

## ICE DAMAGE TO SLASH AND LOBLOLLY PINE IN NORTHERN LOUISIANA

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Slash pine (*Pinus elliottii* Engelm. var. *elliottii*) produces high-quality timber. It is characterized by straight boles and relatively few branches. When planted somewhat outside of its natural range, slash pine grows as rapidly as loblolly pine (*P. taeda* L.) on many sites.

In an attempt to take advantage of the many favorable characteristics of slash pine, numerous slash pine plantations were established during the 1950's in northern Louisiana, an area outside the species' natural range. These plantations were established even though slash pine has been widely reported as being more susceptible to ice damage than loblolly pine and other southern pines (1,3,4).

### Procedure

Thirteen plantations were surveyed for damage after the severe ice storm of January 1973. Six of the plantations, each approximately one-half acre in size, had been planted at the North Louisiana Hill Farm Experiment Station, Homer, Louisiana, in 1950, at a 6- by 8-foot spacing. Two were pure loblolly, two were pure slash, and two contained both species planted in alternate rows. The pure stands had been thinned to 80 square feet of basal area (approximately 300 trees per acre) per acre at age 15. At the time of the storm, the pure

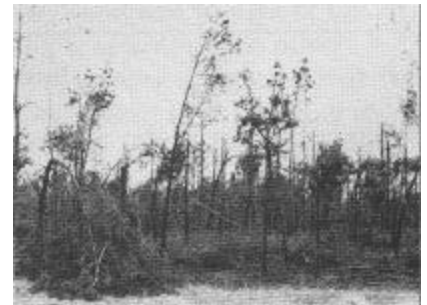
stands contained approximately 275 trees per acre. These trees averaged 8.7 inches in diameter at breast height (d.b.h.) and 65 feet in height. The mixed plantations contained approximately 325 loblolly and 100 slash pine stems per acre. The loblolly were an average of 9.2 inches d.b.h. and 64 feet tall; the slash, 6 inches d.b.h. and 52 feet tall.

Five of the remaining seven plantations were loblolly and two were slash planted at either 6- by 6-foot or 6- by 8-foot spacings; all had been row-thinned in 1972 when they were 12 to 13 years old except for one of the slash pine stands, which was 20 years old when thinned and which had been lightly thinned from below several years earlier. Average diameters after thinning were generally 5 to 6 inches; and stocking was 550 to 650 trees per acre, except for the older slash pine stand that had an average d.b.h. of 8.3 inches and a stocking of 340 trees per acre.

A 100 percent damage survey was made of the plantations at the North Louisiana Hill Farm Experiment Station. Eight 0.1-acre plots were randomly established in each of the row-thinned plantations and the percentage and type of damage were noted. (Typical ice damage to a loblolly pine plantation row thinned during 1972 and damaged by ice storms of January

A survey of damage to slash and loblolly pine plantations after a severe ice storm revealed no difference in percentage of damage between species in either plantations that had been heavily thinned from below 8 years before the storm or in plantations that had been row-thinned during the year preceding the storm.

1973 and 1974 is shown in figure 1.)



**Figure 1.**—Loblolly pine plantation, row-thinned in 1972 and damaged by ice in 1973.

### Results and Discussion

There was virtually no difference in percentage of damage between the 23-year-old loblolly and slash pine plantations (40.3 percent for the loblolly, 39.7 percent for the slash), but substantially more of the slash pine broke below the base of the crown (8.6 percent vs. 3.4 percent) (table 1). The higher amount of severe stem breakage among the slash pine probably resulted from a higher incidence of fusiform rust and its associated cankers, which reduce the strength of the stem. However, the occurrence of fusiform rust among both loblolly and slash pine in this part of Louisiana is very low relative to other parts of the State and the South. This low rate of fusiform rust occurrence on slash pine is partly reflected in

**Table 1.**—*Ice damage to a 23-year-old slash and loblolly pine in pure and mixed plantations*

Plantation	Percentage of trees damaged	Percentage of trees that broke below the base of the crown
Slash	39.7	8.6
Loblolly	40.3	3.4
Mixed:		
Slash	22.8	6.6
Loblolly	38.1	0.8

the fact that less than 9 percent of the slash pine broke below the base of the crown. If it is assumed that diameter growth is temporarily reduced by the loss of more than the top one-third of the crown, the slash pine plantations fared little worse than the loblolly, except for the higher amount of total crown loss and possible loss of more branches from individual trees.

Loblolly pine suffered heavier damage than slash pine in the two mixed plantations (38.1 percent vs. 22.8 percent), probably because the loblolly pine averaged 12 feet taller than the slash pine and partially protected the latter. As in the pure plantations, a higher percentage of slash pine broke below the base of the crown (6.6 percent vs. 0.8

percent). Again, the difference was probably due to the higher incidence of fusiform rust among the slash pine.

A comparison of damage among the row-thinned plantations revealed that the two slash pine plantations did not incur a higher average amount of damage than the loblolly pine plantations. Percentage of damage among all the row-thinned plantations ranged from 50.9 to 62.2 percent, with both high and low being loblolly plantations (table 2). Damage to the row-thinned plantations was generally 10 to 20 percent higher than damage to the 23-year-old plantations that had been thinned at age 15. The greater percentage of total damage in the row-thinned plantations of

**Table 2.**—*Ice damage to row-thinned slash and loblolly pine plantations*

Plantation	Percentage of trees damaged	Percentage of trees that broke below the base of the crown
Slash	57.2	37.8
Slash	51.4	9.8
Loblolly	62.2	34.0
Loblolly	62.2	32.1
Loblolly	56.4	20.4
Loblolly	52.7	17.2
Loblolly	50.9	19.6

both species was due to a substantial increase in the percentage of trees that broke below the base of the crown.

In contrast to the 23-year-old plantations thinned at age 15, the row-thinned stands exhibited no species differences in stem breakage below the crown. The highest percentage of trees that broke below the base of the crown, 37.8, occurred in the older slash pine plantation, whereas the other slash pine plantation had the lowest percentage of trees that broke below the base of the crown (9.8). The difference between the two slash pine plantations in percentage of trees damaged was only 5.8. The lack of any difference between the row-thinned slash and loblolly plantations in stem breakage below the base of the crown would seem to indicate that possible increased susceptibility of slash pine to that type of damage (due to a slightly higher rate of fusiform rust infection) was obscured by the great increase in susceptibility of trees of both species to damage that occurs after a stand is "opened up" and crown support is reduced by row thinning.

**Summary and Conclusions**

Percentage of ice damage in nearly adjacent 23-year-old slash and loblolly pine plantations similar with respect to stocking

and tree size was virtually identical (about 40 percent). More trees in the slash pine plantations broke below the base of the crown, probably due to a slightly higher incidence of fusiform rust and its associated cankers, which weaken the bole. However, the total number of trees that incurred this type of damage was small as was the difference between species. Possible inherent species differences in overall susceptibility to ice damage were not evident. In fact, slash pine has both a higher specific gravity and a higher modulus of rupture than loblolly pine (2), which means that slash pine should not break as readily as

loblolly pine, especially in the lower stem below the crown.

Damage to 12- and 13-year-old plantations of both species that had been row-thinned during the year preceding the 1973 ice storm did not differ by species nor did the percentage of trees that broke below the base of the crown. The reduction in crown support caused by row thinning apparently increased susceptibility of all trees to damage to the extent that possible differences between the two species were obscured.

The observations presented here differ from those reported elsewhere and indicate that slash pine, when planted in areas outside its natural range,

does not always suffer more severe damage from ice storms than loblolly pine does, especially if the incidence of fusiform rust is low.

### Literature Cited

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