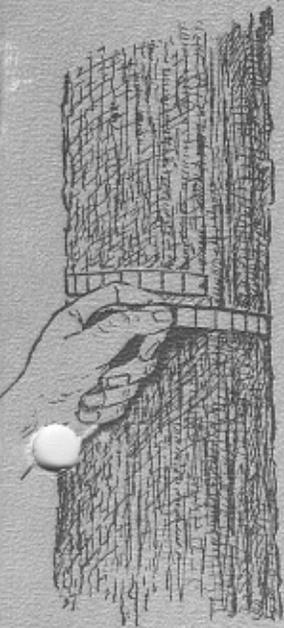
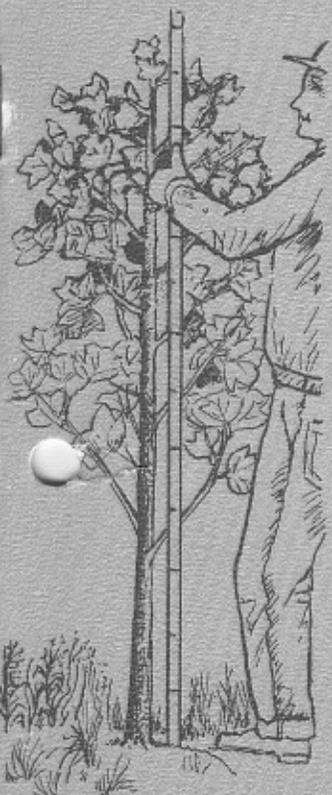


Direct Seeding and Planting Virginia and Loblolly Pine On Sites Prepared by Burning



Virginia Division of Forestry



Department of Conservation and Economic Development

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DIRECT SEEDING AND PLANTING VIRGINIA AND LOBLOLLY PINE
ON SITES PREPARED BY BURNING

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ABSTRACT

A study was installed in 1966 and 1967 to test and compare direct seeding of Virginia pine with planting of both Virginia and loblolly pine. Virginia pine seed was sown at rates of 1/2 and 1 pound per acre. In 1967, direct seeding of loblolly pine at a rate of 1 pound per acre was added. Plots were installed in the Piedmont on 12 different tracts, 6 each in 1966 and 1967, on cutover sites prepared by prescribed burning only.

Average Virginia pine stocking after 3 years for the 1 pound sowing rate was 2,470 seedlings per acre in 1966, and 2,400 per acre in 1967; for the 1/2 pound sowing rate, the average stocking was 1,540 in 1966, and 1,030 in 1967. Average loblolly pine stocking for the 1 pound sowing rate in 1967 was 480 seedlings per acre. For both years average survival of planted seedlings was 80% for Virginia pine and 82% for loblolly pine.

After 3 years planted seedlings were considerably taller than direct seeded seedlings. Planted loblolly pine seedlings were taller than planted Virginia pine.

DESCRIPTION OF STUDY

Virginia pine seed was sown at rates of 1/2 and 1 pound per acre on cutover and prescribed burned sites on the Cumberland and Prince Edward State Forests in 1966 and 1967. In 1967 loblolly pine seed was also sown at a rate of 1 pound per acre. ^{2/}A cyclone seeder was used to broadcast the seed on 1/5 acre plots. Treated ^{2/}non-stratified seed was sown in February.

The seeding was done on 6 different tracts each year, for a total of 12 tracts. A single plot of each seeding treatment was installed on each tract.

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^{2/} Materials applied and rates per 100 pounds of seed:

Arasan 75	- 2.4 gallons
Endrin 50-W	- 2.5 pounds
Dow Latex 512	- 12 ounces
Aluminum flakes	- 1.9 ounces

Both Virginia pine and loblolly pine seedlings were planted adjacent to the direct seeding plots within a month of the date the seeding was done. In most cases, a 1/5 acre plot was planted with Virginia pine and the rest of the tract surrounding the plots was planted with loblolly pine. The planting rate was approximately 1,000 seedlings per acre.

The tracts were prescribed burned during the summer prior to seeding. All tracts had been cutover prior to burning, and burning was the only site preparation applied, except for hand treatment of residual hardwoods not killed by the fire.

On all tracts, where plots were installed fire coverage was nearly complete. Intensity of burn, however, varied from tract to tract with varying amounts of unburned litter remaining.

Soils vary considerably among the 12 tracts. Well drained soils in the Cecil, Madison, and Tatum soil series occur on the plots of 9 tracts. Imperfectly drained soils occur on the plots of the other 3 tracts: moderately well drained Vance on one, somewhat poorly drained Helena on another, and somewhat poorly drained Iredell on the third. Slopes range up to about 10 percent on the plots.

MEASUREMENTS

Seedling counts and height measurements were made when the seedlings on the seeded plots were 3 years old. Seedlings were counted on 49 mil-acre plots systematically distributed over each 1/5 acre plot. The height of the tallest seedling on each mil-acre plot was measured.

At the same time, survival and heights were obtained for planted seedlings. Where planting was done on a 1/5 acre plot, every seedling on the plot was measured. Where the tract surrounding the plots was planted, the seedlings in the row immediately adjacent to the plots were measured.

RESULTS

Stocking

Stocking at age 3 is shown in Table 1.

Table 1. Number of Seedlings Per Acre and Mil-Acre Stocking Percent^{3/} After Three Years

Tract	1966 - Virginia Pine			
	1/2 Pound		1 Pound	
	No./Ac.	Stock. %	No./Ac.	Stock. %
Ceatham 4-3	1,020	55	2,370	86
Ceatham 4-24	590	35	1,900	75
Flippen 6-4	1,760	74	2,840	92
Rock Quarry 11-38	2,470	82	3,470	84
Smith 28-42	1,980	78	2,820	92
Willis 22-28	1,430	59	1,430	47
Means	1,540	64	2,470	79

^{3/} The percentage of mil-acre plots that contained one or more seedlings.

Table 1 (continued)

Tract	1967				Loblolly Pine	
	Virginia Pine				1 Pound	
	1/2 Pound		1 Pound		No./Ac.	Stock. %
	No./Ac.	Stock. %	No./Ac.	Stock. %	No./Ac.	Stock. %
Juckoff 14-45	1,670	74	4,350	98	490	31
Lipscomb 6-18	1,200	55	2,430	90	370	29
Lipscomb 6-20	510	33	2,350	78	470	39
Mt. Creek 1-5	900	47	1,490	65	260	22
Mt. Creek 1-22	820	43	2,490	88	610	43
North Branch 10-17	1,100	53	1,330	88	650	39
Means	1,030	51	2,400	84	480	34

If 60% mil-acre stocking is considered acceptable, the 1 pound Virginia pine rate gave acceptable stocking in all cases except the Willis tract in 1966. The 1/2 pound Virginia pine rate gave acceptable stocking on only 4 of the 12 tracts. However, if 50% stocking is considered acceptable, then 8 of 12 tracts sown at the 1/2 pound rate were acceptable. The stocking obtained from the 1 pound loblolly rate in 1967 was unacceptable on all 6 tracts.^{4/}

Survival of planted seedlings after 3 years was at least 65 percent in all cases (Table 2). Loblolly and Virginia pine survived about equally well, and identical average survival percents were obtained in each year; 80% for Virginia pine and 82% for loblolly.

Table 2. Survival of Planted Seedlings After Three Years.

Tract	1966		Tract	1967	
	Va. pine	Loblolly		Va. pine	Loblolly
Cheatham 4-3	77%	87%	Juckoff 14-45	80%	94%
Cheatham 4-24	86%	86%	Lipscomb 6-18	65%	83%
Flippen 6-4	90%	87%	Lipscomb 6-20	78%	71%
Rock Quarry 11-38	76%	69%	Mt. Creek 1-5	92%	88%
Smith 28-42	82%	86%	Mt. Creek 1-22	68%	76%
Willis 22-28	69%	74%	North Branch 10-17	96%	79%
Means	80%	82%	Means	80%	82%

^{4/} For the 1967 study, an analysis of variance was made using logarithms of numbers of seedlings per acre. Differences between treatments were tested using Duncan's New Multiple Range Test. Loblolly pine stocking was significantly poorer than both 1/2 and 1 pound Virginia pine stocking at the 1% level.

Height Growth

After 3 years planted seedlings were taller than direct seeded seedlings on all tracts (Table 3). Planted loblolly pine seedlings were taller than planted Virginia pine seedlings on most tracts.^{5/}

Table 3. Heights of Direct-Seeded and Planted Seedlings After Three Years.

Tract	1966				
	Direct Seeded ^{6/}		--feet--	Planted ^{7/}	
	1/2 Pound	1 Pound		Virginia pine	Loblolly
Ceatham 4-3	1.7	1.6		2.5	3.3
Ceatham 4-24	2.7	3.4		4.0	5.1
Flippen 6-4	2.7	2.8		4.4	5.7
Rock Quarry 11-38	2.3	2.2		2.9	3.0
Smith 28-42	2.6	3.3		3.7	4.2
Willis 22-28	1.7	2.4		3.2	3.1
Means	2.3	2.6		3.4	4.1

Tract	1967					
	Direct Seeded ^{6/}			--feet--	Planted ^{7/}	
	1/2 Pound	1 Pound	1 Pound		Virginia pine	Loblolly
Juckoff 14-45	1.5	2.2	2.3		3.0	4.2
Lipscomb 6-18	2.6	2.6	3.0		4.1	4.7
Lipscomb 6-20	1.6	1.7	1.4		2.7	3.0
Mt. Creek 1-5	2.2	2.4	1.8		4.5	4.8
Mt. Creek 1-22	2.0	2.0	1.9		3.2	4.2
North Branch 10-17	1.9	2.0	1.7		3.9	3.9
Means	2.0	2.2	2.0		3.6	4.1

^{5/} Analyses of variance were made of mean heights of surviving seedlings after 3 years. Differences between treatments were tested using Duncan's New Multiple Range Test. There were no significant differences between heights of seedlings for the seeding treatments. Planted seedlings (both Virginia pine and loblolly) were significantly taller than direct seeded seedlings, at the 1% level in both 1966 and 1967. Planted loblolly seedlings were significantly taller than planted Virginia pine, at the 5% level in 1966 and the 1% level in 1967.

^{6/} Average height of tallest seedling on each mil-acre plot.

^{7/} Average height of all planted seedlings.