

TREE IMPROVEMENT IN INTERNATIONAL PAPER COMPANY'S DELTA REGION

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Abstract. --The McNair Seed Orchard, its insect control) fusiform rust problems, cone picking, some production figures, and the results of its first 5-year progeny test, which shows an average of 26.84% volume superiority, are discussed. During the 1973-74 planting season approximately 100 each of half-sib seedling families of superior sweetgum and sycamore phenotypes will be planted **in** two locations as progeny tests. Later, parts of one test will be made into a seedling seed orchard.

Additional Keywords: Pinus taeda, Liquidambar styraciflua, Platimus occidentalis, Cronartium fusiforme.

DELTA REGION

The Southern Kraft Division of International Paper Company is divided **in-** to five Woodlands Regions. The Delta Region covers roughly the Northwest 80% of Mississippi and approximately the Southeast 75% of Louisiana.

MCNAIR ORCHARD

In 1960 we started the 49-acre McNair loblolly pine (*Pinus taeda* L.) seed orchard, which is located 35 miles northeast of Natchez, Miss. This orchard has five types of soil which are loessal. Rainfall over the past 13 years has averaged 54" with a high of 79" and a low of 39". We do not always get the moisture we want when we need it the most. The origins of our clones are: 1 from Texas, 7 from Arkansas, 14 from Louisiana, and 9 from Mississippi. The average age of our ramets is nine years.

Insect Control

In controlling insects we use a Super Hurricane mist blower and two 100-gallon fiber glass tanks, mounted on a Ford 5000 diesel tractor. This tractor is operated in 3rd gear, low range, at 1900 rpm, or at 3.26 mph, causing the power takeoff to turn the mist blower at the recommended 540 rpm. We make three trips a day, putting out 200 gallons of 1.33% Guthion each time, quitting about 11:00 a.m., because of the unbearable heat. It takes three days to spray the entire orchard. We spray down one side of a row and come back on the other side of the same row to insure complete coverage. Generally we start spraying on or about the 15th of the following months: April, May, June, July, and as soon as cone picking is over. Since the operator of the mist blower has to be bundled up in hot, protective rubber clothing, we use the White Cap system, which filters and cools the operator's air and prevents condensed moisture from collecting on the inside of his mask. A local medical doctor makes cholinesterase tests twice each year.

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Fusiform Rust

We have had an annoying fusiform rust (Cronartium fusiforme H. & H.) problem at McNair during the last four years. We planted the 400-foot 'pollen dilution' strips with sweetgum and sycamore and followed with clean cultivation. The oak host immediately adjacent to the orchard has consequently been eliminated. The sweetgum and sycamore will, when they have attained sufficient height, form a screen that should intercept spores produced by the fungus on surrounding oaks.

In order to better cope with the rust infections presently existing in the orchard, we have classified all galls into three categories: (1) gall on the main stem, (2) limb gall within two feet of the stem, (3) and limb gall farther than two feet from the stem. We attempt to excise the galls on the stem and closely watch the number two category so that we can cut off the branch when the gall begins to endanger the stem. The galls in the number three category are ignored. Table 1 below summarizes the number of galls of each type we have removed to date.

Table 1.--Number of galls of each type removed to date per year

| <u>Year</u> | <u>No. 1 Gall</u> | <u>No. 2 Gall</u> |
|-------------|-------------------|-------------------|
| 1970 | 103 | 37 |
| 1971 | 53 | 85 |
| 1972 | 74 | 122 |
| 1973 | 56 | 85 |

Cone Picking

During cone picking, we cover the orchard three times, because, thank the Lord, not all of our clones' cones mature at the same time. Usually, the first phase is ready on September 17, and the entire operation is completed in 4 to 5½ weeks, depending on the size of the crop. We have gone through an array of cone picking methods: (1) by walking, (2) from step ladders, (3) from pickup cabs, (4) from low, home-made platforms, (5) from high platforms, (6) from 24' and 27' Selma Man Lifts that rent for \$500-\$525 per month, and (7) from the Elliot High Reach with either the 45' or 50' platforms. Its platform is 70" x 40", big enough for two people to work comfortably all the time. This machine, mounted on a truck, rents for \$1,150 per month. We can pick two adjacent ramets from one setting. The third man in the crew drives the truck, sets the outriggers, and pitches most of the picked cones to the base of the ramet. A follow-up crew picks up the cones, cleans them of trash and puts one bushel into each sack. This crew later stores the sacks outside on cone racks that prevent them from touching the ground.

Production Figures

Here is a chart of some of McNair's production figures.

See Table 2 on the following page.

Column 9 is a prediction I helped to make in 1965. This prediction is based on the premise that each 20-year-old ramet would produce one bushel of

Table 2.--McNair's production figures

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 | Column 7 | Column 8 | Column 9 |
|-----------------|--|----------------------|---------------------------------|---------------------------|----------------------|--------------------------------|----------------------|---|
| Year | % Ram-ets bearing 1 or more cones / year | No. of cones/ bushel | No. of bushels/ year | No. of lbs. of seed/ year | Lbs. of seed/ bushel | Eastern Tree Seed Lab. Figures | | 1965 Prediction of Yearly lbs. of seed to be produced |
| Started in 1960 | | | | | | No. of Seed/lb. | %Germ. 30 Day strat. | |
| | | | Total acres = 49 | | | | | |
| 1965 | ? | | | 0 ³ | - | | | 1 ² |
| 1966 | 27 | | | 7 ⁰ | - | | | 3 ⁵ |
| 1967 | 47 | 291 | 85 | 87 ⁰ | 1.02 | 15,780 | 83 | 11 ² |
| 1968 | 52 | 278 | 208 | 283 ⁰ | 1.36 | 16,380 | 89 | 26 ⁴ |
| 1969 | 62 | 338 | 162 | 110 ⁰ | 0.68 | 18,360 | 73 | 49 ⁷ |
| 1970 | 66 | 374 | 187 ¹ / ₂ | 34 ⁰ | 0.18 | - | - | 84 ⁸ |
| 1971 | 80 | 321 | 892 | 1123 ⁰ | 1.26 | 17,350 | 93 | 137 ⁰ |
| 1972 | 60 | 307 | 168 | 142 ⁰ | 0.85 | 17,906 | 88 | 212 ⁵ |

cones, which would yield 0.85 pounds of seed, and that mortality would be 1% annually. Over the past five years our mortality rate has averaged 2.3% per year.

As the proof of the pudding is in the eating, so the proof of our tree improvement program is in our progeny testing. During the years of 1967, 1968, and 1969, we have outplanted four 10-pollen polymix progeny tests. The 5th year measurements of the first test, which represented ten families, showed an average height superiority of 9.87%, and an average volume superiority of 26.84%, ranging from a high of plus 59% to a low of minus 3% over nursery run checks.

HARDWOOD TREE IMPROVEMENT

Beginning in the summer of 1968 all of our field people began to look for superior sweetgum (Liquidambar styraciflua L.) and sycamore (Platinus occidentalis L.) phenotypes. In selecting these trees, six traits were used in

scoring. Table 3 below shows this scoring process.

Table 3.--Six traits used in scoring sweetgum and sycamore phenotypes

| | |
|------------------------|---------------|
| 1. Straightness | 0 - 5 points |
| 2. Crown | 0 - 5 " |
| 3. Epicormic Branching | 0 - 3 " |
| 4. Pruning Ability | 0 - 3 " |
| 5. Branch Angle | 0 - 2 " |
| 6. Apical Dominance | 0 - 3 " |
| Total | 0 - 21 points |

No trees with less than 10 points were accepted. Since it is usually impossible to get comparison trees with either of these two species, each tree was scored individually.

We now have half-sib seedling families from nearly 100 sweetgum and nearly 100 sycamore trees being grown in a company nursery. **In** order to get the seed for this many trees we had to select 104 sweetgum and 108 sycamore. (See Figure 1.) During the 1973-74 planting season, seedlings of each of these species will be outplanted in progeny tests on a bottomland hardwood site, located close to the Mississippi River, near Rodney, Miss., and on a loblolly pine site of 100-110 in the hills of Copiah County, Miss. Each family will be represented in a 5-tree row plot in each of five replications at 10' x 10' spacing. It is our plan to cultivate six or more times each year for at least two years. Starting with the fifth year, we will begin to rogue out to about 45 trees per acre, on the upland site only, at least two replications each of sweetgum and of sycamore. There, we will cut out everything but the best individual trees in the best families. After 5 to 10 years we should begin to get seed production. If necessary, we could still start grafted orchards of both species.

Hardwood Seed Orchard

We will end up with one seed orchard with at least 2.725 acres each of sweetgum and sycamore, When in full production, one acre of sweetgum orchard should produce enough seed to plant 2100 acres per year; and one acre of sycamore orchard should plant 3724 acres per year. This orchard acreage will more than satisfy all of the Delta Region's hardwood needs in the future.

LITERATURE CITED

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FIGURE NO. 1

DELTA REGION

INTERNATIONAL PAPER CO.

LOCATION OF

108 SYCAMORE PHENOTYPES = Syc

104 SWEET GUM PHENOTYPES = SG

50 MILES

