# MORTALITY OF LOBLOLLY PINE
## PLANTED UNDER SMALL HARDWOODS

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The study described here was undertaken to explore the relationship between mortality of planted loblolly pine and various degrees of overtopping by small hardwoods.

Loblolly pine (Pinus taeda L.) was planted in 1957 on twelve 1/3-acre plots occupied by small hardwoods. The proportion of area overtopped by these hardwoods ranged from 25 to 87 percent (fig. 1), as estimated by milacre sampling. Dominant stems averaged 4 to 8 feet in height. Southern red oak, post oak, mulberry, and witch hazel predominated, but red maple, sweetgum, persimmon, sassafras, dogwood, sumac, hickory, elm, ash, wild plum, and Hercules-club were also present.

The site is in Drew County, Arkansas, on a sloping phase of Caddo silt loam. The top 20 inches of light brown soil grades into a very compact silty clay loam layer that impedes internal drainage. Surface drainage is good.



Figure 1.--Extremes in hardwood overtopping at time of pine planting: Left, 30 percent of area overtopped; Right, 87 percent overtopped.

Fifty 1-0 pines were spaced 10 by 10 feet on each plot in January 1957 and examined 7, 12, and 24 months later. Deer and cattle nipped some of the pine leaders and, although survival was not affected, height-growth measurements were rendered invalid.

Weather immediately following planting and for 2 years thereafter was most favorable. Soil moisture from May through October was abundant, and lacked only 4.5 inches each year of meeting estimated requirements for maximum growth. Under these conditions survival is usually good.

Pine mortality 7 months after planting ranged from 6 to 26 percent and averaged 14.5 percent. By December 1958, dead pines had increased to 30.7 percent, and a slight relationship linking greater mortality with increasing hardwood overtopping became evident. However, the spread in mortality within any given degree of hardwood over-topping was considerable. Two years after planting, mortality ranged from 20 to 64 percent among plots. It was greatest on areas which originally bore the heaviest hardwood cover.

Analysis of the relationship between total mortality of pine as of 1959 and original hardwood overtopping yielded a correlation coefficient of +0.736, which is significant at the 1-percent level. The relationship is linear and can be expressed as: $y = 18.19 + 0.4303x$ where y = percent mortality and x = percent hardwood overtopping (fig. 2). The standard error of regression estimate is ±2.86 percent. This regression is highly significant.
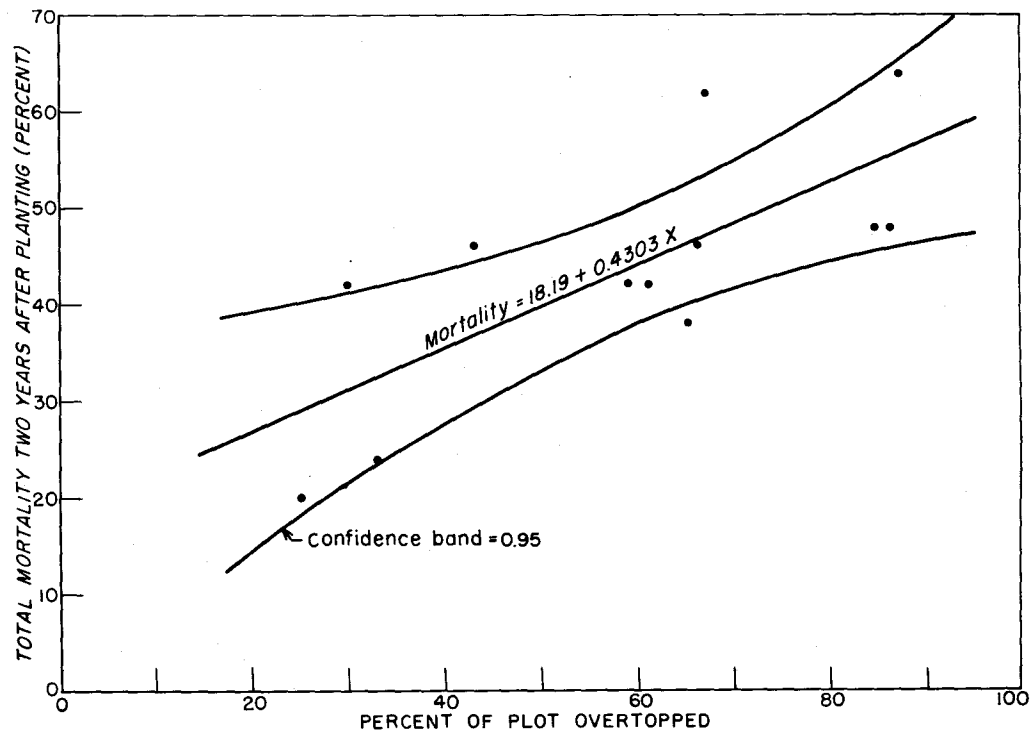


Figure 2.--Relationship between pine seedling mortality and degree of hardwood overtopping as determined when pines were planted.

The results of this study provide further evidence that planting pine under competing hardwoods is not good business. Because of the favorable weather during the 2 years of this study, the mortality observed here is probably low; in years of scant rainfall, pine mortality under similar conditions very likely would be even greater.

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