

Diameter Growth Of Mature Loblolly Pine Unaffected By Under-Story Control

By RALPH A. KLAWITTER

Control of under-story vegetation is widely practiced in the Southeastern coastal plain. Among the methods employed are prescribed fire, chemical applications, and heavy chopping. One prescribed burning technique uses a succession of annual summer fires in advance of harvest of the mature timber to eradicate or reduce the vigor of under-story vegetation. The question is whether or not diameter growth of sawtimber-sized loblolly pine in the lower coastal plain is affected measurably by this program of under-story control.

Research in the Midsouth and Piedmont has indicated under-story control can affect the growth of younger loblolly pine. One explanation offered is that under-story trees and shrubs and pine roots together may take up more water from the soil than pine roots do by themselves. In addition, under-story leaves also provide more surface area to lose water to the air during warm, dry weather. Thus, elimination of the under-story might increase the supply of soil water available for pine tree growth.

A 17-year-old test of prescribed fire on the Santee Experimental Forest near Charleston, South Carolina, provided an opportunity to study soil water and pine growth

where the under-story was controlled and where it was not. In 1964, when soil water and tree diameter measurements were begun, the loblolly pine over-story was about 60 years old. It was even-aged, and had been thinned from below three times prior to 1964 with little disturbance of the under-story. Sweet gum, black gum, and mixed oaks made up most of the hardwood under-story, and Southern bayberry, pepperbush, and gallberry predominated among the shrubs. Soil, locally known as Coxville, consisted of about a foot of fine sandy loam over eight inches of sandy clay loam which was underlain by clay. Although the soil was poorly drained and rated low in nutrients for other agricultural crops, it produced above-average yields of loblolly pine timber.

Formal prescribed burning tests have been carried out on plots within the stand since 1946. Annual summer fires successfully eradicated all under-story hardwoods and shrubs with the exception of a few of the larger hardwoods (Figure 1). These results contrasted sharply with unburned plots, where the number of under-story stems exceeded 10,000 per acre. Within each plot we installed five wells to measure soil water changes. Our concern with soil water arose because eradication of the under-story on poorly drained sites might reduce transpirational surface enough to increase soil wetness. Increased wetness on sites already poorly drained could create accessibility

problems during harvest and for other management purposes, as well as affect soil water recharge, runoff over the surface, and stream-flow. At each well site we checked the diameter of the closest loblolly pine tree at the beginning and end of the 1964 and 1965 growing seasons. All together, we measured 30 trees at 30 well sites on three pairs of burned and unburned plots.

Tree diameter averaged 16 inches on both the burned and unburned plots at the beginning of the 1964 growing season. Two growing seasons later, average diameter had increased about 0.3 inch. Comparisons of the tree growth on the burned plots with those on the unburned plots showed no meaningful differences. We concluded, therefore, that under-story control probably did not affect growth of the pine in 1964 and 1965.

Studies of pole-sized loblolly pine stands in the Mid-south have demonstrated that diameter growth can be limited by deficiencies in soil water. Consequently, soil water measurements were tabulated and their status at the beginning and end of each growing season noted. Water loss and recharge were comparable for both the burned and unburned plots, which could explain why diameter growth was so similar on them as well.

Growing season rainfall usually is more plentiful and uniformly distributed in the Southeastern coastal plain than in the Mid-south. This factor might explain the similarity in soil water on plots with and without understories. For example, precipitation near the study site totaled 54 and 33 inches for the period March through October in 1964 and 1965, respectively. By contrast, rainfall at Vicksburg, Mississippi, for the same seasons and years totaled 40 and 23 inches, or only about 70 per cent as much as that on the Santee Experimental Forest. With such plentiful growing season rainfall, the soil recharged in the summer. When the soil is moist, the under-story apparently does not compete measurably for soil water in upland pine forests. Thus, there probably was little opportunity for the under-story draft to create moisture deficiencies on the poorly drained soil in this study.

When trees reach advanced age, their growth rates slow and they become less responsive to treatment. We suspect that the 60-year-old trees in this study could not have shown spectacular differences in diameter growth even with reduction of under-story that is competing for space, moisture, and nutrients. In any case, forest managers should consider factors such as access, stand regeneration, and wildlife habitat management as primary reasons for under-story control in mature loblolly pine stands of the lower Southeastern coastal plain.



FIGURE 1.—By the time of the tenth annual summer fire in 1957, nearly all under-story hardwoods and shrubs had been eradicated from beneath the loblolly pine canopy. Appearance of the plot has changed little since then, even with 10 additional fires.

