

TREE IMPROVEMENT PROGRAM
of the
Texas Forest Service

The Texas Forest Service has undertaken research in forest tree improvement as described below. The outlines for the projects listed were approved in 1951 and the projects are all in operation, with seedlings produced for field planting.

1. Isolation of strains of pine suitable for planting in the drier, more extreme environment found in the Post Oak Belt to the west of the Pine-Hardwood Region.

a. This problem is being attacked by the three following methods:

(1) By selection, to determine if strains of loblolly pine can be found that will be suitable. Such selection will be made from (a) the four areas of "Last Pines". (The "Lost Pines" are scattered islands of pines growing from 40 to over 100 miles west of the pine belt with 10 to 20 inches less rainfall), and (b) from isolated pines occasionally found growing in the Post Oak Region.

(2) By production and testing of various hybrids that might be suitable for this area.

(3) By testing various exotic species that grow naturally in an environment similar to the Post Oak Belt.

b. The various strains, hybrids, and exotics are planted in three regions of the Post Oak Belt (northern, central, southern) as well as at the central test area in the East Texas Pine-Hardwood Region. Additional, cooperative tests have been arranged with other individuals and agencies in the south.

2. Determine the role genetics plays in the determination of wood density of loblolly pine.

a. This very complex problem is at present being attacked from the genetic standpoint but plans are to attack the problem from the physiological and anatomical viewpoint.

b. Of the greatest importance is the control of environmental factors so that results will reflect only genetic differences.

c. Loblolly pines with the densest and lightest wood have been located. For this purpose over 6,000 individual pines were sampled.

d. Trees with very light and very dense wood will be used as follows:

(1) Grafts on loblolly stock. These will be in the form of twin grafts when possible. A scion from a light tree and one from a dense tree will be grafted onto the same stock. This will result in a forked tree, one fork from dense scion, one from a light scion. The effect

of environment on the individual scions is in this way greatly equalized.

(2) As soon as methods are worked out for successfully rooting loblolly pines, cuttings from the same dense and light trees will be planted together on uniform sites.

(3) Controlled pollination of dense to dense, dense to light, and light to light trees will be made. Controls will be open pollinated seed from the same trees.

e. Effect of interspecies hybrids on wood density will also be checked.

3. Regional cooperation in a study of racial variation.

a. This study is in cooperation with the Committee on Southern forest Tree Improvement. It will determine the areas outside Texas where seed may be procured when cone crops in Texas are lacking.

b. The Texas Forest Service has collected seed for, and will test in return various geographic strains of loblolly, shortleaf, slash and longleaf pines from all parts of the South.

(1) These tests will be made at the central test areas in the Pine-Hardwood Region of East Texas.

4. Supplementary study of racial variation.

a. By coordination of projects 1 and 3 listed above, the characteristics of the strains of pine from the "Lost Pines", may be compared with the characters of the regional geographic strains.

5. Tests of outstanding pine trees ("Superior" trees).

a. This project will yield information regarding the inheritance of various characters of value to foresters and the wood industries. It will point to the feasibility of using these trees as seed sources and will constitute the first steps necessary to the volume production of better pines.

(1) "Superior" trees of loblolly, shortleaf, and longleaf pines have been chosen throughout East Texas.

(2) "Superior" trees are those chosen that have the best silvical and wood characters possible, with special emphasis on those characters known, or strongly suspected of being, strictly controlled genetically. "Superior" trees are those that: (a) Have an outstanding growth rate, especially as regards height growth; (b) Possess limbs of small diameter; (c) Have most efficient crowns (small, narrow crowns, dense foliage while still retaining better than average growth rate); (d) Have shown good pruning ability; (e) Have shown exceptional ability to be a good competitor. Almost all "superior" trees have been selected from dense stands or from what had been dense stands as shown by stumps; and

(f) Have straight bole, little taper, etc.

(3) Open pollinated progeny of these pines are under test at the present time. In the future, controlled pollinations will be made.

(4) As methods are further developed these "superior" trees will be tested clonally, by cuttings or grafts.

(5) All progeny tests will be made in the central test area with suitable controls.

6. Determine if the occasional outstanding trees that appear in nursery beds are of special value.

a. This study should indicate how well the mature characters of a tree can be predicted from the study of a seedling.

b. It should indicate if the outstanding seedlings are genetically "superior" and as such, selection of these could be a simple method of obtaining such trees.

c. Outstanding trees will be selected from the nursery beds and planted in the central test area along with average and inferior seedlings from the same bed.

(1) Seeds are graded by size to avoid the outstanding seedling being merely the result of seed size differential.

(2) Seed source is all East Texas to avoid any variation due to major geographic inequalities.

7. Determine pine phenology (time of flowering, seed maturity, etc.).

a. Phenological observations of the four major southern pines are being taken at four points throughout East Texas. In addition, general observations are recorded.

In conjunction with the above listed projects and to anticipate future projects, the following activities have been completed.

1. Selection of a site in East Texas to be used as a central area for genetic research. Such an area of 50 acres has been obtained near Fastrill, Cherokee County, through the courtesy of the Southern Pine Lumber Company of Diboll, Texas.

a. A portion of the area will be used as an arboretum where all species of pines available that will grow in this area will be planted. Seeds of a number of species are now in the nursery beds, and a number of plants are outplanted.

1. b. The remainder, and majority, of the area will be used as a "uniform garden" test area where stock for the various projects will be planted and tested.

2. Selection of three sites in the Post Oak Region for testing of Seedlings described in paragraph 1. A total of 13 acres in 3 areas has been obtained.

Several projects are in the formative stage, but have not yet been officially initiated. These deal with the determination of the value of different hybrids and particularly backcrosses to specific insect, disease, or silvical problems encountered in Texas.