control groups on two soils**[1]

Test soil	Mean d.b.h.[2]		Mean height[3]		Mean stem volume[4] to 3½-inch top	
	Select	Control	Select	Control	Select	Control
	—Inches—		—Feet—		—Cubic feet—	
Commerce Silt Loam	7.6	6.3	56.8	51.2	6.5	3.7
Sharkey clay	3.8	3.3	31.6	28.4	....	....

[1] Select values are average for 14 select clones, control values are average for 39 randomly obtained clones.

[2] D.b.h. measurements are based on 10 ramets per clone on silt loam and 18 ramets per clone on clay soil.

[3] Height measurements are based on 5 ramets per clone on silt loam and 8 ramets per clone on clay soil.

[4] Volume measurements are based on 3 ramets per clone.

problems that could be associated with a small proportion of the clones. Planting a mixture also reduces the risk of growth loss due to selection of a clone that is not as good a performer as the limited tests indicated.

Since five of the clones described are open-pollinated progeny of a single female parent, the group of 14 is none too large. A group of 20 to 30 would be more desirable, and if promising clones from other improvement programs can be obtained they should be included in the plantation. Sufficient information for choosing supplementary clones can be obtained in tests such as those described by Farmer and Wilcox.[5]

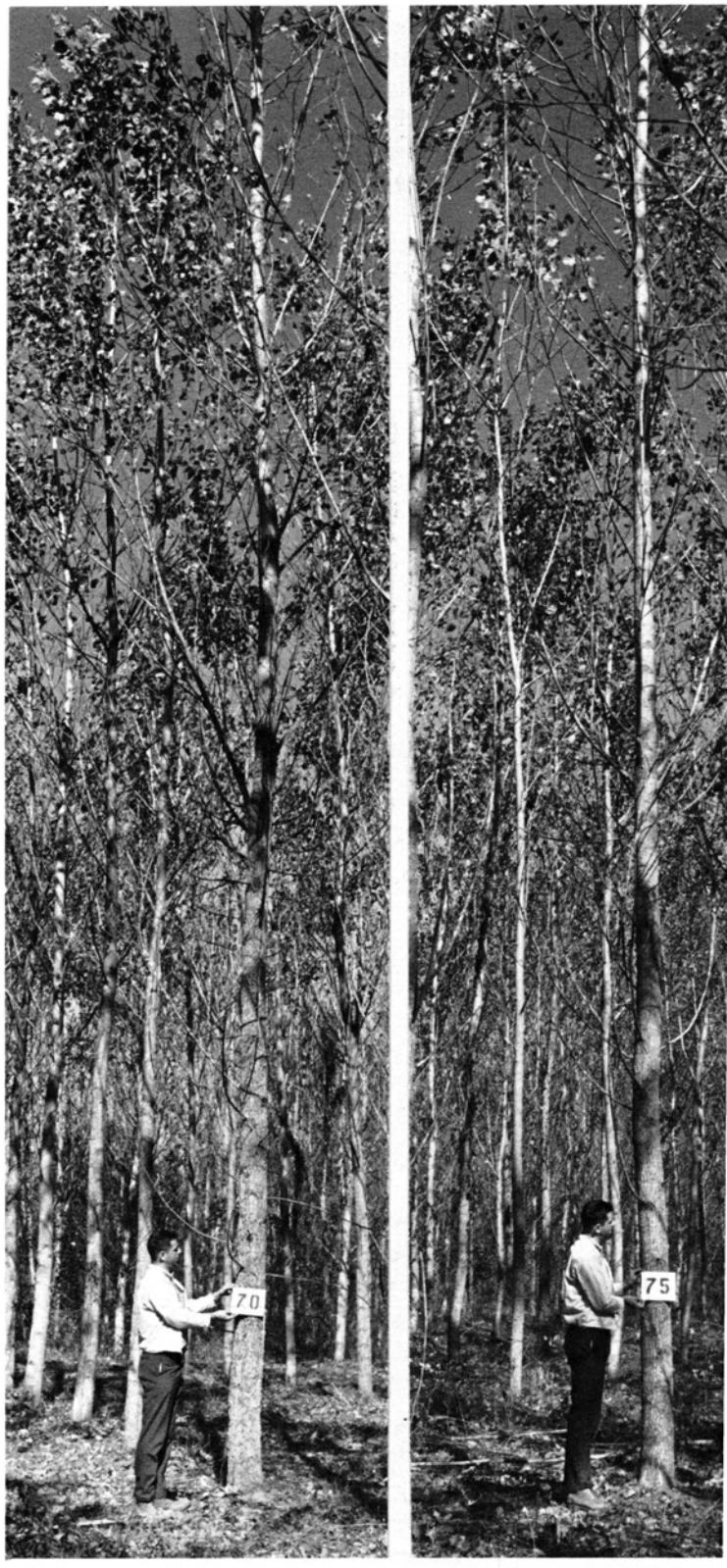
The clones described are probably best adapted to the climatic conditions near their origin—in the Mississippi River Valley between Memphis, Tennessee, and Vicksburg, Mississippi. Clones from the same area have performed very well in 4- and 5-year-old plantings near Cairo, Illinois, and use of the select clones somewhat north of Memphis can be reasonably considered. No information is currently available concerning their performance south of the test area. Where climatic conditions are significantly different from Greenville, Mississippi, these clones should be used only on an experimental basis.

Only the first step in the cottonwood improvement program has been completed, and the present clone mixture should be viewed as temporary. Individual clones may be replaced after evaluation on a large number of sites over a long period. Clones of equal or more promise will be identified in improvement programs in the region, and these can be used to supplement or upgrade the mixture. Careful maintenance of the identities of the original clones in nurseries will be required to facilitate these changes.

CLONE DESCRIPTIONS

The individual select clones are described on the following pages. Each is identified by the name Stoneville and a number. To insure uniformity, it is suggested that this identification be used exclusively. Descriptions are still incomplete, but they incorporate all currently available information. In the future they will be updated and new selections will be described.

Unless otherwise stated, comparisons made in the descriptions are with the mean performance of



Two select clones of eastern cottonwood. The number shown, preceded by the word Stoneville, should be used to refer to the clone.

[5] Farmer, R. E., Jr., and Wilcox, J. R. Cottonwood improvement system for commercial planters. USDA Forest Serv. Res. Note SO-7, 3 p. S. Forest Exp. Sta., New Orleans, La. 1964.

all clones in the tests described previously. At present, data regarding pest and disease resistance are almost completely lacking. Such data are obviously needed, and they are being sought. No quantitative data on growth habit (branching and stem form) are available, but short subjective descriptions are provided. The sex of some of the clones is unknown because they have not yet flowered. Also lacking is information on rooting characteristics, which were not considered during selection. Recent tests have indicated substantial clonal variation in field survival from unrooted cuttings. Since survival is greatly influenced by treatment of cuttings, weather conditions, and planting techniques, the data given must be interpreted with caution.

STONEVILLE 63

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 4) found in Issaquena County, Mississippi (32°37'N, 91°W)

General Information

Sex: Unknown

Foliation date: 42 days after 2/28; mean for tests, 39 days

Defoliation date: Average relative to local cottonwood

Habit

Trunk: Below average straightness

Branches: Average number, small

Pest and Disease Information

Melampsora rust: Average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: Mean first-year survival of unrooted cuttings in 4 tests, 69 percent; mean for 19 or more clones in same tests, 81 percent

Wood Characteristics

Specific gravity: Mean of 0.32 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Smooth

Thickness: 0.25 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 63 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 63	Control	Stoneville 63	Control
D.b.h. (inches)	7.0	6.3	3.3	3.3
Height (feet)	57.2	51.2	28.6	28.4
Volume, including bark, to 3½-inch top (cubic feet)	5.5	3.7	....	....
Volume, inside bark, to 3-inch top (cubic feet)	5.1	3.2	....	....

[1] Means for Stoneville 63 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 66

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 7) found in Issaquena County, Mississippi (32°37'N, 91°W)

General Information

Sex: Male

Foliation date: 37 days after 2/28; mean for tests, 39 days

Defoliation date: Late relative to local cottonwood

Habit

Trunk: Below average straightness

Branches: Above average number, relatively large

Pest and Disease Information

Melampsora rust: Average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: First-year survival of unrooted cuttings in 4 tests, 93 percent; mean for 19 or more clones in same tests, 81 percent

Wood Characteristics

Specific gravity: Mean of 0.34 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Average roughness

Thickness: 0.45 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 66 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 66	Control	Stoneville 66	Control
D.b.h. (inches)	8.1	6.3	4.0	3.3
Height (feet)	58.6	51.2	32.4	28.4
Volume, including bark, to 3½-inch top (cubic feet)	8.1	3.7	....	....
Volume, inside bark, to 3-inch top (cubic feet)	7.1	3.2	....	....

[1] Means for Stoneville 66 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 67

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 7) found in Issaquena County, Mississippi (32°37'N, 91°W)

General Information

Sex: Unknown

Foliation date: 40 days after 2/28; mean for tests, 39 days

Defoliation date: Average relative to local cottonwood

Habit

Trunk: Above average straightness

Branches: Average number, relatively large

Pest and Disease Information

Melampsora rust: Average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: First-year survival of unrooted cuttings in 4 tests, 83 percent; mean for 19 or more clones in same tests, 81 percent

Wood Characteristics

Specific gravity: Mean of 0.36 for disks taken at breast height at age 5; range of 20 clones in same tests 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Average roughness

Thickness: 0.35 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 67 on two soils[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 67	Control	Stoneville 67	Control
D.b.h. (inches)	7.8	6.3	3.8	3.3
Height (feet)	59.3	51.2	32.7	28.4
Volume, including bark, to 3½-inch top (cubic feet)	6.4	3.7	....	....
Volume, inside bark, to 3-inch top (cubic feet)	5.7	3.2	....	....

[1] Means for Stoneville 67 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 70

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 7) found in Issaquena County, Mississippi (32°37'N, 91°W)

General Information

Sex: Unknown

Foliation date: 37 days after 2/28; mean for tests, 39 days

Defoliation date: Late relative to local cottonwood

Habit

Trunk: Average straightness

Branches: Average number, average size

Pest and Disease Information

Melampsora rust: Below average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: No data available regarding first-year survival of unrooted cuttings

Wood Characteristics

Specific gravity: Mean of 0.33 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Extremely rough at age 5

Thickness: 0.45 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 70 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 70	Control	Stoneville 70	Control
D.b.h. (inches)	7.4	6.3	4.6	3.3
Height (feet)	53.4	51.2	33.0	28.4
Volume, including bark, to 3½-inch top (cubic feet)	[2]6.0	3.7	....	....
Volume, inside bark, to 3-inch top (cubic feet)	[2]4.0	3.2	....	....

[1] Means for Stoneville 70 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

[2] Volume for Stoneville 70 was estimated because poor survival prevented cutting trees.

STONEVILLE 71

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 7) found in Issaquena County, Mississippi (32°37'N, 91°W)

General Information

Sex: Unknown

Foliation date: 42 days after 2/28; mean for tests, 39 days

Defoliation date: Average relative to local cottonwood

Habit

Trunk: Average straightness

Branches: Above average number, average size

Pest and Disease Information

Melampsora rust: Average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: No data available regarding first-year survival of unrooted cuttings

Wood Characteristics

Specific gravity: Mean of 0.33 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Very rough

Thickness: 0.60 inch (single thickness) at d.b.h. at age 5 on silt loam; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 71 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 71	Control	Stoneville 71	Control
D.b.h. (inches)	7.4	6.3	3.9	3.3
Height (feet)	57.2	51.2	32.8	28.4
Volume, including bark, to 3½-inch top (cubic feet)	5.5	3.7	....	....
Volume, inside bark, to 3-inch top (cubic feet)	4.9	3.2	....	....

[1] Means for Stoneville 71 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 72

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 7) found in Issaquena County, Mississippi (32°37'N, 91°W)

General Information

Sex: Female

Foliation date: 40 days after 2/28; mean for tests, 39 days

Defoliation date: Average relative to local cottonwood

Habit

Trunk: Average straightness

Branches: Average number, average size

Pest and Disease Information

Melampsora rust: Above average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: No data available on first-year survival of unrooted cuttings

Wood Characteristics

Specific gravity: Mean of 0.33 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Very rough

Thickness: 0.40 inch (single thickness) at d.b.h. at age 5 on silt loam; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 72 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 72	Control	Stoneville 72	Control
D.b.h. (inches)	7.6	6.3	4.0	3.3
Height (feet)	61.4	51.2	34.3	28.4
Volume, including bark, to 3½-inch top (cubic feet)	6.5	3.7	.....	.....
Volume, inside bark, to 3-inch top (cubic feet)	5.9	3.2	.....	.....

[1]Means for Stoneville 72 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 74

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 8) found in Issaquena County, Mississippi (32°37'N, 91°W)

General Information

Sex: Unknown

Foliation date: 44 days after 2/28; mean for tests, 39 days

Defoliation date: Average relative to local cottonwood

Habit

Trunk: Average straightness

Branches: Average number, average size

Pest and Disease Information

Melampsora rust: Below average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: Mean first-year survival of unrooted cuttings in 3 tests, 78 percent; mean for 19 or more clones in same tests, 86 percent

Wood Characteristics

Specific gravity: Mean of 0.31 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Average roughness

Thickness: 0.30 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 74 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 74	Control	Stoneville 74	Control
D.b.h. (inches)	8.1	6.3	3.8	3.3
Height (feet)	57.1	51.2	31.6	28.4
Volume, including bark, to 3½-inch top (cubic feet)	7.6	3.7	....	....
Volume, inside bark, to 3-inch top (cubic feet)	6.5	3.2	....	....

[1]Means for Stoneville 74 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 75

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 11) found in Issaquena County, Mississippi (32°37'N, 91°W)

General Information

Sex: Male

Foliation date: 43 days after 2/28; mean for tests, 39 days

Defoliation date: Late relative to local cottonwood

Habit

Trunk: Average straightness

Branches: Average number, average size

Pest and Disease Information

Melampsora rust: Below average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: Mean first-year survival of unrooted cuttings in 4 tests, 60 percent; mean for 19 or more clones in same tests, 81 percent

Wood Characteristics

Specific gravity: Mean of 0.31 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Average roughness

Thickness: 0.30 inch (single thickness) at d.b.h. at age 5 on silt-loam; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 75 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 75	Control	Stoneville 75	Control
D.b.h (inches)	7.6	6.3	3.9	3.3
Height (feet)	55.2	51.2	32.0	28.4
Volume, including bark, to 3½-inch top (cubic feet)	7.8	3.7	.....	.....
Volume, inside bark, to 3-inch top (cubic feet)	7.1	3.2	.....	.....

[1]Means for Stoneville 75 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 81

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 14) located in Issaquena County, Mississippi (32°40'N, 91°05'W)

General Information

Sex: Female

Foliation date: 41 days after 2/28; mean for tests, 39 days

Defoliation date: Late relative to local cottonwood

Habit

Trunk: Average straightness

Branches: Average number, average size

Pest and Disease Information

Melampsora rust: Average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: Mean first-year survival of unrooted cuttings in 4 tests, 56 percent; mean for 19 or more clones in same tests, 81 percent

Wood Characteristics

Specific gravity: Mean of 0.32 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Average roughness

Thickness: 0.40 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 81 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 81	Control	Stoneville 81	Control
D.b.h. (inches)	7.4	6.3	3.9	3.3
Height (feet)	55.9	51.2	30.5	28.4
Volume, including bark, to 3½-inch top (cubic feet)	6.3	3.7	.....	.....
Volume, inside bark, to 3-inch top (cubic feet)	5.7	3.2	.....	.....

[1]Means of Stoneville 81 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 91

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 21) found in Issaquena County, Mississippi (32°40'N, 91°05'W)

General Information

Sex: Male

Foliation date: 42 days after 2/28; mean for tests, 39 days

Defoliation date: Late relative to local cottonwood

Habit

Trunk: Below average straightness

Branches: Average number, relatively large

Pest and Disease Information

Melampsora rust: Average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: No data available regarding first-year survival of cuttings

Wood Characteristics

Specific gravity: Mean of 0.32 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Smooth

Thickness: 0.30 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 91 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 91	Control	Stoneville 91	Control
D.b.h. (inches)	7.4	6.3	3.3	3.3
Height (feet)	56.1	51.2	31.5	28.4
Volume, including bark, to 3½-inch top (cubic feet)	6.7	3.7	.....	.....
Volume, inside bark, to 3-inch top (cubic feet)	6.3	3.2	.....	.....

[1]Means for Stoneville 91 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 92

Identification

Species: **Populus deltoides** Bartr.

Origin: Open-pollinated progeny of phenotypically superior tree (Stoneville 21) found in Issaquena County, Mississippi (32°40'N, 91°05'W)

General Information

Sex: Unknown

Foliation date: 42 days after 2/28; mean for tests, 39 days

Defoliation date: Late relative to local cottonwood

Habit

Trunk: Average straightness

Branches: Average number, average size

Pest and Disease Information

Melampsora rust: Less than average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: First-year survival of unrooted cuttings in 3 tests, 88 percent; mean for 19 or more clones in same tests, 86 percent

Wood Characteristics

Specific gravity: Mean of 0.33 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Smooth

Thickness: 0.30 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 92 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 92	Control	Stoneville 92	Control
D.b.h. (inches)	7.4	6.3	3.7	3.3
Height (feet)	54.9	51.2	29.6	28.4
Volume, including bark, to 3½-inch top (cubic feet)	5.9	3.7	.....	.....
Volume, inside bark, to 3-inch top (cubic feet)	5.3	3.2	.....	.....

[1]Means for Stoneville 92 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 107

Identification

Species: **Populus deltoides** Bartr.
Origin: Seedling collected from sandbar in Bolivar County, Mississippi (33°47'N, 91°W)

General Information

Sex: Male
Foliation date: 30 days after 2/28; mean for tests, 39 days
Defoliation date: Early relative to local cottonwood

Habit

Trunk: Average straightness
Branches: Average number, average size

Pest and Disease Information

Melampsora rust: Above average juvenile incidence
Other: No serious damage noted to age 5

Cultural Information

Propagation: No data available on first-year survival of unrooted cuttings

Wood Characteristics

Specific gravity: Mean of 0.33 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Smooth
Thickness: 0.35 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 107 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 107	Control	Stoneville 107	Control
D.b.h. (inches)	7.1	6.3	3.8	3.3
Height (feet)	55.7	51.2	32.7	28.4
Volume, including bark, to 3½-inch top (cubic feet)	5.7	3.7	.....	.....
Volume, inside bark, to 3-inch top (cubic feet)	5.1	3.2	.....	.....

[1]Means for Stoneville 107 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 109

Identification

Species: **Populus deltoides** Bartr.

Origin: Seedling collected from sandbar in Bolivar County, Mississippi (33°47'N, 91°W)

General Information

Sex: Female

Foliation date: 32 days after 2/28; mean for tests, 39 days

Defoliation date: Average relative to local cottonwood

Habit

Trunk: Average straightness

Branches: Above average number, relatively large

Pest and Disease Information

Melampsora rust: Above average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: No data available on first-year survival of unrooted cuttings

Wood Characteristics

Specific gravity: Mean of 0.35 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Average roughness

Thickness: 0.40 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 109 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 109	Control	Stoneville 109	Control
D.b.h. (inches)	7.2	6.3	3.9	3.3
Height (feet)	55.4	51.2	31.6	28.4
Volume, including bark, to 3½-inch top (cubic feet)	5.4	3.7	.....	.....
Volume, inside bark, to 3-inch top (cubic feet)	5.0	3.2	.....	.....

[1]Means for Stoneville 109 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.

STONEVILLE 124

Identification

Species: **Populus deltoides** Bartr.

Origin: Seedling collected from sandbar in Issaquena County, Mississippi (32°55'N, 91°05'W)

General Information

Sex: Male

Foliation date: 40 days after 2/28; mean for tests, 39 days

Defoliation date: Early relative to local cottonwood

Habit

Trunk: Average straightness

Branches: Above average number, relatively large

Pest and Disease Information

Melampsora rust: Average juvenile incidence

Other: No serious damage noted to age 5

Cultural Information

Propagation: First-year survival of unrooted cuttings in 4 tests, 83 percent; mean for 19 or more clones in same tests, 81 percent

Wood Characteristics

Specific gravity: Mean of 0.32 for disks taken at breast height at age 5; range of 20 clones in same tests, 0.31-0.36. Basis: 3 ramets per clone on each of two soils

Bark

Surface: Average roughness

Thickness: 0.30 inch (single thickness) at d.b.h. at age 5 on silt-loam soil; mean for 40 randomly obtained clones in same test, 0.30 inch. Basis: 6 determinations per clone

Average 5-year growth of Stoneville 124 on two sites[1]

Character and unit of measure	Commerce silt loam		Sharkey clay	
	Stoneville 124	Control	Stoneville 124	Control
D.b.h. (inches)	8.5	6.3	3.6	3.3
Height (feet)	58.3	51.2	29.8	28.4
Volume, including bark, to 3½-inch top (cubic feet)	8.5	3.7	------	------
Volume, inside bark, to 3-inch top (cubic feet)	7.6	3.2	------	------

[1]Means for Stoneville 124 and the control (made up of 40 randomly obtained clones) are based on measurements of 10 ramets/clone for diameter, 5 ramets/clone for height, and 3 ramets/clone for volume on the silt-loam soil. On the Sharkey clay means are based on 18 ramets/clone for diameter and 8 ramets/clone for height.