

A Half Century of Forest Research

From the Hell Hole plot of 1905, the Record is rich in accomplishment

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Forest research in South Carolina dates back to the very beginning of forestry in the South. Among the earliest studies were the so-called "Hell Hole" plots established by the U. S. Forest Service in 1905 in the vicinity of that famous swamp of the same name. By coincidence, some were located within the present boundaries of the Santee Experimental Forest near Charleston. These

study in longleaf and loblolly pine started in 1924 at Lanes. From this, A. L. MacKinney published five articles about the longleaf pine only, inasmuch as the results for loblolly pine were inconclusive. Changes in ownership and unscheduled cutting in the mid-thirties eliminated the plots from further usefulness. Another study in 1925 resulted in a series of four longleaf pine thinning plots on the Southern Railway's Lincoln Green Forest near Pregnall. These 30-year-old plots form one of the oldest active research studies in the South.

Period of Awakening

During the 1930's there was a flurry of research activity in the loblolly pine type. The first formal investigation was a cooperative logging and mill scale study in 1931 between the Southeastern Forest Experiment Station, the Forest Products Laboratory of the U. S. Forest Service and the Old North State Lumber Company. Strangely enough, this also took place within the present Santee Experimental Forest.

The results of the production-cost phase of the study were released by the Forest Products Laboratory in 1935 under the title of "Selective Logging in the Loblolly and Longleaf Pine Forests of South Caro-

lina." Also, in later years, L. E. Chaiken published "Growth and Mortality During Ten Years Following Partial Cuttings in Loblolly Pine" in the *Journal of Forestry*.

In 1934, the Southeastern Station and the Forest Products Laboratory commenced a study of loblolly pine growth and pulpwood production. This was a regional investigation, but much of the work was in South Carolina. From this came the well-known Technical Note 33, "Volume, Yield and Growth of Loblolly Pine in the Middle Atlantic Coastal Region," by Chaiken and MacKinney.

This productive decade also saw the establishment in 1935 of one of the earliest forest genetics studies in the South involving 105 lots of planted loblolly pine seedlings grown from seed of widely differing parent trees. From this L. S. Minckler prepared the article "One Parent Heredity Tests" for the *Journal of Forestry*. Flooding of Lake Moultrie destroyed the experiment before additional benefits were derived.

Finally, in 1939, the Southeastern Station set up a major study of experimental cuttings in pulpwood stands to determine the best methods of handling young even-aged loblolly pine. To this end groups of six plots, each with a different method of



Prize loblolly pine seedlings from a superior parent tree scheduled for planting in one of the South's first seed orchards at the Westvaco Experimental Forest.

were small plots in young stands of loblolly pine, aiming to show the effects of thinnings, density of stocking, and light burning on rate of growth. Lack of funds, unscheduled cuttings, and beetle attacks resulted in abandonment of the entire study in 1933, but not before several reports were made including a *Journal of Forestry* article in 1929.

For a long time after this early effort, formal research studies were few and far between and mainly restricted to small plots. One was the Southern Forest Experiment Station's prescribed burning

This installation on the Calhoun Experimental Forest measures runoff from a small watershed as part of a program to determine measures needed to improve the water resource



cutting, were installed in five different locations, two of which were in South Carolina. T. A. McClay summarized the results in 1953 in a Station Paper called "Growth, Mortality, and Regeneration After Cutting in Loblolly Pine Pulpwood Stands."

Approaching the Goal

Forest research in the state received its greatest impetus in the mid-forties with the establishment of two research centers, the Piedmont and Santee, under the direction of the Southeastern Forest Experiment Station. These were part of a group authorized in a South-wide expansion of federal forest research, strongly supported by the Forest Farmers Association Cooperative.

Each research center was established within a reasonably uniform forest province of 10 or 20 million acres. In this decentralized pattern, the forest researchers live in the area and gain a first-hand knowledge of conditions there. They cooperate closely with school, farm, state, and industrial groups. An advisory committee of local forestry experts and landowners helps to keep the research program geared to the needs of the people in the area.

The Southeastern Station's Santee Research Center was established in 1945 with headquarters at Charleston. Its territory embraces the state's 28 coastal plain counties—an area where loblolly pine reaches its maximum development (heights up to 130 feet in 50 years). Much of the center's research work is concentrated on the 6,000-acre Santee Experimental Forest about 30 miles north



Problems of converting scrub oak to a productive pine forest in the Sandhills are being attacked through multi-agency cooperative program



Seedbed preparation and hardwood control studies at the Santee Experimental Forest lead to abundant stands of young loblolly pine

Obtaining samples of soil profile at the lower depths at Piedmont Research Center



The original "Hell Hole" plot was established in 1905 to study effects of stand density and light burning on growth of young loblolly pine



of Charleston on the Francis Marion National Forest.

In this flatwoods locale, research emphasis has been largely on the silviculture and management of loblolly pine. Results of the center's work on the chemical control of weed trees and use of prescribed fire in the regeneration and culture of loblolly pine are well known and widely used. A station paper on this work, "The use of chemicals to control inferior trees in the management of loblolly pine," went through an edition of 14,000 copies.

On the experimental forest one may also observe 10-year results of various management systems for loblolly pine carried on as commercial operations on 28 large tracts. In addition, a 33-acre woodland demonstrates the development of a profitable forestry operation in a small farm woods. Among numerous other studies of loblolly pine, one of the most important looks into the relationship between stand density and growth of the pine as part of a larger region-wide co-operative study to determine the influence of growing space upon timber yields under management.

Forest farmers will be particularly interested in the latest publication by the Santee Research Center on loblolly pine. This is Farmers' Bulletin 2097, "Growing loblolly pine in the South Atlantic States," just issued by the U. S. Department of Agriculture.

The research center has also made the beginnings of research in two other important forest types, namely, bottomland hardwoods and longleaf pine-scrub oak. In the first, some progress is being made on the problem of rehabilitating depleted bottomland hardwood areas by planting. In the second, a major cooperative project in the Sandhills, the challenge is to determine the most economical and practical methods of converting scrub oak lands to productive pine forest again. Recent successful planting and nursery experiments point to an eventual solution.

The Piedmont Research Center was established by the Southeastern Forest Experiment Station in 1947 to carry on research in the pine-hardwood types of the Piedmont, from South Carolina to southern Virginia. Headquarters are the 12,000 acre Calhoun Experimental Forest near Union on the Sumter National Forest. The research aim at the center is improved management of forested lands in the Piedmont province for the best utilization of its soil, water and timber resources.

Over much of the South Carolina Piedmont, the once fertile lands have been greatly depleted by past poor farming practices. More than 90 percent of the forest was once in cultivated crops. Serious soil deterioration has limited the development of the forest and water resources. This is amply shown by low site quality, understocked stands, flash floods, low sustained water flows and muddy streams—all typical of parts of the area.

Initial experiments were designed to determine the influence of soil characteristics on the hydrologic cycle and forest growth, and how vegetative cover alters soil properties. During this time much effort was also given to determining the cause of the littleleaf disease of pine and developing management practices for the affected stands. Recent additional studies are directed toward obtaining fundamental information on the silvical characteristics of shortleaf pine, including seeding characteristics, seed-bed requirements, cutting methods, and growth rates. New work also includes the Piedmont hardwoods and is mainly concerned with the forest management problems of the type. Much of the initial effort is being concentrated on a soil-site survey. This work is designed to bring a better understanding of the growth potential of commercial hardwoods on different sites.

The 1940's also witnessed a surge of research activity by private interests. Outstanding in this respect was the development of the Westvaco Experimental Forest by the West Virginia Pulp and Paper Company. Trial plantings, thinnings and seed tree cuttings begun in 1931 by company foresters led to the establishment of this forest in 1944. The 20,000-acre outdoor laboratory spreads from the cypress-tupelo swamps of the Santee River across pine flats, sand ridges and bays to the pine-hardwood headwaters of the Sampit River in Georgetown County. This range of forest types and conditions, typical of the section, presents an ideal opportunity for research into the many problems of timber production. Work at the Westvaco Experimental Forest covers the broad fields of growing, harvesting and utilizing timber crops. Activities fall into four principal categories:

1. Research in the production of improved timber crops.
2. Design and tests of machines and methods for improved harvesting and handling of timber products.
3. Demonstration and extension of findings to timber growers and producers.

4. Operation of the forest as a profitable tree farm.

Among accomplishments credited to Westvaco is the South's first loblolly pine seed production area. Out of this was developed the system under which the company now produces its own seed for planting stock from selected parent trees. Currently, the experimental forest is expanding its effort in forest genetics and has established a loblolly pine seed orchard. In the harvesting field, Westvaco originated the tilting fork pallet truck, designed an improved sulky for small crawler tractors and made many improvements of pulpwood lift trucks and the split sling for handling pulpwood. Westvaco research is constantly testing new ideas and changes to keep abreast of progress and make tree farming a more profitable business for the forest owners and woods workers in South Carolina.

Clemson College conducts research in forest management and forest utilization, in cooperation with the Southeastern Forest Experiment Station. Present studies include the occurrence of gelatinous fibers in hickory and seed production in shortleaf pine.

A Look to the Future

The foregoing describes in a small way the activities of major research groups in the state. However, the keystone of research progress in the state is the high level of cooperative effort existing between public and private agencies. This results from a general realization of the importance of a sound research program in furthering the forestry goals of individuals and organizations. The best example is found in the Sandhills, where current research efforts stem from a unified attack by organizations such as the Southeastern Forest Experiment Station, Atomic Energy Commissions (Savannah River Project), S. C. State Commission of Forestry, Clemson College, North Carolina State College, Division of Forestry of the North Carolina Department of Conservation and Development, and an appreciable number of private individuals and organizations.

A look ahead points to a further development of these cooperative ties. Directly related is the strengthening of existing research groups to meet the challenge of increasing costs. Such a strengthening would not only insure continuation of current research effort but also provide the means for tackling much needed research in forest types like the bottomland hardwoods, of which there are over 3 million acres in South Carolina.

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