FOREST TREE IMPROVEMENT UNDER THE IDA CASON CALLAWAY FOUNDATION

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The Ida Cason Callaway Foundation was established by Mr. and Mrs. Cason J. Callaway, of Hamilton,. Georgia, some years ago for the purpose of carrying on charitable and educational activities. In 1950, in line with these objectives, the Foundation .undertook a project designed to find, and make available on a commercial scale, superior trees for southern planting, primarily pine.

For more than a decade Mr. Callaway has had as his major objective the improvement of the economic condition of the South. Although the immediate objective of toe Tree Improvement program is the attainment of a superior tree, or trees, this is not the end goal. That is still the economic improvement of the South. Mr. Callaway's reasoning is that since timber plays such an important role in the South's economy, anything that will aid better timber production will likewise help the South as a whole; and that a long step towards improving timber production is the development of a superior strain of pine for timber growing.

The Southeastern Forest Experiment Station of the U. S. Forest Service was contacted early in 1950 to initiate the program. Mr. Keith W. Dorman set up the program and started the work by selecting superior pine trees for study, and by making a few cross-pollinations between slash, loblolly, longleaf, and shortleaf pine.

By fall of that year a full-time forester, James T. Greene, was employed to head up the work. Now, at the end of two years, we can begin to see what is developing, and what promises are becoming apparent for the future.

The mechanics of this project have been the selection of superior trees of the four species named; the cross-pollination of a restricted number of combinations; collection of seed from the selected trees and seed resulting from the hybridizing; the raising of seedlings from these seed sources; and the field planting of the seedlings. But no project is wholly mechanical, certainly not any activities that deal with nature.

The selection of superior trees on which to base the studies has been a challenge to the enthusiasm and judgment of the ones making the choices - a challenge that has been ably met. Each selection was made on the basis of the superiority of an individual tree over the average of other trees within a comparable radius in the stand. This radius varies from a 1/10 acre to a 1/4 acre, depending on the stand conditions. The points that were considered in making the choices were factors of growth in diameter and height; crown form; limb size; and resistance to disease. To date 263 selections have been made: 92 slash pine; 70 lob-lolly pine; 58 longleaf pine and 43 shortleaf pine. The three last named species are native to the section, while slash pine occurs near Hamilton only in plantations; the oldest of which we-have available is now 17 years old.

A small number of cross-pollinations have been made each year. Results have been only fairly satisfactory and improved techniques and equipment for use in the South are urgently needed. The chief factors contributing to poor seed catch are: freezing weather following pollination; failure of the pollen to "catch"; and pollinating after the receptive stage of the female flower had elapsed. A record is kept of the dates of pollen production for the four pine species, and of the various stages of female flower development. This record has been helpful in planning programs of field work for this activity.

It is not necessary to go into the details of the equipment used in pollinating because standard procedures were followed, but I would like to mention that some work was done on the choice of equipment and that the process of trying different techniques and materials is still going on. This is especially true of pollen containers and dispensers, and bags for covering the female flowers.

Seed collection, with all its accompanying records (so that the chain of continuity from the selected parent to its progeny would not become confused) has been done faithfully and efficiently. A record was kept of the number of cones, and the number of seed per cone from each tree. Also, year before last, we obtained data for weight per thousand seed from each selected tree. Seed weight varied widely between trees but we found very little relationship between seedling size and seed weight. This subject needs additional study but we do not have adequate facilities for doing it.

The only place available for seedling production for the first year was a slathouse, designed for half-shade. Normal nursery practice was followed, from the preparation of the soil for the beds to the lifting of the mature plants. Towards the end of the season it was found necessary to open the roof of the slathouse to admit full sunlight to toughen-out the seedlings. Germination ranged from 7% to 71% and averaged 35.4% for the 53 groups of seed used.

During this past year the nursery was located in a bottomland, below the dam of a 170-acre lake. Water requirements were met by a siphon line from the lake. The seedbeds were built up from 10" to 16" above the surrounding ground, and filled with prepared soil composed of 2 parts ordinary soil, 2 parts sand, 1 part peat moss.

Germination of the experimental lots of seed this year ranged from 0% to 92.3%, and averaged 46.7%, compared to the previous year's average of 35.4%.

Last winter the first year nursery crop was planted out in a 100-acre field that was set aside for this project. A planting plan was prepared by the Southeastern Forest Experiment Station to get the best comparison of growth between seedling lots. To accomplish this, the seedling sources were repeated in three blocks, each block being widely separated from the others in the field. Seedlings were planted in individual plots in groups of from 4 to 100 or more depending on the quantity available and the source. A 10' by 10' spacing was used throughout. Seedlings from a few geographic sources were also represented

in these plantings. Each plot, representing a single source, has concrete posts at each corner, the posts being marked with the code number of the parent source.

Each study is designed to provide a comparison between the offspring of each selected tree and between the offspring of selected trees and seedlings from commercial seed. Seedlings from commercial seed are grown in the Georgia State Nursery and in the Foundation nursery.

It was of interest to note the seedling growth in the nursery this past year, as it varied according to the parents represented. Some parents produced seedlings with a wide range of heights, and others produced seedlings that held to a narrow range of height.

In 1951 the slowest growing lot of slash pine seedlings averaged 8.2" in height, the fastest growing 14.2". Seedlings from commercial seed averaged 9.8" in height. The slowest growing loblolly pine seedling lot was 5.4", the fastest growing 11.1" while the control seedlings averaged 7.6" in height. In 1952 the slowest growing lot of slash pine seedlings was 4.0" and the fastest growing was 20.0".

Our work in the improvement of pine trees so far has shown that it is possible to find trees of high vigor and good form. Also, that the very young offspring of some of these trees, after wind pollination, are more vigorous than those of other trees. Our field planting tests are not old enough to give a good follow-up of the continuity of superiority. However, we have found enough apparently superior types to encourage us to expand our efforts in controlled breeding to create still better types and, also, to develop seed orchards which will produce seed of high quality strains in volume.