

PROVENANCE STUDY OF FIVE GEOGRAPHIC SOURCES OF  
LOBLOLLY PINE

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Abstract.--Five geographic seed sources of loblolly pine (Nassau and Marion Counties, Fla.; Telfair and Schley Counties, Ga.; and Conecuh County, Ala.) were planted near four of the areas of seed origin. After five years in the field, the Marion source had greater mean volume production and lowest average per cent rust infection. The Telfair and Nassau sources were second in growth performance with the Schley source ranking second in lowest per cent rust incidence.

Additional keywords: Pinus taeda, survival, volume growth Corn-artium fusiforme resistance.

The increasing demand for loblolly pine seedlings in Container Corporation of America's reforestation program made it imperative that a serious look be taken at the loblolly seed sources available within the geographic boundaries of the Company's holdings and their performance within these limits. Such information is needed for making intelligent decisions as to where future seed collections should be made, as well as the most desirable geographic source to be used in the expanding and establishment of loblolly pine seed orchards. The Marion source was of particular interest because of outstanding growth and form of stands in the area. This same source had been a top growth performer in progeny tests of Continental Can Company, planted in east Georgia.

METHODS

In the fall of 1967 cones were collected and kept separate from five individual dominant and codominant loblolly trees in Marion and Nassau Counties, Fla.; Telfair and Schley Counties, Ga.; and Conecuh County, Ala. <sup>2/</sup> (fig. 1). Seed from these collections were sown in five replicated blocks at Container's nursery near Brooker, Fla. in the spring of 1968. Each of the five blocks in the nursery was assigned to one of five planting locations. The seedlings were outplanted in the winter of 1968-69. A nested planting design was used with each nest comprised of seedlings from each of the five individual trees planted in four randomized blocks. Trees within each nest were planted in ten tree row plots using a 6' x 10' spacing. A single border row using extra seedlings from the various sources was planted around the outside boundaries of each test.

Planting sites were selected near each of the areas from which the cone collections were made (fig. 1). Necessary steps were taken at all planting sites to keep damage from fire and man at the very minimum. To date these efforts have been quite successful. The Telfair planting was lost due to excessive flooding of the area shortly after planting.

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!/ Seed from the Conecuh was bulked in error.

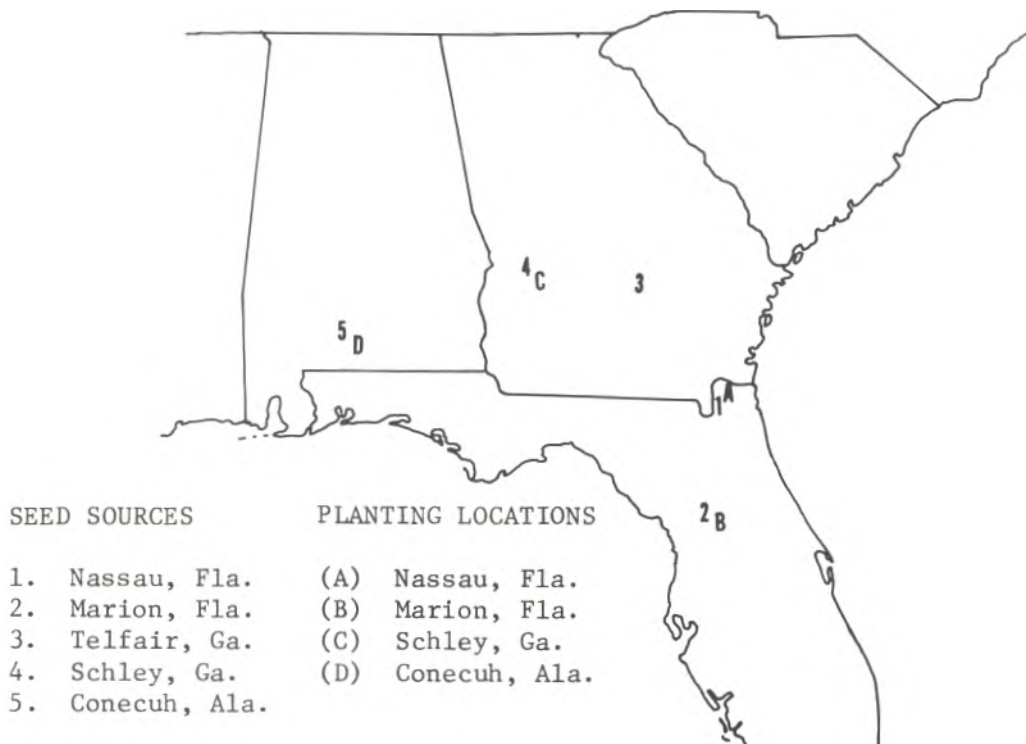


Figure 1.--Sources and planting locations of loblolly pine in Florida, Georgia and Alabama.

Fifth year measurements were made during the winter of 1973-74. Survival, total height, d.b.h., and the incidence of fusiform rust were recorded. Survival is expressed as per cent of total number of trees planted. Volume growth is expressed as average cubic foot volume per tree for the source (Goddard and Strickland 1968).

An analysis of variance was computed by location and over all locations for rust incidence and volume production for all sources. Tuckys mutliple range procedures was used to test for significant differences (at the .05 per cent level of significance) among the ranked seed source means. Variance of of individual families within sources was not analyzed.

## RESULTS

### Survival

Fifth year survival was very good and averaged near 90% or better at all locations except the Conecuh site where survival ranged from 50-87% (table 1). There was no significant difference between survival of sources at the Nassau, Marion and Schley planting sites. The survival of the Conecuh source was slightly better at each of these sites and out performed all sources when planted in its home county (fig. 2).

Table 1.-- Average survival for five geographic sources of loblolly pine at end of five growing seasons planted at four geographic locations.

Sources	Planting Location				Average
	Nassau	Marion	Schley	Conecuh	
PERCENT					
Nassau Fla	89.5	89.5	87.5	59.5	81.5
Marion Fla	92.5	88.5	84.5	49.8	78.8
Telfair Ga	93.0	90.5	87.5	66.8	84.4
Schley Ga	94.0	90.5	93.5	59.8	84.4
Conecuh Ala	96.0	93.5	90.0	86.5	91.5
Average	93.0	90.5	88.6	64.5	

Inexperienced planting labor and adverse weather conditions could possibly explain the lower average survival at the Conecuh site; although these factors did not have too much effect on the Conecuh source. The overall good survival of this source can probably be traced to some physiological aspects.

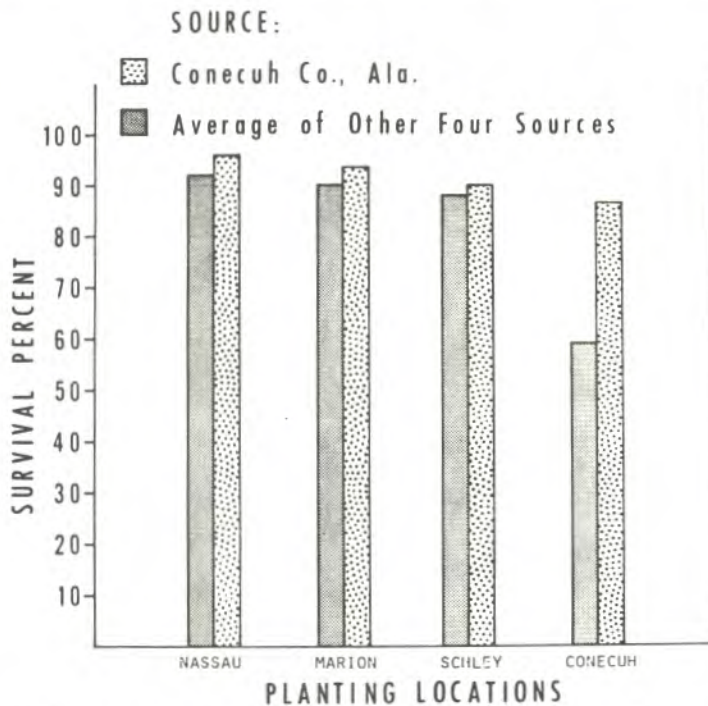


Figure 2.-- Survival of loblolly pine comparing Conecuh Co., Ala. source with average for other four sources at four planting locations.

Growth

Volume growth varied considerable between planting sites due to differences in site quality. Growth at the Marion, Schley and Conecuh sites was depressed to some degree by damage from Nantucket pine tip moth (Rhyacionia frustrana Comst.). Total mean volume production at the Nassau location was almost twice that at the other sites (table 2).

Table 2.-- Mean volume growth per tree for five geographic sources of loblolly pine at end of five growing seasons planted at four geographic locations.

Sources	Planting Location				Mean Volume <sup>b/</sup>
	Nassau	Marion	Schley	Conecuh <sup>a/</sup>	
	- - - - - CUBIC FOOT - - - - -				
Marion Fla	.28	.12	.15	.08	.16
Nassau Fla	.21	.08	.13	.07	.12
Telfair Ga	.20	.07	.13	.08	.12
Schley Ga	.19	.05	.10	.08	.11
Conecuh Ala	.18	.05	.11	.09	.10
Mean Volume	.21	.07	.12	.07	

<sup>a/</sup>Mean volume at end of sixth growing season.

<sup>b/</sup>Means within a single bracket are not significantly different.

The mean growth for all planting sites was significantly better for the Marion source. This source was also more productive at individual planting locations except the coneuh site where there was no significant difference in volume growth between sources

Fusiform rust

There was considerable variation in rust infection between planting locations. Although per cent rust incidence at the Schley planting closely paralleled the rates of infection reported for this area in the fusiform rust incidence survey 1971-1973, the per cent infection at Conecuh was much lower than survey figures (Phelps 1974). No comparisons could be made for the Florida plantings since loblolly pine was not sampled for this area in the rust survey.

Container has several acres of loblolly plantings scattered throughout an eight thousand acre tract in Marion County, Florida. The Marion planting site is located within the boundaries of said property. Our past surveys have shown that the per cent of rust infection is much greater for loblolly than slash in this specific area. Latest survey figures show the average rust incidence to be 47.0% for loblolly and 8.0% for slash.

While the average rust infection for the Marion source was lower than all other sources, it was not significantly different from the Schley and Conecuh sources (table 3). The Marion source had the lowest rust incidence at all planting locations except at Schley, where the per cent of infection for the local source was slightly lower. However, even at the Schley site the percent rust infection for the Marion source was less than the average for all sources (fig. 3).

Table 3.-- Average per cent rust infection of five geographic sources of loblolly pine at end of five growing seasons planted at four geographic locations.

Sources	Planting Location				Average <sup>a/</sup>
	Nassau	Marion	Schley	Conecuh	
----- PERCENT -----					
Nassau Fla	29.8	77.5	73.2	14.5	48.8
Telfair Ga	22.5	69.0	70.3	21.5	45.8
Conecuh Ala	22.0	64.5	64.5	20.2	42.8
Schley Ga	26.2	60.0	59.0	19.8	41.3
Marion Fla	18.3	48.8	64.0	12.5	35.9
Average	23.8	64.0	66.2	17.7	

<sup>a/</sup> Means within a single bracket are not significantly different.

#### CONCLUSION

Based on fifth year performance, Marion Co. loblolly is the best of all local seed sources to use in the reforestation of Container's land holdings in Florida and Georgia.

In the west Georgia area, rust infection of loblolly is a serious problem and, based on our limited data, the same could be true for Marion Co., Florida. In lieu of these facts, a second choice for loblolly seed source would be seed collected in the west Georgia area.

These requirements fit a close pattern with Container's holdings since our largest acreages of loblolly pine fall within the boundaries of these two geographic areas.

However, (Wells 1969) indicated the superior rust resistance and growth of Livingston Parrish and high rust resistance of east Texas loblolly sources when planted in the general geographic areas of Container's holdings. Investigation is continuing on the suitability of these external sources on Container's lands.

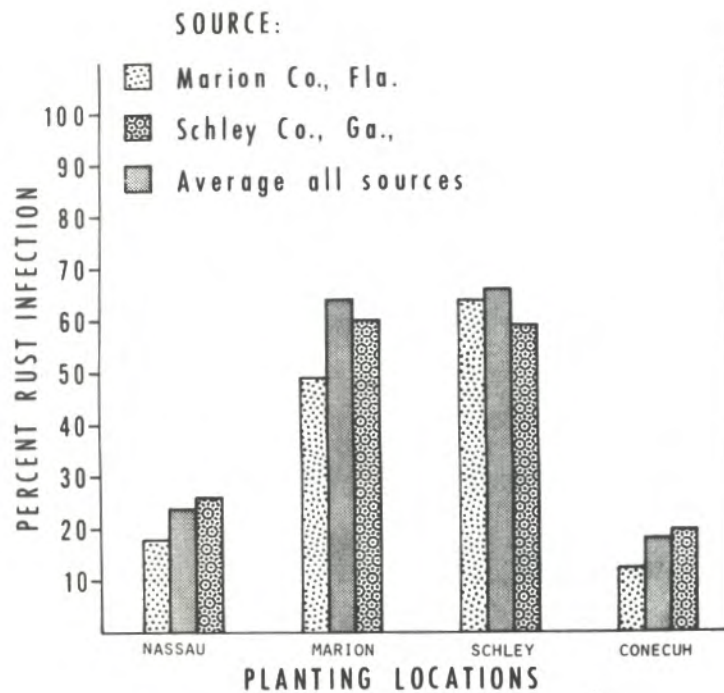


Figure 3.-- Average per cent rust infection of loblolly pine comparing Marion Co. Fla. and Schley Co., Ga. sources with average for all other sources at four planting locations.

#### LITERATURE CITED

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