The Forest Tree Improvement Program at the University of Florida

by T. O. Perry and Chi-Wu Wang 1/

Forestry in the South is blessed with an especially favorable environment. Fast growth rates prevail throughout the area, with trees achieving breast height in 3 years. Seedlings are transplanted after 1 year in the seedbed as 1-0 stock. The terrain is level, and mechanized planting and land clearing are economically feasible operations. Major pestilences, like those that sweep through northern United States and Canada, are uncommon. Thus there is no pestilence of a severity corresponding to that of the white pine weevil, the white pine blister rust, or the bronze birch borer that seem to sweep across entire states and provinces. Our pestilences, such as the turpentine beetle and the ips engraver beetle, strike individual trees or clusters of trees in stand, and only rarely sweep through a whole forest. Usually forest stands are even-aged and of a single species, making selection of promising phenotypes a relatively easy task.

In this favorable economic and biological environment the support of forestry research, particularly forest genetics, is unusually strong. Forest industries, especially the pulp and paper industry, take an active role in supporting forest genetics research. Industry cooperators are assisting tree improvement work by providing planting sites and taking measurements of the racial variation studies of the Committee on Southern Forest Tree Improvement and other agencies. The pulp and paper industries, through direct financial support, are aiding three genetics research programs: The Texas Forest Service Program, the University of Florida Program, and the North Carolina State College Program The author is most familiar with the University of Florida Program and will describe it briefly.

The Cooperative Forest Genetics Research Program at the University of Florida is completing its third year of operation. The Program is supported by the University of Florida and 11 pulp and paper companies which have holdings in the Southeast Coastal Plain. The Program is administered by the Universityof Florida School of Forestry and is supported by annual contributions from the cooperating industries. Dr. T. O. Perry and Dr. Chi-Wu Wang supervise the research work at the University and make regular visits to the forest holdings of the cooperating companies. At the University, three assistants supervise the record keeping and nursery operations. A temporary crew is hired annually to assist in propagating work.

The Program is further aided by the contact men of the cooperating industries. The contact men are appointed to serve as liaison between. Dr. Wang and Dr. Perry in the tree improvement work for each company. These men are specially trained in tree selection techniques and in the methods of marking stands for genetic improvement.

1/ Associate Professor's, School of Forestry, University of Florida, Gainesville, Fla.

Practical research, basic research, and teaching comprise the threefold objective of the Program as supported by the industries.

One of the major projects of the Program is the selection of superior phenotypes for use in the establishment of seed orchards for cooperating industries. These selected trees are propagated by grafting and then serve as breeding stocks for many basic studies. The best will provide the breeding lines of the future.

A11 selected trees are being tested to see if their phenotypic superiority has a genetic basis. Past experience in selecting superior southern pine phenotypes permits the prediction that most of these trees will prove to be genetically superior. The plantations from the initial seed orchards will produce a significantly greater return than the plantations established by current seed collection practices. The few selected trees that are proved genetically average or inferior will be rogued from the cooperator's seed orchards. At the start of the Program, each cooperating company was visited and a 2-day training session was held for the field foresters. At these training sessions the theories and techniques of tree selection were explained and demonstrated to over 175 foresters.

During the past 3 years over 6,000 trees were examined by these foresters and their assistants. The best of these were reported to the company contact men. This contact man examined each tree again and with the aid of a special scoring system selected the best for propagation and use in the Genetics Program. Over 500 trees have been selected to date Most of these trees are growing over 2½ times as fast as the surrounding trees of the same age and are outstanding in straightness, height growth, disease resistance, and other characteristics of importance to the cooperator's production goods.

Cuttings from these selected trees are shot down with a high-powered rifle and shipped to the University for grafting. The grafts are planted in a central test area here at Gainesville and in the seed, orchards of the cooperating companies. Two grafted plants from each tree are kept by the University and the remainder are sent back to the cooperators.

In addition to the practical activities of selection of superior trees and seed orchard establishment, companies are becoming increasingly seed-quality conscious. Logging operations in good timber stands are being deferred until the time of seed ripening when a double crop of seed and timber is being harvested from the land. Nearly every contact man is engaged in the task of thinning exceptional stands of trees to stimulate seed production. In many cases these "seed production areas" are sprayed with insecticides from the air and fertilized to improve seed crops. These are stop-gap measures being instigated to provide vital seed during the years when the seed orchards are growing to full production capacity.

A large area of practical research evolves directly from the problems of seed-orchard and seed-production area establishment and management. What spacings, what fertilizers, what clutivation, and what pruning practices

should be used to obtain maximum production and efficiency in these areas? These practical research demands must be and are being met.

Basic research studies, too, form an essential part of the Program. Weekly measurements of height and diameter growth are revealing much information regarding the phonology and genetic variation in photoperiod requirements of the southern pine species. A nearly completed study reveals a clinal pattern of genetic variation and the winter chilling requirement for red maple. Several research projects are aimed at elucidation of the pattern of genetic variation in forest trees.

A comprehensive description of the activities of the Cooperative Forest Genetics Research Program may be obtained by writing for the Second Progress Report published by the University of Florida in June 1957.