

# A Paper Company's Silvicultural Use of Genetics

by

**EARL P. STEPHENS**

**Champion Papers  
Pasadena, Texas**

I don't know how close you people keep up with these things, but Champion Papers and U. S. Plywood merged yesterday and it's up to the stockholders to approve it. What I have to say here refers to Champion Papers' lands as they existed before the merger. They're complicated enough without bringing in another confounding issue. Just to give you an idea, Champion Papers owns about 700,000 acres of land. This land is broken down into two regions. One is our Carolina region and the other is our Texas region. We also have an operation in Brazil.

Our lands in the Carolina region are confined essentially to the 'lower Piedmont physiographic province and to the Appalachians. Our approximately 350,000 acres in Texas are confined to southeastern Texas in the area of flatwoods and rolling country.

In the Carolina region, we are working primarily in the lower Piedmont area of South Carolina, North Carolina, Georgia, and a little bit of eastern Tennessee. Most of our acreage is in loblolly pine. We have some Virginia pine, shortleaf pine, and a whole variety of hardwoods.

In Texas we have also been on a pine economy, as many other pulp and paper industries in the south have been. Loblolly pine is our major species there also, along with some longleaf, a little shortleaf, and again a whole host of hardwood species. In Brazil, we are primarily concerned with eucalyptus and bamboo.

Most of our research at Champion in regard to the forest operations is done on a contractual basis. We cooperate and do contract work with public and private institutions. For example, we had a contract with the Forestry Department of the Ohio Agricultural Research and Development Center before John Hacskeylo died. John was doing some mineral nutritional work for us on cottonwood.

Another relationship which we have on a contractual basis is the large program of pine improvement work being conducted at North Carolina State University under the direction of Bruce Zabel. It began about 10 years ago and, as far as I know, is

the 'largest forest genetics program in the world today. Champion was one of the 11 charter members of that tree improvement cooperative arrangement. There are currently about 20 members, including some state agencies but mostly pulp and paper industries of the south. The land ownership of the members of this group totals more than 10 million acres. They have a planting program on a 30-year rotation, involving at least 300,000 acres a year.

So far within this program some 1500 acres of seed orchards have been established in the South in 11 states. This involves 67 individual seed orchards. Frank Cech was in on the ground floor of this operation. It is a tremendous effort. North Carolina State University provides three faculty members practically full time and some six secretaries and technicians. The industries have 25 to 30 men working full time on the program. I regard it as a sort of monument to the spirit of cooperation which can be developed between private industry and a public institution.

Progeny tests are currently being conducted from the seeds produced in these seed orchards. Some of them are now coming into production. In 1965, about 2,000 acres were planted from seed produced from these orchards. In 1966, some 25,000 acres were planted and in the future we hope that these 1,500 acres of orchards will produce ample quantities of seed for the requirements of these companies.

What does it cost Champion to participate in this program? The original charter members each contributed \$1,500 annually during the first 3 or 4 years. A lot of these funds were matched. Then the annual membership fee was increased to about \$2,000 and last year it was increased to \$2,500. This is some of the best money we have ever spent.

What are we learning from this type of program? Well, it is still in its embryonic stages, but as an example we are learning from some of our progeny tests that there is a high degree of inheritance of resistance to *Cronartium* in selected trees. Certainly straightness of bole in loblolly pine is strongly inherit-

ed, as are other attributes, such as specific gravity of wood and tracheid length. Another very pleasant surprise was the recent indication that volume growth is a rather strongly inherited trait. This of course interests the pulp and paper industries greatly.

I was impressed by some of the statements made here concerning the responsibilities of the forester to make the best utilization of the land available. Champion's seed orchard operations are certainly not as large as those of some other companies.

From the very beginning, one of the questions which confronted us was: In loblolly pine do we want to produce trees of higher than average specific gravity wood or lower than average specific gravity wood? Right now the 'bulk of Champion's papers being produced are of the so-called higher quality. Low specific gravity wood, with its thin walled cells, would be best for this type of product. However, at the time this decision had to be made, almost 10 years ago, we didn't know what kind of paper we would be producing "X" years from that time. So we elected to go two separate routes. We have two loblolly pine seed orchards now, one composed of lower-than-average specific gravity wood and one composed of higher-than-average specific gravity wood.

It costs us on the order of \$20,000 or \$30,000 a year for the manpower involved to participate in this program. Here again we feel this is some of the best money that we have ever spent. We cooperate with other people, too. For example, we have been working with the Texas Forest Service for several years. Perhaps most of you are familiar with the so-called drought-resistant loblolly pine there. We have played a part in that. Also, Hans Van Buijtenen did a very fine job helping us to establish a series of clonal tests of cottonwood.

We are extremely interested in the eucalypts and bamboos. We are not confining our thoughts to trees, as far as production of pulp is concerned. We are working with a large variety of annual plants which 'lend themselves to absolute mechanization with machines that can be operated by one man and harvest 30-50 tons per hour. These annual plants tend

to broaden our fiber base. We can't confine our reasoning to trees which require even 30 years to grow, for example.

## DISCUSSION

*Question:* Can you tell us a little about the organization of your cottonwood research program?

*Stephens:* We have a program with an annual budget. We are just using rough guides, based on the requirements for 100 bushels of corn per acre. We are spending on the order of \$30 or \$40 per acre and planting 1,000 acres of cottonwood per year. We are not being very successful with it because the sites on which we are planting are not good cottonwood sites. But we are doing the best we can with the sites available. We are cultivating them to the "nth" degree and fertilizing at least every other year.

In those plantations which are 2 years of age or older, we can no longer get in to cultivate and we can no longer apply fertilizer from the ground. Therefore, this year we are going to be flying the fertilizer on, which means we are going to be using a high-analysis type of fertilizer. We expect this fertilizer program to cost (us \$10 to \$12 per acre per year.

*Question:* Is this cultural work based on analyses of the soil? Have you had any comparisons between the fertilized and unfertilized plots?

*Stephens:* As you folks know better than I, the development of some of our agronomic crops is based at least to some extent on their response to fertilization. This we know nothing about as far as cottonwood is concerned. We have fertilized some of our cottonwood and obtained very good responses, in increased growth rate, for example. In other cases we can't get the responses we would like to get. We have had our soils analyzed. Most of our plantations are on sites which would be evaluated as site index 90 to 100 for loblolly pine. We test soil samples and find that they have around 8 lb. of available P<sub>2</sub>O<sub>5</sub> per acre and roughly 18 lb. of calcium. This is very low but these pine trees are growing 80, 90, or 100 feet tall in 50 years.