Seedlings of Two Liquidamber Species Compared

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Abstract. In a nursery in southern Mississippi, **Liquidambar formosana** Hance. and sweetgum (**L. styraciflua L.**) seedlings grew equally well in height and diameter for 2 years. The sweetgum had more branches per seedling, and stopped growing earlier in the year; **L. formosana's** wood had higher specific gravity and longer fibers.

Liquidambar formosana is a valuable tree in its range in southeastern China and Taiwan. Trees in natural stands reach a height of 130 feet, and the wood is used in fine furniture. In plantations, trees are typically branchy and poorly formed. In the present study, the early performance of **L. formosana** was compared with that of **L. styraciflua,** the only member of the genus indigenous to the United States. The study was conducted in southern Mississippi where climate is similar to that in **L. formosan's** natural range.

Methods

In the spring of 1964, 4-foot rows in a nursery on the Harrison Experimental Forest were planted with seeds frpm 42 **L. formosana** trees in Taiwan and four local **L. styraciflua** trees. Immediately after the seedlings emerged, they were thinned to four per foot, approximately equally spaced. Each row contained progeny from one source, and rows were replicated four times.

At the end of the first growing season, date of bud set, total height, diameter at the root collar, and number of branches per seedling were recorded for the five tallest plants in each row. Ranges and variances were computed for plot means. For testing of differences, a confidence level of 5 percent was set.

In the winter of 1964, 103 seedlings of each species were transplanted at the nursery to a 12- by 12-inch spacing. In November 1965, a section 65mm. long was cut from the base of the stem of each of these seedlings. Diameter, specific gravity by the green-volume: dry-weight method, and average length of 60 fibers were measured for each section.

To compare field growth, the remaining seedlings were lifted at the end of the first growing season and outplanted at an 8- by 8-foot spacing in southern Mississippi, and at a 10- by 10-foot spacing in northwestern Mississippi.

Results and Discussion

At the end of the first growing season, morphological differences between species were apparent. Most **L. formosana** leaves had three lobes, some had five; most **L. styraciflua** leaves had five lobes, some had seven. In contrast to sweetgum, the exotic had pubescent stems and branches, and longer and more slender stipules. It did not have corky ridges on stems.

Height and diameter by species did not differ significantly (Table 1). **L. styraciflua** seedlings had more branches and set their terminal buds earlier than **L. formosana** seedlings. Differences among progeny means within species were significant for all the characters just mentioned except number of branches in **L. formosana.**

At the end of the second growing season, both in the nursery and field plantings, differences between species in height and diameter were still insignificant. However, **L. formosana** wood had higher specific gravity and longer fibers than **L. styraciflua.** Thus, although growth was comparable, **L. formosana** seedlings were producing more wood substance. If this trend continues, the exotic species. may be a source of germplasm for increasing the specific gravity of sweetgum wood.

In **L. styraciflua,** there was a significant correlation between diameter and both specific gravity and fiber length. Seedlings of larger-than-average diameter tended to have longer fibers and heavier wood than seedlings of smaller-than-average

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diameter. The same was not true in **L. formosana** seedlings.

In the widely spaced field plantings, the exotic seedlings branched more than the native sweetgum. This was a reversal of the trend that appeared in the nursery. In form development, it appears that **L. formosana** is more sensitive to competition than **L. styraciflua.**

TABLE 1. Seedling characters by species

CHARACTER	L. formosana		.s tyraciflua	
	Mean	Range	Mean	Range
Plant height (cm.)	62.7	53.1 – 72.6	65.2	59.3 – 69.5
Stem diameter (m m .)	5.8	5.0 – 6.6	6.2	6.1 – 6.4
Number of branches	2.3	0-5 – 4.6	7.3	4.6 – 10.2
Date of bud set	11/20	11/2 – 12/6	10/26	10/16 – 11/3
Specific gravity	.515	.462 – .566	.443	.394 – .490
Fiber length (mm .)	1.28	1.14 – 1.48	1.16	1.00 – 1.30