12. SELECTING SLASH PINE FOR GREATER YIELDS OF TURPENTINE

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Turpentine, rosin, tar, and pitch, often referred to as naval stores, have been important forest commodities since the earliest days of our Colonial history. Production of turpentine and rosin from the oleoresin (gum) of living longleaf and slash pines reached its peak about 1908. Since then competition from other sources, unstable market conditions, and other economic problems have caused a gradual decline in the gum naval stores industry. At present about 94 percent of the production is concentrated in southeast Georgia and north Florida with only small amounts being produced in Alabama, Louisiana, Mississippi, and South Carolina. Probably the gum naval stores industry has reached the bottom of its long decline as its principal competitor, the wood naval stores industry, cannot expand further because of dwindling stump supply. The other major source of naval stores, the sulphate pulp industry, while able to supply great quantities of turpentine, cannot provide sufficient rosin to meet estimated future requirements. One of the main uses of rosin is for paper size and since the production of pulp is expected to double in the next 20 years and the supply of wood rosin will certainly begin to decline within another decade, there appears to be ample need for a gum naval stores industry in the future.

There is however, one large problem. Turpentining as practiced at present in natural forests involves a large amount of hand labor and while some improvement has been made through the new bark chipping and acid technique, the industry lags far behind other agricultural pursuits in the efficient use of manpower through mechanization, hybridization, and improved cultural techniques. If the industry is to survive and prosper in the future it must develop strains of pine trees that yield large quantities of oleoresin. Such trees should be grown in plantations where they can be cultivated intensively and worked efficiently. A good start has been made in this direction at the Lake City (Florida) Research Center of the Southeastern Forest Experiment Station,

On August 19, 1941, a tree improvement program for gum naval stores production was initiated by H. L. Mitchell and his associates. Systematic measurements of the gum production of thousands of mature trees identified 12 superior specimens that yielded at least twice

as much gum as ordinary pines. These trees then were control-pollinated to obtain seedlings of known parentage. At the same time cuttings were propagated vegetatively for the establishment of a progeny plantation in which the relative merits of the different parents could be determined.

Now let's digress a minute while we consider the factors that enable some trees to produce more gum than others.

In 1951 Dr. C. S. Schopmeyer discovered that the flow of oleoresin from mature slash pines was influenced by the viscosity of the gum, the average size of horizontal resin ducts, and the number of such resin ducts per square centimeter.

In 1954 Dr. Francois Mergen made similar tests on the offspring of the high-yielding turpentine trees. One-inch square wounds were made near the base of the seedlings and the resulting flow of gum collected for a period of four weeks. The viscosity of the gum was compared with that of the mother trees and found to be a closely controlled hereditary characteristic. There was also a close correlation between the viscosity of the oleoresin and the rate of flow or yield. These tests revealed beyond question that saplings from high-yielding parents also produced above-average quantities of gum.

At the same time additional checks were made for evidence of other inherited traits. For example, three-quarters of the offspring of one crooked parent also are crooked. Saplings from another set of parents appear to be susceptible to pitch canker. Still other seedlings have not developed properly. Strains with these and other undesirable traits are being eliminated in the final selection of breeding stock.

Breeding a second generation must be deferred until young trees are old enough to produce pollen and conelets, usually at 8 to 10 years of age for the most prolific and 10 to 15 years or longer for many slash pines. So the geneticist seeks to hasten or stimulate flowering by changing normal sapling development through strangulation or partial girdling of the main trunk, by heavy applications of fertilizer, and other treatments.

Some flowers have appeared on a few of the best saplings and these trees have been control-pollinated again to see if strains of even greater gum yields can be developed.

In 1954 scions from the most desirable of the tested high yielders were grafted to ordinary planted 2-or 3-year-old seedlings for the establishment of seed orchards. Although some seed of high-yielding strains have been obtained from a few exceptionally fruitful trees, mass production in quantity will not be possible for several more years. Then the seedlings so obtained must reach a minimum diameter of 9 inches at breast height before commercial turpentining is feasible. This will take another 15 to 20 years, depending upon the productivity of the site and any intensive cultural treatments that may be devised.

This effort to breed a superior strain of oleoresin-producing slash pine has already consumed 13 years, and a minimum of 20 more years will elapse before commercial turpentining becomes possible. We know now that the job can be done. How intensively it is to be undertaken is something for the gum naval stores industry and the general public to decide.