

DEER-BROWSING IN JACK PINE PLANTATIONS
IN SOUTHEASTERN MANITOBA

by

N. R. Walker, H. P. Sims and R. F. DeBoo

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INTRODUCTION

Current studies on management of jack pine (Pinus banksiana Lamb.) in southeastern Manitoba have provided an opportunity to assess damage from browsing by the white-tailed deer (Odocoileus virginianus borealis Miller). Such damage has precluded periodic growth-measurements in several studies of seeding and planting.

The first jack pine plantation in southeastern Manitoba was established in 1950 and an ambitious planting program has been carried out since then. Planting of jack pine has increased each year; from 1967 to 1970, over $6\frac{1}{2}$ million seedlings were planted. In 1956, Cayford reported loss of height increment in jack pine plantations in southeastern Manitoba resulting from browsing of terminal shoots. He also considered damage by deer to contribute markedly to the under-stocking of cut-over areas. Horton (1964), in Ontario, concluded that deer-browsing should be considered in plantation development as it can result in significant reduction of growth as well as deformities of the lower stem. Zai (1964) suggested that silvicultural techniques could reduce the incidence of browsing.

¹Technician and Research Officer, respectively, Department of Fisheries and Forestry, Canadian Forestry Service, 5320 - 122 Street, Edmonton 70, Alberta. Research Scientist, Chemical Control Research Institute, 25 Pickering Place, Ottawa 8, Ontario.

This report presents information from two current projects in southeastern Manitoba and illustrates the effects of site preparation on the incidence of browse damage and the effect of browsing on height increment. The first project is concerned with regenerating an area by planting after clear-cutting, prescribed burning, and scarification; the second study was designed to assess development of new and existing plantations. Although neither study was intended specifically to assess browsing damage, information obtained is pertinent to the problem and of interest to persons concerned with jack pine regeneration in the Province of Manitoba.

METHODS

In August, 1967, portions of a 46-acre jack pine cutover were burned and scarified with shark-finned barrel scarifiers. During the fall of 1967 and the spring of 1968, jack pine seedlings were planted by hand at 6-ft spacing in rectangular blocks on the area. During the spring of 1968 and 1969, survival was counted and browsing damage to individual seedlings was recorded (Table 1).

Additional data were obtained from 23 plots within plantations established on scarified areas in 10 different locations of southeastern Manitoba. Seedlings in group 1 of Table 2 were planted at 3-ft spacing on areas prepared with a middlebuster plow; seedlings were set out on furrow bottoms and ridges, and on unscarified areas between the furrows. Groups 2 to 6 were planted at 6-ft spacing in furrows created by a middlebuster plow or a V-blade plow.

Table 1. Browse damage to jack pine plantations located on burned and scarified cutovers in southeastern Manitoba

Method of site preparation	Acreage	No. of jack pine planted		Age of stock (years)	Percentage browsed		Basis: (no. of seedlings) May 1969	Percentage mortality from browsing to September 1969.
					May 1968 (1967 stock)	May 1969 (1967 and 68 stock)		
Burned	20	1000	2000	2-0	1	41*	2343	9
Burned & scarified	10	1000	1000	2-0	1	23	1725	1
Scarified	16	500	500	2-0	1	27	752	1

* Difference between burned, and burned and scarified in 1969 was significant at the 5% level.

Table 2. Percentage of trees browsed and effect of browsing on height growth of jack pine plantations in southeastern Manitoba.

Group	Year planted	Year of measurement	Year of browsing	Number of plots (0.1 acre)*	Total number of seedlings	Percentage browsed		Average height (ft)	
						Mean	Range	Browsed	Unbrowsed
1	1964 Spring	1965 1966	1965 1966	3	173	54	20-98	1.40	1.72**
2	1965 Spring	1967 1969	1967 1969	2	103	72	61-88	1.65	2.56**
3	1963 Spring	1967 1968 1969	1967 1968	5	336	19	0-34	3.74	4.68**
4	1965 Fall	1967 1968 1969	None	3	210	0	-	-	1.94
5	1966 Spring	1967 1968 1969	1967 1968 1969	2	283	57	57-58	1.07	0.98
6	1967 Spring	1967 1968 1969	1969	8	500	40	20-64	1.26	1.46**

* Except Group 1, planted in 4-milacre quadrats on 1-acre plots.

** Significantly different at the 1% level.

RESULTS AND DISCUSSION

Both terminal and lateral shoots were browsed on the area prepared by burning and scarification. Browsing of laterals only was rare and will have little effect on plantation development. Browsing on the burned and scarified, and scarified areas was 18 and 14% lower, respectively, than on the burned area (Table 1). Differences between the burned, and burned and scarified areas were significant at the 5% level. Mortality directly attributable to browsing on the burned area during the winter of 1968-69 was 2% by May, 1969, and 9% by September, 1969. A total of 248 seedlings were browsed so severely that no buds remained on the terminals or laterals. Seventy-six per cent of these seedlings recovered by adventitious budding, and were again classified as healthy in the fall of 1969. These seedlings usually produced 10 or more new laterals; on one such seedlings, 37 laterals and buds originating from the main stem were counted.

Differences in browse damage between burned-scarified and burned-unscarified areas could perhaps be attributed to the presence of furrows, which might induce deer to follow a straight path through a planted area. On an unscarified, cleanly burned area, the deer may follow a random path and therefore spend a longer time browsing. Also, on scarified areas, seedlings planted on furrow bottoms receive protection from snow cover for a longer period. The slash and debris between furrows on the unburned-scarified area confines deer to the furrows whereas non-planted areas between furrows are more accessible and attractive to the deer on burned-scarified areas. This may account for the slightly higher incidence of browsing on the former area.

Plantations in Table 2 are grouped by year and season of planting.

Browsing occurred on all but five plots and ranged as high as 98%. In four of the five groups in which browsing occurred, unbrowsed seedlings were significantly taller (1% level) than browsed seedlings. In group 5, most of the browsing occurred during 1969 and in group 6, all browsing occurred in 1969. Group 3 plantations were well established with an average height of 4.50 ft and no new browsing was noted during the 1969 measurement. These observations agree with those of Jordan (1967), who found that deer would not browse to a height above 5 ft.

There is a loss of height increment from deer-browsing. The young seedlings are subjected to repeated browsing, apparently until they reach a height of about 4.5 ft, and plantation failures could result. Form and quality are affected and rotation is delayed through reduced vigor. McGinnes (1969) reported that areas larger than 20 acres were little used except near forest borders. All plantations examined were on clear-cut areas which varied in size from 2 to 50 acres. Such cutover areas, regardless of site or method of preparation, generally revert to fairly heavy shrub and forb cover which attracts deer. All areas examined are surrounded by, or immediately adjacent to, well-stocked stands of jack pine affording good cover. The deer can move from the protection of the stand to these areas with relatively little exposure.

The authors recommend that an intensive study of browsing in southeastern Manitoba be undertaken by a qualified organization. Particular emphasis should be on the effects of variations in size of deer populations, size of clear-cut areas, method of site preparation for planting, and perhaps site type. It is expected that site will have more influence on deer populations in the area rather than availability of browse on clear cuts.

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