Not for publication

BARREL SCARIFYING AND SEEDING OF A BURNED-OVER JACK PINE STAND, INTERLAKE, MANITOBA

by

G. R. Hennessey

FOREST RESEARCH LABORATORY
WINNIPEG, MANITOBA
INTERNAL REPORT MS-105

CANADIAN FORESTRY SERVICE
DEPARTMENT OF FISHERIES AND FORESTRY
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The treatments described in this report were carried out under the direction of K. Vogel, Regional Forester, Eastern Region, Manitoba Department of Mines and Natural Resources. The assessment of the early results of the treatments was provided by the Canadian Forestry Service, Department of Fisheries and Forestry.

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G. R. Hennessey[1]

INTRODUCTION

Considerable difficulties have been experienced in the reforestation of understocked, burned over, dry jack pine sites, in the Interlake region of Manitoba, using site preparation followed by conventional planting. Plantation failures have been reported and this was felt to be the result of poor planting due to the extremely stoney and shallow-soiled sites.

An attractive alternative would appear to be artificial seeding after scarification to reforest these old burns. This type of treatment would have two chief advantages, natural rooting in the stoney ground, would occur, and broadcast seeding would be much less costly than hand planting. Such treatments were carried out in 1968-69 with an assessment of the regeneration being made in October 1969.

DESCRIPTION OF AREA AND TREATMENTS

An area (Figure 1) burned over in 1961 was chosen for scarification during the 1968 field season to prepare seedbeds suitable for artificial seeding. Prior to the burn, the area had supported a jack pine stand on a very dry to moderately moist (moisture regimes 0 to 4) extremely calcareous loam till over limestone bedrock. The shallow and excessively stoney soils are in the rock substrate phase of the Fairford and Inwood soil series of the Manitoba Soil Survey. Ground vegetation indicated that the predominant moisture regimes were dry to moderately fresh.

Approximately 420 acres were scarified using an HD15 tractor and barrel scarifiers (Figure 2). The area size is an approximation due to the inclusion of unscarified residual stands and adequately stocked advanced growth, within the treatment area. This equipment treated the area in 323.5 hours at $9.00 per hour and including scarifier repair expenses, cost $7.20 per acre. The barrels produced well furrowed ground on most of the area with exceptions where boulders were congregated or bedrock was near the surface.

Between October 2 and 18, 1968, Block 1 was seeded and seed-dragged using a John Deere tractor equipped with wheel tracks. The seed drag was pulled approximately 18 feet behind the tractor and was either an eight foot drawbar with three foot agricultural seed chains at six inch spacing, or a 10 to 14 foot log. Seed was distributed over a 14 foot width by a cyclone seeder, manually operated from a platform behind the tractor seat. This arrangement left approximately one third of the block seeded but not

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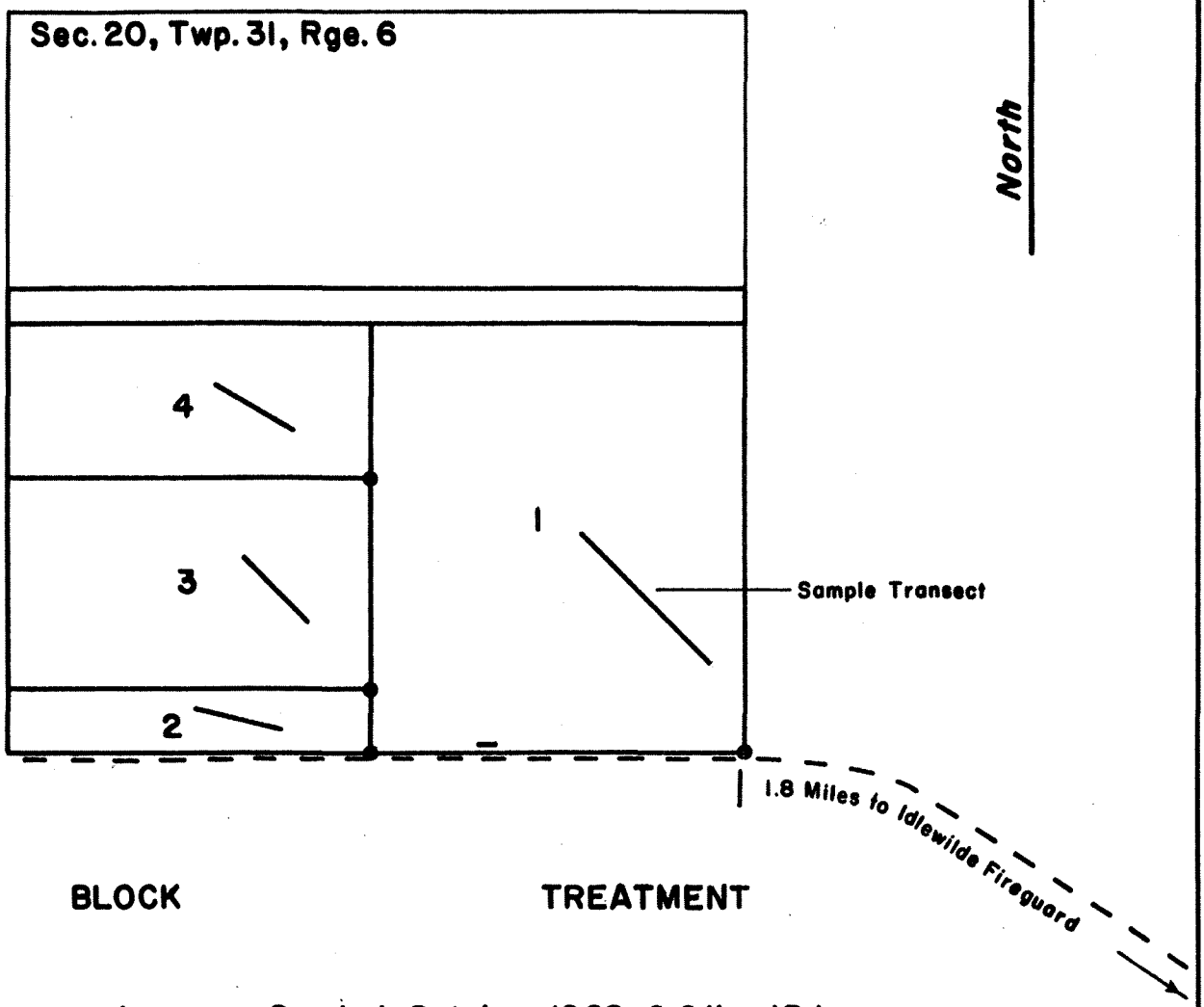

BLOCK	TREATMENT
1	Seeded, October, 1968, 0.6 lbs. jP/acre
2	Seeded, October, 1968, 2.0 lbs. wS/acre
3	Seeded, March 18-19, 1969, 1.1 lbs. jP/acre
4	Seeded, March 25, 1969, 2.0 lbs. wS, jP, rP/acre

● - Block Marker

0 10 20 30 chns.

GRH 16/12/69

Fig.1 Artifical Seeded Barrel Scarified Area, Lake St. Martin, Manitoba

Fig. 2. Top--Tractor and barrels in operation.

Bottom--Autumn seeding. Note seed drag.

seed dragged. With a gross acreage of 190 and 120 pounds of jack pine seed, estimated seeding rate was 0.6 pounds per acre. The seed was obtained from southeastern Manitoba during 1964 and 1965, and averaged 86 per cent viable when tested at the Pineland Nursery.

During the same period Block 2 was seeded in the same fashion using 60 pounds of white spruce seed to cover approximately 30 acres for a seeding rate of 2.0 pounds per acre. This seed had been obtained in the Interlake in 1964 and tested 45 per cent viable at the Pineland Nursery. The cost of the seeding operation for Blocks 1 and 2 are estimated to be $1.60 per acre. Treatment costs, exclusive of the cost of seed, were estimated to be $8.80 per acre.

During March 18 to 19, 1969, Block 3 was seeded over snow using a Skidoo, sleigh and cyclone seeder. Seeding width was about 20 feet and 100 pounds of jack pine seed was used to seed approximately 90 acres (1.1 pounds per acre). The seed was obtained in southeastern Manitoba in 1966 and 1967, and a weighted average of the viabilities tested at the Pineland Nursery was 93 per cent.

On March 25, 1969, Block 4 was seeded over snow, as in Block 3, using 30 pounds of jack pine, 110 pounds of white spruce, and inadvertently five pounds of red pine, in a mixture, to cover approximately 70 acres (2.0 pounds per acre). Germination tests at Hadashville Nursery showed the jack pine seed collected in 1966 in southeastern Manitoba to be 97 per cent viable, and the white spruce seed collected in 1964 and 1966 in the Interlake to average 20 per cent viable. The weather was sunny, mild, and calm during seeding operations and subsequent wind dispersal of seed would seem unlikely.

Meteorological reports for the region indicate that temperatures were well below normal during the first half of the growing season and average in the latter half. Precipitation was below normal throughout the growing season and particularly light during June and July where precipitation totalled about two and one half inches for the nearest reporting station.

ASSESSMENT

In October, 1969, a regeneration survey was carried out to assess the early results of the various treatments. Line transects of milacre quadrats were run diagonally to the furrowed ground in each block. Data from these transects were compiled to provide per cent stocking and number of trees per acre of regeneration for each block. A small additional sample of dragged and not dragged seedbeds was also taken. Table 1 shows the results of this assessment.

All blocks where jack pine was sown were well to fully stocked in the autumn of 1969. Block 3, sown exclusively with white spruce, was a failure and should be reseeded. The anomaly of satisfactory establishment of autumn sown jack pine and spring sown white spruce as opposed to the the establishment failure of autumn sown white spruce would require closer observation to determine the factors responsible. Perhaps the autumn sown

TABLE 1

PER CENT STOCKING, SEEDLINGS PER ACRE, SEEDLING LOCATION,

AND SPECIES, LAKE ST. MARTIN, MANITOBA - 1969

Block	Seeded to	Per cent stocking	No. of seedlings per acre	Per cent jack pine seedlings	Per cent seedlings found on			Basis:† No. of milacre subplots
					Mineral soil	Humus	Mounds or Undisturbed	
1	jP	75.9	3,900	100	79.5	4.6	15.9	170*
1 (dragged)	jP		2,600	100				20
1 (not dragged)	jP		1,500	100				20
2	wS	11.0	100	0	100.0	0.0	0.0	100
3	jP	81.0	1,600	100	65.4	2.5	32.1	100
4	jP, wS, rP	82.0	4,700	72	54.9	1.2	43.9	100

† Every 10th subplot was a total count plot.

* A chain and a half segment of the line was untreated, well stocked, advance growth jack pine and was eliminated from the data.

spruce germinated prior to a killing frost or when damping-off fungi were most active. Many failures, due to damping-off, have been reported for untreated seed on calcareous soils. White spruce germinants that were found in Blocks 3 and 4 appeared healthy at the time of the survey.

Autumn sown jack pine compares well with that sown in the spring considering the much lower seeding rate for the block sown in the autumn. In addition, a higher percentage of the spring sown jack pine was found on undisturbed seedbeds, mostly on open seedbeds of fire origin or on similar seedbeds well covered with bearberry. Seedling mortality may be considerably higher on these unscarified seedbeds.

A small sample of dragged and not dragged areas of Block 1 indicated that dragging increased the number of established jack pine at the end of the first growing season. However, this result is probably biased in favour of the dragged area as it is nearer the centre of the seeding pattern produced by the cyclone seeder. A valid comparison using this type of survey would require separate dragged and not dragged blocks.

Although initial stocking to jack pine is good, early growth and vigour of the seedings are poor and typical of inferior jack pine sites. As such, high early mortality rates are possible and some measurement of subsequent survival will be necessary in order to determine the success of the treatments.

FUTURE WORK

The established sample plots will be remeasured in the autumn of 1970.