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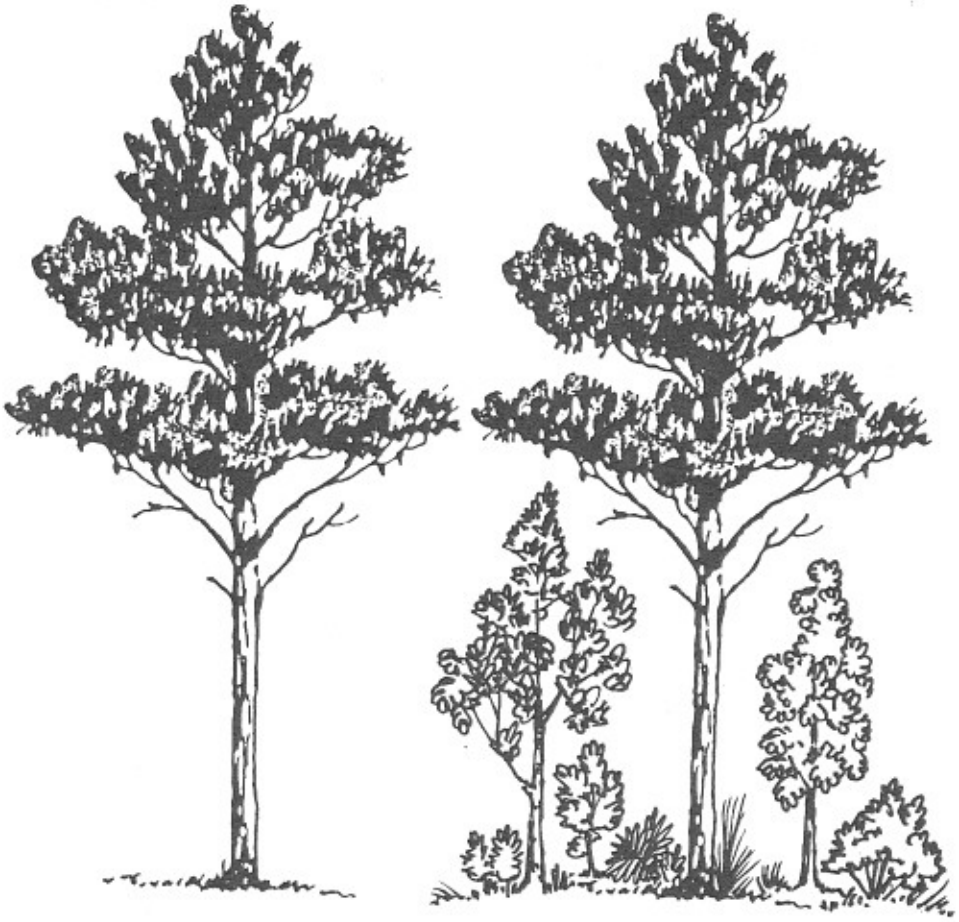

Virginia
Department of Forestry

LOBLOLLY PINE RESPONSE TO COMPLETE ELIMINATION OF UNDERSTORY VEGETATION

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ABSTRACT

Complete elimination of understory vegetation in a 10-year-old loblolly pine plantation had only a slight and non-significant effect on diameter and basal area growth over an 8-year period.

INTRODUCTION

This study was installed in a ten-year-old loblolly pine plantation in which, at age 10, most of the loblolly pines were emerging or had emerged from a moderately dense stand of hardwood sprouts and brush. Many of the more vigorous hardwood sprouts, mostly oaks, were still in an intermediate crown position, and thus were competing for crown growing space. In addition to oak sprouts, there was also some dogwood, red maple, hickory, and blackgum. There was considerable blueberry and huckleberry in places and also small patches of bracken fern.

We were well aware that the larger hardwood sprouts, which were still competing for crown growing space, were inhibiting the growth of loblolly pine. We wondered, however, whether the strictly understory hardwoods and brush, that were not competing for sunlight, might also be inhibiting the growth of the loblolly pine. We were especially curious about the possible effect of the dense patches of huckleberry and blueberry.

This study was installed in the same plantation as, and immediately adjacent to, one of our regular release studies, the results of which have already been published in Occasional Report No. 86--Release Report No. 15. This study was installed in the released portion of that plantation (Figure 1).

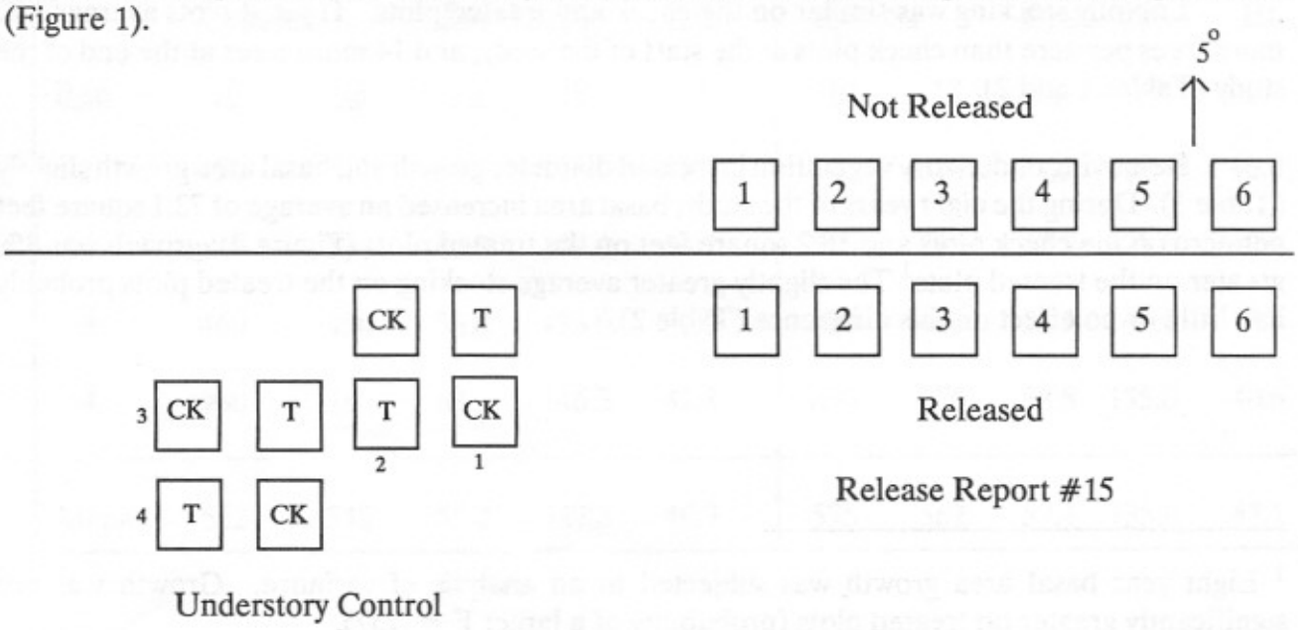

Figure 1. Layout of study plots.

INSTALLATION OF PLOTS

Four pairs of tenth-acre plots were installed. We chopped off all hardwoods that were tall enough to be competing with the loblolly pine for crown growing space, on all 8 plots. This was to insure that we were studying just the effect of understory vegetation. Plots were installed in late July 1978, at which time the four treatment plots were also treated with 2,4,5-T applied with a backpack mist blower. The treated plots were basal sprayed, using 2,4,5-T, in April and May 1979, attempting to eliminate all hardwood sprouts. In September 1979, the treated plots were again mist blown, this time using Roundup. Hardwoods on the treated plots were again basal sprayed, this time using Garlon, in April 1981.

These four chemical treatments were effective in eliminating, or at least severely stunting, all hardwood vegetation, including the blueberries and huckleberries. The small amount of grasses and herbaceous vegetation that invaded was also well controlled. The bracken fern was not adequately controlled.

The plots were measured at the end of the tenth growing season, and at ages 13, 14, 15, 16, 17, and 18. Shortly after the age 18 measurement, the entire plantation was thinned for pulpwood, and the study was terminated. The DBH of each loblolly pine was measured to the nearest inch at all measurements. In addition, at the age 13 and 17 measurements, a large sample of trees in each diameter class was measured for total height, noting which trees were dominant or codominant.

By the age 18 measurement, loblolly pine density was great enough that the vigor of the understory vegetation on the control plots was noticeably less than at age 10 when the study was installed.

RESULTS

Loblolly stocking was similar on the check and treated plots. Treated plots averaged 23 more trees per acre than check plots at the start of the study, and 14 more trees at the end of the study (Tables 1 and 2).

Removing understory vegetation increased diameter growth and basal area growth slightly (Table 1). During the eight years of the study, basal area increased an average of 72.1 square feet per acre on the check plots and 78.2 square feet on the treated plots (Figure 2); growth was 8% greater on the treated plots.[1] The slightly greater average stocking on the treated plots probably had little or no effect on this difference (Table 2).

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[1] Eight year basal area growth was subjected to an analysis of variance. Growth was not significantly greater on treated plots (probability of a larger F = .157).

Table 1. Average number of loblolly per acre, DBH, basal area per acre, and dominant and codominant height.

	No. Loblolly/Acre			Basal Area			Mean DBH			Avg.D & CD Ht.		
Age	Ck.	Trt.	Diff.	Ck.	Trt.	Diff.	Ck.	Trt.	Diff.	Ck.	Trt.	Diff.
10	552	575	23	55.2	57.4	2.2	4.2	4.2	0	-	-	-
13	552	570	18	83.6	90.5	6.9	5.2	5.3	.1	31.8	31.8	0
14	552	568	16	97.1	103.2	6.1	5.6	5.7	.1	-	-	-
15	550	568	18	101.8	109.1	7.3	5.8	5.8	0	-	-	-
16	550	565	15	112.5	119.3	6.8	6.0	6.1	.1	-	-	-
17	550	562	12	118.6	125.8	7.2	6.2	6.2	0	40.7	41.1	.4
18	548	562	14	127.3	135.6	8.3	6.4	6.5	.1	-	-	-

Table 2. Individual plot data: number of loblolly and basal area per acre at ages 10 and 18, and average D & CD height at age 17.

	Check Plots					Treated Plots				
	Number		Basal Area		Ht.	Number		Basal Area		Ht.
Rep	10	18	10	18	17	10	18	10	18	17
1	450	450	54.1	121.0	41.3	640	610	54.2	119.8	40.0
2	540	530	46.5	109.0	36.7	510	510	57.5	123.0	40.9
3	460	450	56.8	133.0	42.0	480	460	58.9	144.8	42.8
4	760	760	63.5	146.3	42.8	670	670	58.8	155.0	40.6
Means	552	548	55.2	127.3	40.7	575	562	57.4	135.6	41.1

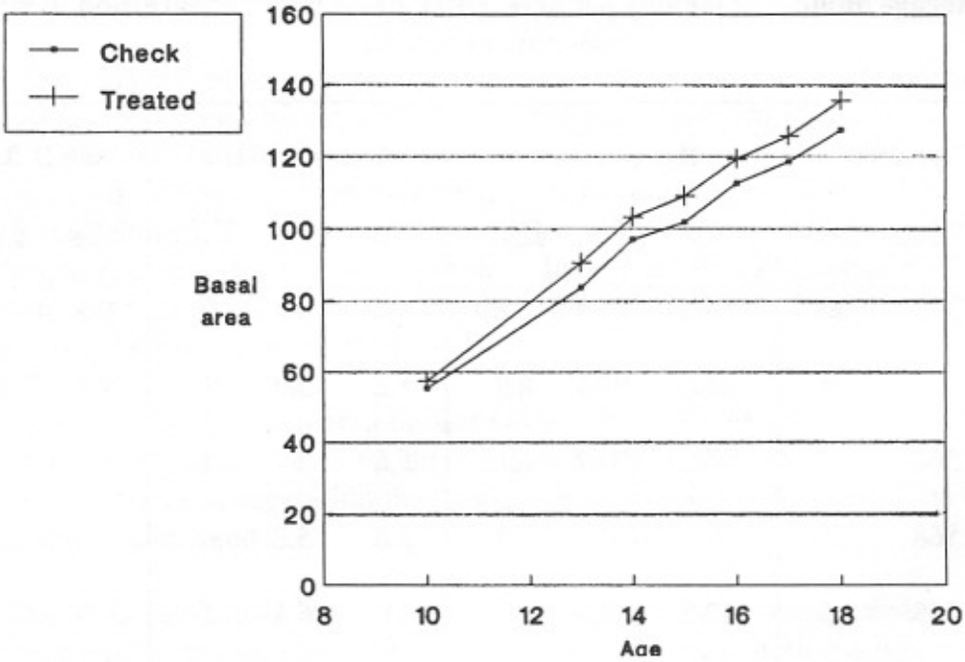

Figure 2. Average basal area on check and treated plots at each measurement.

Most of the small increase in basal area growth took place during the first three years after the treatments were applied. This can be seen from an examination of Table 1 and Figure 2. The treated plots averaged 2.1 square feet of basal area more than the check plots at the start of the study, and 3 years later the difference had increased to 6.9 square feet. Five years later, at age 18, the difference had only increased to 8.3 square feet.

Average DBH was only slightly affected by the treatments. At age 10, average DBH was the same on check and treated plots, and 8 years later there was only a .1 inch difference in favor of the treated plots (Table 1).

Average height of dominant and codominant loblolly pine does not seem to have been affected. Heights were measured at age 13 and age 17 (Table 1). There was no difference in average height at age 13, and the .4-foot difference in favor of the treated plots at age 17 was not statistically significant (probability of a larger F = .81).