

A SEED SOURCE STUDY OF SLASH PINE WITHIN THE STATE OF GEORGIA

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The economic importance of geographic races in forest trees has been recognized for about 75 years (Baldwin and Shirley, 1936). In southern pines, an experimental plantation established at Bogalusa, La., in 1926-27, shows that distinct and economically important geographic races exist even within the southern half of the range of loblolly pine (*Pinus taeda* L.). These races indicated important differences in tree size, volume of wood produced, and susceptibility to southern fusiform rust (*Cronartium fusiforme* Hedgecocke and Hunt) as reported by Wakeley (1944). Conversely, Crow (1958) found no effects at the end of 4 years in a test using loblolly pine seed from five locations in Louisiana, 20 to 180 miles from the planting sites.

At the Fifth Southern Conference on Forest Tree Improvement, in 1959, Henry (1959) and Wakeley (1959) reported statistically significant variations in survival, growth, and fusiform rust infection among lots of 3- to 5-year-old slash pine grown under comparable conditions from seed from different geographic races. In distinct contrast, Deer and Enghardt (1960) found no statistically significant difference in slash pines from seven geographic seed sources in growth, yields, or fusiform rust infection after 22 years in a plantation in central Louisiana.

Source of seed becomes an increasingly important factor, especially since progeny of individual trees vary in vigor. Statistically significant differences in height growth and survival percentages in progenies of individual selected trees of loblolly and slash pine (*Pinus elliottii* Engelm.) seedlings have been shown, even when the selected trees are located within a 5-mile radius of the nursery site (Greene et al, 1957).

The objective of this study was to determine if there are statistically significant differences in survival percentages, height growth, and the occurrence of *Cronartium fusiforme* in slash pine grown from seeds collected within the State of Georgia, when planted outside the natural range in the Piedmont section of Georgia where other plantations of slash pine are occasionally established.

Materials and Methods

Five slash pine seed sources collected by districts (fig. 1) were used in this study. The seeds were collected and furnished by the Georgia Forestry Commission, Macon, Ga. The seeds used were taken by random samples from the composite seed from each Georgia district.

Since the seeds obtained from the Georgia Forestry Commission were collected by districts, the distances from the planting site are approximate. The center of each district was chosen as an arbitrary point from which to calculate the distance in miles (table 1).

The seeds were sown at the Forestry School Nursery, located at Athens, Ga., in the spring of 1957, in a randomized block design. Analysis of height growth and survival percentages after one year, showed no statistically significant difference between the five sources of slash pine.

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In March, 1958, the seedlings were outplanted at a spacing of 10 by 10 feet, near Rutledge, Ga., in a randomized block design with six replications. A total of 150 seedlings were planted from each source. Rutledge is outside the natural range of slash pine and lies in the Piedmont Province of Georgia (fig. 1).

Height growth, survival percentages, and occurrence of *Cronartium fusiforme* on individual seedlings were recorded in January and February of 1961.

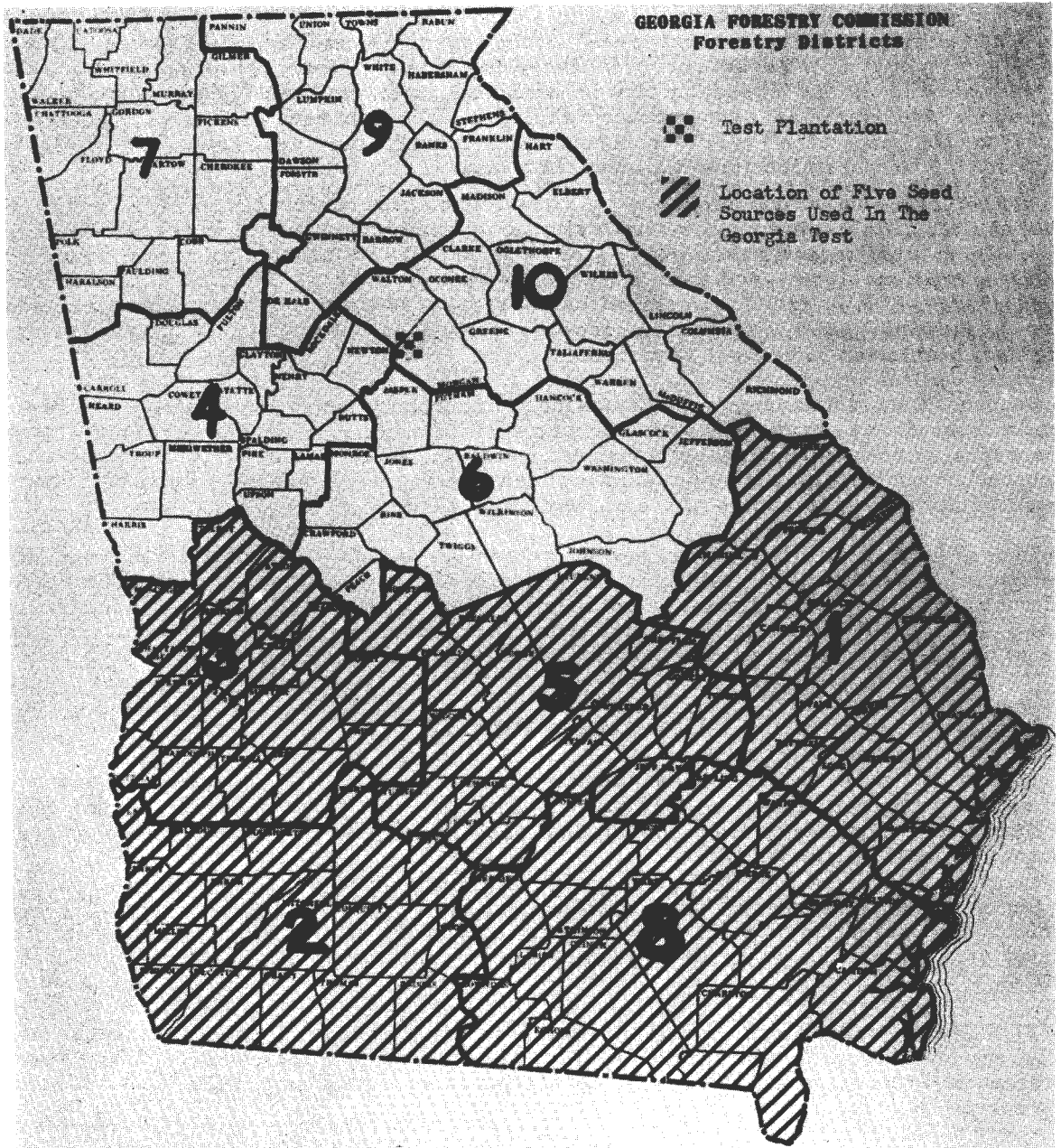


Figure 1.--Hatched area shows the districts from which the seeds were collected.

TABLE 1.--Third-year survival, height, and incidence of fusiform rust for planted slash pine of various local seed sources in Georgia

Seed source (district)	Approximate distance from planting site	Average height	Fusiform cankered	Average survival
	<i>Miles</i>	<i>Feet</i>	<i>Percent</i>	<i>Percent</i>
5.....	110	2.78	5	32.6
1.....	137	3.96	6	39.4
3.....	141	2.94	6	27.4
2.....	183	3.19	7	36.4
8.....	186	3.47	8	38.0

Results of Study

Table 1 summarizes the results at the end of the third growing season. An analysis of variance of seedling survival indicates no statistically significant difference among the five sources of slash pine seedlings. The average percent survival ranged from a high of 39.4 to a low of 27.4. Most of the seedlings were lost during the first summer, due to drought and natural competition from vegetation on the abandoned field site. Since that time mortality has been negligible.

An analysis of variance of height growth of the seedlings showed no statistically significant difference among the five sources of slash pine, although the average range of height, in feet, was from a high of 3.96 to a low of 2.78.

Cankers induced by southern fusiform rust on infected trees ranged from a high of 8 percent to a low of 5 percent. An analysis of variance showed no statistically significant difference among the five sources.

Conclusions

The data obtained showed no statistically significant differences in percent survival, height growth, or the occurrence of Cronartium fusiforme infection between the five slash pine seed sources.

The seed sources range approximately from 110 to 186 miles from the planting site. Actually, the source 186 miles from the planting site had an average height of 3.25 feet as compared to an average of 2.94 feet for the source 110 miles away. Although more precise information could have been obtained by replication of sources of each district, nevertheless, these results indicate that in the State of Georgia, it is not necessary to confine the planting of slash pine seedlings to the district where the seed was collected, if height growth and the occurrence of Cronartium fusiforme are significant criteria of performance.

Because statistically significant differences in height growth and percent survival between progenies of individual trees are evident even within the same stand, one questions the validity of geographic seed source studies unless particular attention is given to the trees from which the seeds are selected. For example, there could be as much variation in certain traits within a given population as between different populations in a species such as slash pine with a rather limited geographic distribution.

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