25. THE TREE IMPROVEMENT RESEARCH PROGRAM OF THE SOUTHEASTERN FOREST EXPERIMENT STATION

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The Southeastern Forest Experiment Station has major tree improvement projects at its Lake City Research Center in Florida, and its Athens-Macon Research Center in Georgia. The Station also has several individual studies at other locations. The oldest and largest genetics project of the Southeastern Station is the one at Lake City, initiated formally in 1941 under the direction of Harold L. Mitchell. This program was started with only naval stores research money, but was later expanded by Pomeroy to other fields, with the financial assistance of the Florida Board of Forestry. Also cooperating in the Lake City program are the University of Florida, the National Container Corporation, and a number of other pulpwood companies.

The Lake City Program

The Lake City Research Center genetics program includes research in gum-yield inheritance, racial strains of slash pine, superior-tree selection in the nursery and in older stands, techniques of vegetative propagation, and techniques for managing seed-production areas and seed orchards. The most progress to date has been made in the fields of gum-yield inheritance and vegetative propagation. The heritability of gum-yield in longleaf pine has been demonstrated in 17-year-old one-parent progeny resulting from a study started by T. A. Liefeld in 1935. Another major step was verification of the inheritance of gum yield in 9-year-old trees from cross-pollinated and open-pollinated slash pines of high and average gum yield, as described earlier by Pomeroy. A third plantation of several hundred additional seedlings from open-pollinated and cross-pollinated high-yielding slash pines is not yet old enough for gum-yield determination.

The Lake City center is one of the cooperators in the South-wide Pine Seed-Source Study of the Committee on Southern Forest Tree Improvement. The same center is planting trees this winter for a more intensive local slash pine seed source study involving 16 different geographic origins. A number of other forestry groups are cooperating in this test. The Lake City center is also collaborating with the Athens-Macon Research Center in a local test of loblolly pine seed sources from Georgia and Florida.

A slash pine ecotype study has been started to see if there is any difference in progeny of slash pine from wet and dry sites.

In the field of selection, the major effort in the past was the selection, in the early 1940's, by Dorman, Snow, and others, of a dozen very high-yielding naval stores trees. Nursery selection of superior and odd-type seedlings is now under way on a continuing basis in cooperation with the Florida Forest Service nursery at Olustee. Search has been started also for superior timber-type trees of longleaf and slash pine in existing stands.

Research at Lake City in techniques of vegetative propagation has been stepped up greatly in the past few years to provide the methods needed to perpetuate superior strains. Successful rooting of cuttings from mature trees has now resulted in slash pine saplings that have attained heights up to 25 feet. However, the rooting percentage of severed cuttings from mature trees is still rather low. As described in his talk here earlier, Francois Mergen had very good success at Lake City in rooting slash pine by the air-layering technique. Mergen also had some outstanding success with grafting in naval stores pines. This work is covered in Station Paper No. 46, "How to Root and Graft Slash Pine," and in other publications.

The Lake City program includes several tests of techniques for managing seed production areas and seed orchards. One test compares four levels of mineral fertilization, two types of stem injury, and one type of root injury with the object of stimulating seed production in six-year-old and 20-year-old plantations of slash pine.

Further details on the genetics program at Lake City are available in Mergen and Pomeroy's Project Analysis, published as Station Paper No. 45.

The Athens-Macon Research Center

The Station's genetics efforts in Georgia started in 1950, when Keith Dorman initiated and gave technical supervision to the genetics program of the Ida Cason Callaway Foundation at Hamilton, Georgia. This program will be described by Aaron Jordan.

In 1954, our Athens-Macon Research Center began a formal forest genetics project at the new Georgia Forestry Center at Macon, with the cooperation and assistance of the Georgia Forest Research Council and the Georgia Forestry Commission. The initial effort in this project is the selection of outstanding individuals of the major southern pines in Georgia, both in natural and planted stands. These selections will be used in one-parent progeny tests, in controlled breeding, and in grafted seed orchards. The staff is also selecting super-seedlings from the four Georgia Forestry Commission nurseries. This will give them the best seedlings out of a total of more than one hundred million grown in the four nurseries each year.

The Athens-Macon Research Center is also initiating a local test of loblolly pine seed sources, mainly in Georgia.

Methods for grafting shortleaf pine have been perfected by Zak at our littleleaf disease project at Athens, in cooperation with the School of Forestry of the University of Georgia. Zak is also engaged in selecting individual trees that appear to be resistant to littleleaf disease, and has been using these in controlled breeding in an attempt to develop resistant strains. A crop of over 1900 seeds from such crosses has already been harvested. One-parent progenies exposed to attack by the littleleaf fungus have shown wide variation in resistance. A study of the relation of littleleaf disease resistance to geographic origin of shortleaf pine has also been started by the Athens office. In this study, stock from seed from a dozen parts of the South has been outplanted on littleleaf sites in the Piedmont of Georgia, South Carolina, and Virginia.

Keith Dorman of the Athens-Macon Research Center also serves as chairman of the technical committee of the Research and Marketing Act project on forest genetics in the Southern agricultural experiment stations. Under this regional RMA project, studies are now active at the Alabama Agricultural Experiment Station in Auburn and the Georgia Agricultural Experiment Station in Athens. Dorman also keeps in close touch with the new project in fundamental genetics at the University of Georgia School of Forestry in cooperation with the Georgia Forest Research Council. Thus, Dorman is in a position to coordinate the Station's genetics work in Georgia with that of other groups in the State.

Other Research Centers

The Southeastern Station's Tidewater Forest Research Center at Franklin, Virginia, has a one-parent progeny test of the inheritance of stem form in loblolly pine. The progeny are now two-years-old. The Santee Research Center in South Carolina is testing eight local seed sources of longleaf pine for planting in the Sandhills, in cooperation with the South Carolina. Forestry Commission. The Cordele Research Center in Georgia has a project in the selection of superior strains of slash pine, particularly in its many acres of planted stands on the George Walton Experimental Forest. These selections are now being utilized in two of the Stations genetics projects.

The Southern Appalachian Research Center at Asheville, North Carolina, has a cooperative test with the Central States Forest Experiment Station of the performance of planted yellow-poplar of 16 different geographic origins The same research center has a test of six geographic strains of northern red oak, in cooperation with Harvard University, and a 20-year-old test of hybrid poplar clones.

The Division of Forest Insects Research of our Station has been selecting longleaf and slash pines for resistance to black turpentine beetle at Lake City, Florida.

A major accomplishment of the Station was the development of wilt-resistant strains of the mimosa tree by the Division of Forest Disease Research. Two resistant, named varieties have been turned over to the nursery trade. This project has now been transferred to the Agricultural Research Service.

Forest insect and disease specialists at both the Southeastern and Southern Stations have joined, hands in a thorough annual check of most of the plantations in the South-wide Pine Seed-Source Study as described earlier in this program by Berch Henry.