IMPROVED LOBLOLLY PINE OF NORTHERN PIEDMONT-SOURCE DOES WELL IN THE NORTHERN COASTAL PLAIN

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Many organizations in the North Carolina State University-Industry Pine Tree Improvement Cooperative have landholdings in both the Piedmont and Coastal Plain regions of the southeastern United States. Environmental differences between the two regions are considered great enough to warrant separate breeding programs for loblolly pine (*Pinus Taeda* L.). A problem sometimes faced by cooperators is that the production orchard of one region produces quantities of seed in excess of that required for reforestation programs, while the supply of improved seed for the other region fails to meet the demand. The question then arises as to whether improved material from one region should be favored over unimproved material from the other region, with the hope being that selection and breeding has improved the adaptability of the introduced material.

Several cooperators in the northern part of the Cooperative's working area have established Piedmont and Coastal Plain progeny tests side-by-side. Cooperaprocedure is to plant progeny tests in at least two locations with one "main" six-replication test and a supplemental test of at least three replications. Most side-by-side tests consist of the main test for that physiographic region and the supplemental test of the other region. A commercial check lot of unimproved material is included in each test.

This note reports a comparison of Piedmont and Coastal Plain sources of improved loblolly planted side-by-side in the northern Coastal Plain. Use of the commercial check lot allows the comparison of improved Piedmont material and the unimproved Coastal Plain commercial check.

Materials and Methods

Eleven pairs of side-by-side tests representing five cooperators were available for assessment (table 1). Age at the time of measurement varied from 4 to 8 years. Most tests were located in northern North Carolina or southern Virginia, with three locations in South Carolina.

Volume figures were not available for the younger tests, so height was the growth variable used. Survival was high in all cases, often above 95 percent. Measurements were also made of crown form and bole straightness, utilizing the Cooperative's 1 to 6 subjective system (1 = excellent, 6 = poor). Paired "t" tests were used for all statistical analyses.[1]

Results

Results of comparisons between Piedmont and Coastal Plain sources are given in table 2. Almost no difference in height growth could be detected between improved material of the two sources in table 2. Improved stock from both regions outperformed the unimproved Coastal Plain commercial check, although no statistical significance was found ($p=15$).

Differences in crown form and bole straightness were more evident (table 2). Again, there was little difference between improved material of the two regions but both sources compared favorably to the Coastal Plain commercial check. Of interest here was the comparison of the improved Piedmont and Coastal Plain check that proved statistically significant for both traits.

Discussion

The above results have important implications for movement of improved Piedmont loblolly pine into the Coastal Plain. Little difference could be detected between improved material of the two regions, and the improved Piedmont source tended to be superior to the unimproved Coastal Plain check lot. Piedmont loblolly pine is known to be a "sprinter" at young ages or to slow down earlier (B. J. Zobel, personal communication), so the relative height growth of the Coastal Plain material may improve somewhat at later ages. Quality differences in crown and straightness will likely be maintained.

[1] Snedecor, G. W. and W. G. Cochran. 1967. Statistical Methods. Iowa State University Press. 593 p.

Table 1.—*Test location of Piedmont and Coastal Plain sources grown side-by-side in the Coastal Plain*

Cooperator	Location	Year Established	Year Measured
	North Carolina		
Champion-Eastern	Jones County	1972	1977
Weyerhaeuser	Chowan County	1968	1976
Weyerhaeuser	Chowan County	1969	1977
Weyerhaeuser	Chowan County	1971	1976
Weyerhaeuser	Bertie County	1972	1977
	Virginia		
Virginia Division of Forestry	King & Queen County	1971	1975
Virginia Division of Forestry	King & Queen County	1973	1978
Continental Forest Industries	Chesterfield County	1972	1977
	South Carolina		
S.C. Commission of Forestry	Sumter County	1972	1976
S.C. Commission of Forestry	Dorchester County	1972	1976
S.C. Commission of Forestry	Dorchester County	1973	1977

At this time it would seem that improved Piedmont source material should be preferred over unimproved Coastal Plain lots for planting in the Coastal Plain. Movement of the Piedmont stock into the Coastal Plain will probably result in little volume gain over the unimproved Coastal Plain source, but gains in straightness and crown should make the transfer beneficial. Such movement should be restricted to areas in North Carolina and northward, as more southern areas were not well represented in the analyses.

It should be emphasized that all recommendations apply only to areas in the northern portion of the loblolly pine range. In Virginia and North Carolina, natural stands of the species extend only a short distance westward into the lower Piedmont. As a result, natural selection pressures may have been more similar to those encountered in the Coastal Plain than would be the case farther south. Comparisons such as these for southern regions might yield drastically different results.

Table 2.—*Means and statistical comparisons of Piedmont and Coastal Plain loblolly pine sources combined over Coastal Plain test location*

Coastal Plain Source	Coastal Plain Check		Piedmont Source
Height (ft)			
X = 11.81	11.40		11.97
Piedmont source vs. Coastal Plain source		Difference - .18[1]	
Piedmont source vs. Coastal Plain check		Difference - .57[1]	
Straightness			
X = 3.96	4.41		4.02
Piedmont source vs. Coastal Plain source		Difference - .06[1]	
Piedmont source vs. Coastal Plain check		Difference - .39[2]	
Crown [4]			
X = 3.89	4.06		3.94
Piedmont source vs. Coastal Plain source		Difference - .05[1]	
Piedmont source vs. Coastal Plain check		Difference - .12[3]	

[1] Not significant at p - .05.

[2] Significant at p - .01.

[3] Significant at p - .05.

[4] Crown and straightness were measured using the Cooperative's 1 to 6 scoring method (1-excellent, 6 - poor).