17. SEED ORCHARDS FOR THE SOUTH 1/

Thomas O. Perry and Chi Wu Wang
School of Forestry, University of Florida
Gainesville, Fla.

The initial results of Forest Genetics research are in. They are sensational. Not so sensational as many promoters would lead us to expect but certainly striking enough so that the forestry profession would be very negligent if it failed to apply genetic principles in forest management.

Nearly every conceivable tree character of economic interest to forest industry is markedly influenced by inheritance. The work of Australian forest geneticists with slash and loblolly pine has shown that selection and breeding can produce three to five times as many trees of acceptable form and vigor as can be produced through random seed collection 2/.

Similarly, Monterey pine trees have been shown to differ inherently as much as five times in vigor, by as much as 20 percent in wood density. Fibril angle, fibre length, degree of knottiness, gum yield, disease resistance, and many other characters are rigidly controlled by the inheritance of a tree.

Simple selection of parent trees for superior form and vigor can produce seedlings with three times as many acceptable trees per acre when compared to seedlings from randomly selected parents.

Further research findings reveal that 17-year old seed orchards spaced at 80-100 trees per acre can produce 80 pounds of slash pine seed or 70 pounds of loblolly pine seed in a good seed year. At 13,000 seed per pound, this would be more than a million seeds per acre for slash pine, and at 22,000 seeds per pound this would be more than one and one-half million seeds per acre for loblolly pine. Twenty acres of seed orchard can supply seed for all of the planting needs of any industry. One hundred acres should take care of the state of Florida!

Even when genetic considerations are ignored, the economic advantages of collecting seed from a concentrated acreage which can be so managed as to avoid crop failures cannot be discounted. The tremendous and fantastically unsound practice of chasing all over the southeast to collect thousands of bushels of slash pine cones can be eliminated at a great saving.

1/ Because of the absence of the senior author, this paper was not read at the conference. The junior author, although handicapped by lack of both manuscript and slides, gave an excellent and spirited. resume of the paper from memory. The paper as originally prepared is included here to make the record complete.
2/ Jim McWilliam, Queensland Forest Service, Queensland, Australia, in personal correspondence, 1953-1954.

Grafting techniques have been perfected here at the University of Florida and elsewhere whereby seed orchards bearing cones can be established within two years. However, it will probably be at least fifteen years from the date of establishment of the seed orchards before large quantities of cones are produced. Grafts made in July 1953 at the University of Florida produced seed this year and are bearing another crop of cones that will mature in the fall of 1955.

When factors of racial variation are taken into consideration it is conservative to estimate that 15-30 percent improvements in plantation productivity can be realized through using seed from orchards of selected trees.

As a primary part of the Forest Genetics Program, it is the aim of the School of Forestry to assist the wood using industries of the southeast in establishing orchards of selected trees which will eventually provide all of the tree seed used in forest planting.

Skilled laborers will be trained in the grafting and management of selected plants and will plan on making 5,000 or more grafts a year, about 50 percent of which may be expected to survive. These men will be able to produce selected plants far more efficiently than if each individual forest industry attempted to establish nursery facilities, lath houses, irrigation equipment, etc.

The grafts made by the University will be certified and shipped back to the cooperating industries for planting in their seed orchards. This certification will be important since eventually all tree seed sold for forest planting will probably require a certificate of genetic quality just as pedigrees are required in agriculture.

The biggest task will be that of selecting trees to be used in the seed orchards. Naturally two specialists cannot cover the southeast territory alone and locate enough trees to supply the needs of industry. The brunt of the selection task will fall to the cooperating industries. The following work plan offers one method whereby the job may be done.

Work Plan for Selecting Trees

Each cooperating industry will appoint a forester to the task of screening and selecting of plus tree 3/ to be used in establishing the seed orchards. This assignment should not take more than a month of the appointee's time.

A representative from the University of Florida is visiting each cooperating industry this fall and winter and presenting lectures and demonstrations to the field foresters on the principles and methods of tree selection. A number of sample trees are actually selected and

3/ Plus tree--a tree chosen because it is outstanding when compared to other trees.

through discussion the foresters gain a clear picture of the kinds of trees that should be searched for. The response to these demonstrations has been enthusiastic and in every case the foresters have indicated that they benefited greatly from the demonstrations. The importance of field illustration and discussion cannot be over-emphasized. Most of the foresters in the field have had little or no genetic training and do not know what to look for until shown.

After the lecture and demonstration each cooperating forester has as part of his regular work assignment the task of locating the best tree he sees each day. At the end of the week the best tree among these four or five will be reported to the contact forester in charge of the general selection program. These will be further screened by the contact forester. Special incentives are being offered by industry to encourage the recording of trees by the woods crews. One industry is offering a bottle of whiskey for the best tree recorded each week.

The number of trees needed for each industry will depend on the size of its holdings and the number of seedlings it plants. The more trees recorded the more rigorous final selections can be. In theory the International Paper Company should record close to 6,000 trees by January 1955. From these they will select about 300 to 500 trees for their seed orchards. Over 300 foresters have attended the special lectures and demonstrations. From them and their employees we can expect a thorough screening of our woods for outstanding trees.

During the fall and winter of 1955 a University representative will spend another week with the cooperating industry, examining the selected trees and making final selections. We will begin grafting in the summer of 1955 and by the winter of 1956 each cooperator should have at least one and one-half acres of seed orchard established. By 1958 each cooperating industry will have five to ten acres of seed orchard.

A few grafts from each selected tree will be held for research purposes. As soon as the seed orchard begins to produce seed we will begin progeny testing. Any trees that do not produce desirable seedlings will be rogued from the seed orchard. Further selection and breeding amongst trees of proven genetic superiority, as shown by progeny tests, will provide further improvement in planting productivity. Constant search in the woods will uncover trees superior to our initial selections.

As with corn and other agricultural crops, selection, breeding, reselection, and improvement will be continuous from one year to the next.

Eventually as the pure service job of selection and grafting becomes more onerous and industry is convinced of the merits of seed orchards, the University of Florida may be justified in employing farther personnel who will be free to devote their full energies to this important work.

Along with completing a job of considerable importance to our economy, the establishment of these seed orchards will provide excellent material for further research. Material from these selected trees will be made freely available to all research agencies interested in tree improvement.