RESISTANCE TO ICE DAMAGE -A CONSIDERATION IN REFORESTATION

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In February 1969 a winter storm, described by the U.S. Weather Bureau as the most destructive in memory, struck South Carolina. "Freezing rain caused ice to accumulate rapidly on all objects and literally tens of thousands of trees broke off or were uprooted as they toppled over" (Landers 1969). The damage to woodlands was widespread and necessitated intensive salvage operations.

The Storm

The storm began on February 15th and ended early on February 17th. In the area where its effect was greatest, precipitation was mostly sleet and freezing rain produced by a frontal cyclone moving northeastward about 50 miles off the Atlantic coast. Damage was caused by the weight of ice that built up on exposed surfaces. Trees, poles, and towers were toppled, and telephone lines were borne down by weight of the ice or by trees falling on them.

The storm and its damage stretched southwest to northeast across South Carolina, in a band coincident with the sandhill counties and ranging from 70 to 120 miles wide. Damage was scattered and light over most of this area, but the northeastern end of the band was devastated.

The greatest concentration of destruction was in Chesterfield County and the town of Cheraw. The loss of stumpage alone was estimated at $25 million, and the time required for salvage at 3 to 6 months (Anonymous 1969).

Species Test Allows Damage Comparison

Sandhills State Forest near Patrick is in the heart of the area most heavily damaged by the ice storm. It is also the site of a study established in 1964 by the South Carolina State Commission of Forestry and the Southeastern Forest Experiment Station to test the survival and early growth of the Choctawhatchee and Ocala races of sand pine *(Pinus clausa* (Chapm.) Vasey). Slash *(P. elliottii* Engelm.), lob lolly *(P. taeda L.),* and longleaf *(P. palustris* Mill.) pines were included "to provide a basis for comparison." [2] The experiment was laid out as a 5 by 5 Latin square. Each species was planted on five plots randomly selected from a total of 25. Plots are 84 feet square and were planted with seedlings spaced 6 by 6 feet.

Since the study site was in the path of the ice storm, these pine species can be compared under stress. Ice damage was recorded when measuring the plots 2 months after the storm. Trees with broken tops or those bent over more than 30 degrees from the vertical were listed as damaged.

Results

Mean percentage of ice damage to living trees is ranked by species (table 1). To facilitate comparisons, average survival and height of these plantings at the time ice damage data were obtained are also presented. Ocala sand pine showed the most damage and loblolly the least; between these extremes were slash, Choctawhatchee, and longleaf, all about equally damaged (fig. 1).

The greater resistance of loblolly to ice damage is enhanced by its good overall survival and growth, which ranks it with the best species planted in this study. Loblolly survival was equal to that of slash pine, and its height growth about equal to that of the sand pines.

TABLE 1.—*Ice damage, survival, and growth of the study trees at 5 years of age*

	Pine				
Item	Ocala sand	Slash	Choctawhatchee sand	Longleaf	Loblolly
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
Ice damage	37	27	25	23	13
Survival [1]	60	92	81	59	96
	Feet	*Feet*	*Feet*	*Feet*	*Feet*
Height [1]	9.7	8.8	10.6	5.8	10.0

[1] These figures do not reflect ice damage.

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[2] Harms, William R. A test of the suitability of sand pine for planting in the sandhills of South Carolina. 1963. (Study Plan, Line Proj. SE-1106, Southeast. Forest Exp. Sta., USDA Forest Serv.)

Figure 1.—Ocala sand pine showed the most damage (*top*), loblolly the least (*center*), slash pine intermediate (*bottom*).

Conclusions

At the time this species-comparison study was established, slash was preferred for planting in the Carolina sandhills. Planting stock was easy to obtain, and, although the species was a little north of its natural range, it seemed to thrive. Then the ice storm occurred and showed that slash does have disadvantages. Because of its prominence in sandhill plantings, any damage to slash pine is of considerable significance.

In this storm, slash pine suffered no more than Choctawatchee sand pine and longleaf. However, the young stands in the sturdy do not tell the whole story. In older stands nearby, slash had much greater damage than loblolly and longleaf. (In 10-year-old stands in central Georgia, Jones (1969) found eight times more ice damage to slash than to loblolly.)

Although storms of the sort described here are infrequent, they are among the risks incurred when a species is widely planted outside of its natural range. Where the risk is considered too great, other species could be planted instead. The resistance of loblolly to ice damage suggests it as a substitute, although it has been found to grow well only on better sites (McGee 1964). In this study, for example, where loblolly growth is among the best, soil profiles include sandy loams and sandy clay loams within 6 feet of the surface-better-than-average sites for the sandhills. Although no more ice resistant than slash, Choctawhatchee sand pine might also be considered because it is well suited to poor sites. When planted on infertile sandy soils, it has consistently grown more rapidly than slash pine (Burns 1968).

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