

FIBER LENGTH IN NORMAL AND FOXTAIL *PINUS CARIBAEA* MOR.

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ABSTRACT

Caribbean pine often develops a foxtail form when planted in tropical and subtropical locations. The normal procedure in many plantations is to destroy these trees, partly because it is thought they are of low wood quality. Since as many as 50% of the trees in a location may be affected by foxtailing, this procedure represents a huge loss, especially in areas where survival is already very low.

This study was undertaken to determine if foxtailing lowers the fiber length of the affected tree. Ten normal and ten foxtails were sampled at two heights for fiber length. It was found that fibers from foxtail trees were on the average 13.5% longer than from normal trees growing in the same location.

Keywords: *Pinus caribaea* Mor., fiber length, foxtails.

Caribbean pine (*Pinus caribaea* Mor.) is extensively planted in South America, Indo-China, and other tropical and subtropical locations. When grown in locations other than its native habitat, many trees develop a foxtail form, resulting from terminal growth, which continues throughout the year with no or very limited lateral branching. As many as 50% of the trees in a plantation may be affected by foxtailing. The usual practice is to remove these trees from the plantation in the first thinning, partly because of their susceptibility to wind breakage, and partly because it has been thought that their wood quality is lower than that of trees with normal shape.

In a previous paper (Woods et al. 1979) it was shown that foxtail trees on the average are taller, have a better form factor, and have only slightly lower basic specific gravity than normal trees in the same plantation. Because of these favorable findings, the fiber lengths of foxtail trees were measured to obtain an indication of their suitability for pulping. The results are reported in this paper.

MATERIALS AND METHODS

Sample materials were collected in a plantation near Uverito in eastern Venezuela where Caribbean pine is planted as a part of a program of savannah afforestation, presently encompassing 50,000 hectares. The trees sampled were 6 years old. The average height was 10 meters; the average dbh 15 cm. Ten normal and ten foxtail trees were selected to compare fiber lengths. Foxtail trees were selected at varying locations. Near each foxtail tree the tallest normal tree was

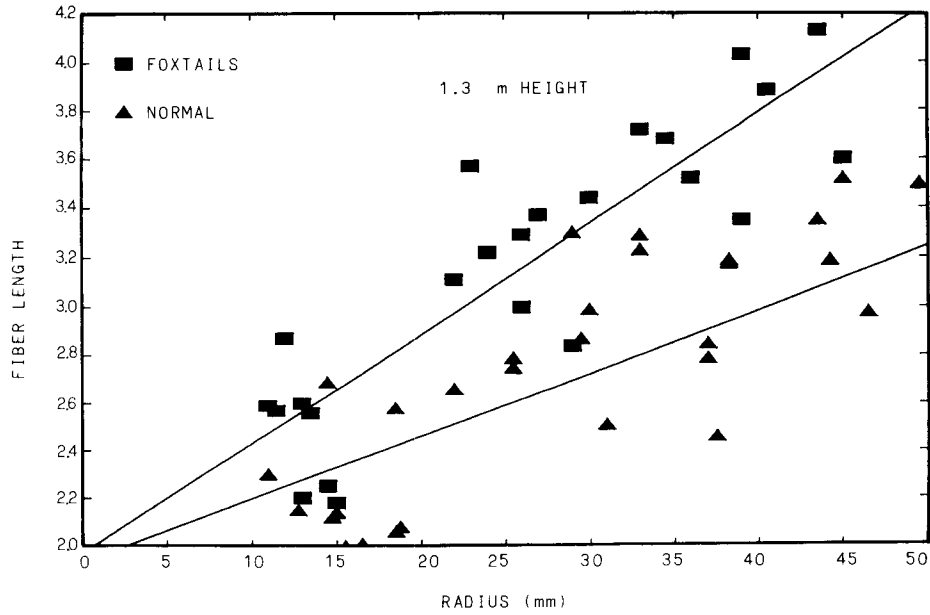


FIG. 1. Fiber length of foxtail trees increases with tree radius at a faster rate (at 1.3 m ht.) than normal trees.

selected. Trees were felled, total height was measured, and 5-cm-thick discs were taken at 1.3 and 5 meters above the ground. Two sections approximately 5 cm wide were cut through the center of each disc and air-dried for storage and transport.

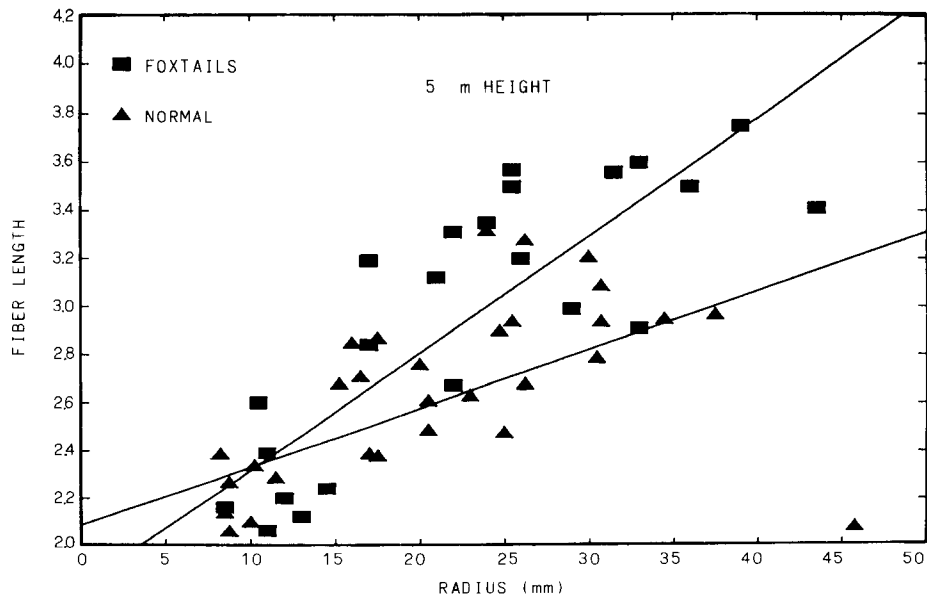


FIG. 2. Fiber length of foxtail trees increases at a faster rate (at 5 m ht.) than normal trees.

TABLE 1. *Weighted average fiber lengths of normal and foxtail forms of plantation Caribbean pine.*

Measurement height	Weighted average fiber length	
	Foxtail	Normal
<i>m</i>	<i>mm</i>	
5 ^a	3.2**	2.8
1.3	3.4**	3.0

^a Each entry is a weighted average of 150 measurements on each of 10 trees.

** Difference in means significant ($P < 0.01$).

The sample material was brought to our laboratory in Knoxville and aspirated under water to restore it to a saturated condition.

Fiber length samples were taken at 25%, 50%, and 75% of the total radius of each section. They were macerated by Jeffery's method (Johansen 1940) lightly stained with safranin, and fifty fibers from each sample point were measured using a microprojector. Average fiber length at each height was calculated by weighting the fiber length at each sample point by the proportionate area of the disc which it represented before averaging.

RESULTS

Weighted average fiber lengths were calculated at each height. Foxtail trees had longer fibers than normal trees at both heights (Table 1). At 1.3 meters foxtail tree fibers averaged 3.4 mm vs. 3.0 mm for normal trees, a difference of 13%. At 5 meters foxtail tree fibers averaged 3.2 mm vs. 2.8 mm, a difference of 14%.

Individual t-tests were made at each sampling location (Table 2). Foxtails had longer fibers at every location except the innermost sample position (25% of total radius) at the 5-meter height.

The results of this study indicate that if foxtail trees were cut for pulp, the resulting material would have longer fibers than pulp material cut from normal trees of the same seed source. It has been shown that foxtail trees have about the same basic specific gravity (0.36), are taller, and have slightly less taper than normal trees on the same site. On the basis of these wood property differences, there appears to be little reason to destroy foxtails, particularly in areas of affor-

TABLE 2. *Fiber length of foxtail and normal Pinus caribaea at 2 heights and 3 radial sampling positions.*

Height	Sample location from pith to bark	Mean fiber lengths		
		Foxtail	Normal	Difference
<i>m</i>	<i>%</i>	<i>mm</i>		
1.3	25	2.5 ^a	2.2	0.3**
1.3	50	3.2	2.8	0.4**
1.3	75	3.7	3.2	0.5**
5.0	25	2.2	2.2	0.0
5.0	50	3.1	2.6	0.5**
5.0	75	3.5	2.9	0.6**

^a Each entry is the average of 50 measurements on each of 10 trees.

** Difference in means significant ($P < 0.01$).

estation where stocking density is already very low and several years have been invested in planting and growth of the foxtails.

REFERENCES

- JOHANSEN, DONALD A. 1940. Plant Microtechnique. McGraw-Hill, New York, NY. 523 pp.
- WOODS, F. W., L. W. VINCENT, W. W. MOSCHLER, AND H. A. CORE. 1979. Height, diameter, and specific gravity of "foxtail" trees of *Pinus caribaea* Mor. For. Prod. J. 29(5):43-44.