

REGENERATING CUT-OVER X, B AND V₂ SITES
BY PLANTING AND SEEDING² SCALPED² STRIPS,
ON LIMITS OF ABITIBI MANITOBA PAPER LIMITED

Project MS-238

by

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FOREST RESEARCH LABORATORY
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INTRODUCTION

In 1963 the Department of Forestry in co-operation with the Manitoba Paper Company (now named Abitibi Manitoba Paper Limited) began a study to determine whether X₂B^{2/} and V₂^{3/} sites can be regenerated to white spruce and black spruce by planting on scalped strips and to jack pine, balsam fir, white spruce and black spruce by seeding on scalped strips. Other objectives are to compare the effectiveness of seeding, hole planting and slit planting on these sites. It is intended that the experiment be replicated for a number of years to compensate for differences in weather. Between 1963 and 1966 three study areas have been established.

This report has been prepared to summarize work completed during the summer of 1966 and outline the work proposed for 1967.

For further details concerning the scope of this project, design and methods of assessing results, the reader is referred to the project plan, mimeo 63-MS-23, progress report 64-MS-3, and internal reports MS-7 and MS-31.

^{1/} Forest Research Technician.

^{2/} X₂B sites - (Manitoba Paper Company classification) these sites occupy lower- and mid-slope positions and support merchantable stands containing various mixtures of black spruce, white spruce, jack pine and trembling aspen; the soil is a till often containing many large stones and boulders; texture varies from a sandy loam to clay loam; soil depth varies but the minimum is about 2 feet; moisture condition varies from fresh to moist; advance growth of softwood species is relatively scarce.

^{3/} V₂ sites - (Manitoba Paper Company classification) these sites occupy mid- and upper-slope positions on low rock ridges and support merchantable stands of black spruce and jack pine; soil origin and texture are similar to that on X₂B sites; soil depth averages 2 feet; moisture conditions vary from dry to moist; softwood advance growth is lacking.

DESCRIPTION OF AREA ESTABLISHED IN 1966

Area 3: The area chosen for the third replication was selected in the fall of 1966. It is on the east side of the Manigotogan highway about 0.5 miles north of the turn-off to camp 26. It is in Sec. 4, Twp. 21, Rge. 10, E.P.M.

The area (logged during the winter 1955-56) is situated on the mid and lower slopes of a rock-cored ridge which runs in a more or less east-west direction. It is bounded to the north by the upper slopes of the ridge and to the south by hardwoods which grade into swamp-type black spruce. A shallow sandy loam till covers the mid-slopes; a somewhat deeper clay loam covers the lower slopes. Moisture conditions vary from fresh on the mid-slopes to moist on the lower slopes.

Prior to logging the site supported a 120-year-old stand of black spruce, jack pine and balsam fir. Per acre stand data typical of X₂B and V₂ sites (supplied by the Abitibi Manitoba Paper Limited) is shown in Table 1.

WORK COMPLETED IN 1966

Seeding

Area 2: Scalped strips were prepared on this area by the Abitibi Manitoba Paper Limited in the spring of 1965.

Strips which had been randomly chosen for seeding were seeded by the Department of Forestry in the spring of 1966. A total of five strips were seeded (by hand) to jack pine, black spruce, white spruce and red pine. ^{1/} Viability of the seed at the time of sowing and rates of seeding is shown in Table 2.

Examination of Plantation Plots

Area 1: White spruce and black spruce transplants (2 - 2 stock from Hadasville Nursery) were slit planted and hole planted on Area 1 by the Abitibi Manitoba Paper Limited in the spring of 1964. Following planting the Department of Forestry established randomly located plantation plots to follow the development and survival of seedlings. The plantation plots on the area were examined in the fall of 1964, 1965 and 1966. Survival, condition of survivors and total heights of seedlings were recorded at each examination.

^{1/} Seed sown was untreated.

TABLE I
PER ACRE STAND DATA

D.B.H	Black spruce	Balsam fir	Jack Pine
5	4	11	1
6	7	11	1
7	11	7	2
8	7	6	2
9	6		1
10	2		
11	2		1
12	4		
13	0		
14	0		
15	2		

* Figures for jack pine are estimates; no jack pine was tallied during the cruise.

TABLE 2
VIABILITY AND SEEDING RATES
OF SEED SOWN ON AREA 2,
SPRING 1966

Species Sown	Per cent Viable	Rate of seeding
jp	95	1 lb/ac
bs	92	1 lb/ac
wS	62	1 lb/ac
rP	85	1 lb/ac

Survival of seedlings by method of planting to fall of 1966 is summarized in Table 3. The data indicate that survival of white spruce and black spruce seedlings has been nearly the same (80 and 81% respectively). Survival of white spruce planted by the hole method appears to have been better than that of seedlings planted by the slit method (83 and 77%); survival of slit planted black spruce appears to have been slightly better than that of hole planted black spruce (83 and 80%). However results of Chi-square tests showed no significant differences at the 95% level of probability.

Average plantation heights in the fall of 1966 (Table 4) was 12.5 inches for white spruce and 16.8 inches for black spruce. Annual growth for three years since planting averaged 2.5 inches for white spruce and 3.0 inches for black spruce. However, as a percent of original transplant heights white spruce increased 155% where as black spruce has increased by only 115%. Height increase for both white spruce and black spruce seedlings appears to have been slightly better for hole planting than for slit planting.

TABLE 3
PER CENT SURVIVAL WHITE SPRUCE AND BLACK SPRUCE
SEEDLINGS ON AREA 1, TO FALL 1964, 1965 AND 1966

Species planted	Planting method	Number plots	Number seedlings	Per cent survival		
				Fall 1964	Fall 1965	Fall 1966
ws	Slit	10	150	91	81	77
ws	Hole	10	150	93	86	83
All white spruce		20	300	92	84	80
bs	Slit	10	150	93	87	83
bs	Hole	10	150	95	85	80
All black spruce		20	300	94	86	81

Area 2: White spruce and black spruce transplants (2 - 2 stock from the Hadasville Nursery) were set out on this area by the Abitibi Manitoba Paper Limited in the spring of 1965. The survival and growth of seedlings is being followed by the Department of Forestry. Plantation plots on this area were examined and measured in the fall of 1965 and 1966.

Seedling survival to fall of 1966 by planting methods has been summarized and is shown in Table 5. The data indicate per cent survival of black spruce was better than white spruce (85 and 79% respectively). Survival of slit planted white spruce appears to be better than that of hole planted white spruce (82 and 75%); survival of hole planted black spruce appears to be better than survival of slit planted (89 and 81%). However Chi-square tests showed none of the differences to be significant.

TABLE 4
AVERAGE HEIGHTS WHITE SPRUCE AND BLACK SPRUCE
SEEDLINGS ON AREA 1, FALL 1964, 1965 AND 1966

Species Planted	Planting Method	Average height (inches)			
		After Planting	Fall 1964	Fall 1965	Fall 1966
ws	Slit	5.0 \pm 1.5 ^{1/}	6.4	8.6	12.2 \pm 4.9
ws	Hole	4.8 \pm 1.8	6.5	9.0	12.7 \pm 5.0
All white spruce		4.9 \pm 1.7	6.5	8.8	12.5 \pm 5.0
bs	Slit	7.8 \pm 2.3	9.5	12.8	16.4 \pm 5.0
bs	Hole	7.9 \pm 2.4	9.5	12.7	17.2 \pm 5.9
All black spruce		7.8 \pm 2.4	9.5	12.8	16.8 \pm 5.5

^{1/}Standard deviation.

TABLE 5
PER CENT SURVIVAL WHITE SPRUCE AND BLACK SPRUCE
SEEDLINGS ON AREA 2, TO FALL 1965 AND 1966

Species Planted	Planting Method	Number Plots	Number Seedlings	Per cent survival	
				Fall 1965	Fall 1966
ws	Slit	10	150	91	82
ws	Hole	10	150	87	75
All white spruce		20	300	89	79
bs	Slit	10	150	86	81
bs	Hole	10	135	93	89
All black spruce		20	285	89	85

The average plantation heights in fall of 1966 (Table 6) was 8.0 inches for white spruce and 12.9 inches for black spruce. Growth for the first two growing seasons averaged 1.6 inches for white spruce and 2.6 inches for black spruce. As a per cent of original transplant heights, height increase for both white spruce and black spruce has been nearly the same, 63 and 65% respectively. Height increase for both slit planted and hole planted white spruce was nearly the same. Black spruce planted by the hole method has shown a greater height increase than the stock planted by the slit method.

Seedbed Treatment

Area 3: Seedbed preparation was carried out on Area 3 by the Abitibi Manitoba Paper Limited in October 1966. A total of 31 strips were scalped (to mineral soil) with a bulldozer using a 10-foot-wide straight blade. The strips were bulldozed in a more or less north-south direction and were made as close to one another as conveniently possible.

Following scalping the Department of Forestry made a survey of the area and prepared a sketch showing location and length of each strip (see Figure 1). The strips were numbered consecutively from west to east then treatments were assigned randomly to each strip (see Figure 1).

TABLE 6

AVERAGE HEIGHTS WHITE SPRUCE AND BLACK SPRUCE
SEEDLINGS ON AREA 2, FALL 1965 AND 1966

Species	Planting Method	Average height (inches)		
		After Planting	Fall 1965	Fall 1966
ws	Slit	4.8 ± 1.5 ^{1/}	6.6	7.9 ± 2.1
ws	Hole	5.0 ± 1.6	6.5	8.2 ± 2.2
All white spruce		4.9 ± 1.5	6.3	8.0 ± 2.2
bs	Slit	8.2 ± 1.5	9.9	13.6 ± 3.3
bs	Hole	7.3 ± 1.8	8.9	12.2 ± 3.4
All black spruce		7.8 ± 1.7	9.4	12.9 ± 3.4

^{1/} Standard deviation.

WORK TO BE DONE IN 1967

Seeding

Area 3: Strips designated for seeding (Figure 1) will be sown to jack pine, black spruce, white spruce and red pine in the spring of 1967.

Planting

Area 3: White spruce and black spruce transplants will be slit planted and hole planted on the designated strips (Figure 1) by the Abitibi Manitoba Paper Limited in the spring. Seedlings will be planted in accordance with instructions in the project plan MS-238.

Plot Establishment

Area 3: Plantation plots to follow the development and growth of transplants will be established on Area 3 in the fall of 1967. Survival condition and growth of seedlings will be recorded. The heights of seedlings following planting will be determined at the time of measurement.

Remeasurements

Area 1: Plantation plots on Area 1 will be remeasured in the fall. Survival, condition of survivors and growth will be recorded.

Area 2: Plantation plots will also be remeasured on Area 2 in the fall.

Reports

Progress to fall of 1967 will be reported.

