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CREATING SMALL CANOPY OPENINGS IN DETERIORATED TOLERANT  
HARDWOOD STANDS AT VALCARTIER TO ENCOURAGE REGENERATION AND  
SURVIVAL OF YELLOW BIRCH ON SMALL PREPARED SEEDBEDS  
(Project Q-86)

by

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INTRODUCTION

The last progress report on Project Q-86 was written in December 1961. It described the 1960 establishment of 280 milacre quadrats and presented the results of the fall 1961 measurement of these quadrats. The report also noted that part of the experiment involving naturally seeded quadrats (140 milacres) was repeated in 1961.

The following report presents a recapitulation of the 1961 results followed by a brief résumé of the 1962 and 1963 results.

RECAPITULATION OF THE 1951 RESULTS

The results of the first measurement are summarized briefly as follows:

- 1) A single season's leaf litter was sufficient to greatly reduce the number of yellow birch seedlings on girdled and control plots.
- 2) Artificially seeded quadrats did not have many more yellow birch seedlings than naturally seeded quadrats, except on  $\frac{1}{4}$ -acre cut plots.
- 3) On artificially seeded quadrats, cut plots were superior to girdled plots in terms of both numbers of yellow birch seedlings and their average maximum height. Plots of  $\frac{1}{10}$ -acre were superior to  $\frac{1}{4}$ -acre plots only in having more seedlings; maximum heights were similar.
- 4) On naturally seeded quadrats, cut plots were superior to girdled plots in terms of yellow birch average maximum height, and in terms of numbers of yellow birch where the current year's leaf fall was not removed.

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Tenth-acre plots were superior to  $\frac{1}{4}$ -acres only on cut plots in terms of numbers of seedlings.

- 5) Numbers of sugar maple and their average maximum height varied very little with treatment.
- 6) Yellow birch outnumbered sugar maple except on girdled and control plots where the current year's leaf fall was not removed.
- 7) On cut plots, average maximum height of yellow birch exceeded that of sugar maple; the reverse was true on girdled and control plots.

#### RESULTS FROM THE 1962 MEASUREMENT

The 140 milacre scarified quadrats that were located within the same treatment plots in 1961 were measured in late August and September 1962. These quadrats represent a replication of the natural seeding half of the original experiment. Results are summarized in Table 1 and comparable 1960 results are shown in brackets.

As in the 1960 study, cut plots were better than girdled plots when a comparison was made of yellow birch average maximum seedling heights, but cut plots were not superior in terms of numbers of seedlings. Also similar to the 1960 results, the numbers of sugar maple varied very little between plots.

Strikingly different from the 1960 results are the low numbers of yellow birch seedlings and their much greater average maximum height. Numbers of sugar maple were about the same as 1960 plots but they too show a much greater maximum height.

Tests for the significance of differences between means reveal that for cut plots, the differences between yellow birch and sugar maple maximum seedling heights are not significant whereas height differences for girdled and control plots are significant.

An analysis of variance was done.

#### RESULTS FROM THE 1963 REMEASUREMENT

Plots established in 1960, first measured in 1961, were re-measured in the fall of 1963.

Results of the 1963 analysis that indicate no change from the situation in 1961 are as follows:

- 1) Differences in numbers of seedlings and average maximum heights between artificially and naturally seeded quadrats are insignificant except for control plots, and girdled plots where 1960 leaf fall was not removed.
- 2) On artificially seeded quadrats, cut plots were superior to girdled plots in terms of both numbers of yellow birch seedlings and their average maximum heights (Table 2).
- 3) On naturally seeded quadrats, cut plots were superior to girdled plots in terms of average maximum yellow birch seedling height, and in terms of numbers of yellow birch where the 1960 leaf fall was not removed (Table 3).
- 4) Yellow birch outnumbered sugar maple except on girdled plots where the 1960 leaves were not removed (Table 4).
- 5) On cut plots, the average maximum height of yellow birch exceeded that of sugar maple. On control plots the reverse was found.

Results which are different from the 1961 analysis are as follows:

- 1) On artificially seeded quadrats in 1961, 1/10-acre plots, both cut and girdled, were superior to  $\frac{1}{4}$ -acre plots in terms of numbers of yellow birch seedlings, but not in average maximum height. In 1963, only 1/10-acre cut plots maintained this superiority over  $\frac{1}{4}$ -acre cut plots; the difference between girdled plots became insignificant (Table 2).

Also in 1963, average maximum yellow birch height was significantly greater on  $\frac{1}{4}$ -acre plots.

- 2) On naturally seeded quadrats, 1/10-acre cut plots in 1963 did not have significantly more seedlings than  $\frac{1}{4}$ -acre plots as in 1961 (Table 3).
- 3) Sugar maple average maximum height, which varied little in 1961, varied considerably with treatment in 1963.
- 4) Sugar maple outnumbered yellow birch on the control plots where 1960's leaves were removed (Table 4).
- 5) On girdled plots, average maximum heights of yellow birch were greater than the maximum heights of sugar maple (Table 4). The reverse was true in 1961.

As expected, the mortality of yellow birch was high since 1961 but the remaining numbers of seedlings per 1/4000-acre quadrat are certainly more than sufficient to provide good yellow birch stocking (Table 4). The increases in average maximum heights of yellow birch and sugar maple since 1961 suggests that given sufficient light, yellow birch on this site can establish and increase a height superiority over sugar maple, at least over the initial three-year-period following treatment. Even on girdled plots, where the overstory canopy did not appreciably thin out until mid-summer 1962, the largest yellow birch is at least as tall as the largest sugar maple.

Results to date are very encouraging and in general suggest that all treatments may be successful in providing mixed hardwood stands well-stocked with yellow birch. Although on certain quadrats there has been severe deer browsing, the total effect of this animal has not been serious. With the abundance of yellow birch achieved, many stems escape damage even on the most severely damaged quadrats.

Work Proposed for 1964

The second measurement of quadrats established in 1961 will be made in the fall of 1964. It is hoped that a short paper can be prepared for publication before the start of the 1965 field season.

Table 1. Results from 1962 Measurement of Plots Established in 1961 - All Quadrats Naturally Seeded.

Treatment	Average Number of Seedlings Per 1/4000-Acre Quadrat		Average of Maximum Height Seedlings on Milacre Quadrats (Inches)	
	Yellow Birch	Sugar Maple	Yellow Birch	Sugar Maple
1/10 acre	Cut	100	12.3	15.5
	Girdled	139	2.6	12.0
	Control	34	1.3	7.9
1/4 acre	Cut	94	16.5	15.1
	Girdled	85	3.5	9.8

Table 2. Comparison of Means and Results of T-tests, Yellow Birch, Artificially Seeded Quadrats Established in 1960, 1963 Measurement.

Treatment	Number of Yellow Birch Seedlings per 1/4000- Acre Quadrats		Critical t	Average Maximum Seedling Height on Milacre Quadrats (Inches)	
	1/10 acre	1/4 acre		1/10 acre	1/4 acre
Cut	173	108	2.08	2.35	39.7
Girdled	61	69	2.66	-	20.4
t	3.76	2.54	.67	4.67	9.60
Critical t	.01	2.64	2.71	2.64	2.64
	.05	1.99	2.02	1.99	1.99

Table 3. Comparisons of Means and Results of T-Tests, Yellow Birch, Naturally Seeded Quadrats Established in 1960, 1963 Measurement.

Treatment	Number of Yellow Birch Seedlings per 1/4000-Acre Quadrat		Critical t		Average Maximum Seedling Height on Milacre Quadrats (Inches)		
	1/10 Acre	1/4 Acre	t	.01	.05	1/10 Acre	1/4 Acre
1960 Leaf Fall Removed	Cut	125	1.89			40.0	42.2
	Girdled	52	.82	2.76	2.05	21.9	24.2
	t	2.86	.50			4.94	5.49
1960 Leaf Fall Not Removed	Cut	97	.62	2.76	2.05	27.0	38.1
	Girdled	15	-		1.18	19.1	15.2
	t	2.38	4.34			2.21	10.13
	Critical t	.01 2.89	2.71			2.89	2.71
		.05 2.10	2.02			2.02	2.02



Table 4. 1960 Plots, Comparison of Yellow Birch and Sugar Maple Numbers and Maximum Height for the 1961 and 1963 Measurements.

Treatment	Average Number of Seedlings per 1/4000-Acre Quadrat				Average Maximum Seedling Height on Milacre Quadrats - Inches				
	Yellow Birch 1961	Yellow Birch 1963	Sugar Maple 1961	Sugar Maple 1963	Yellow Birch 1961	Yellow Birch 1963	Sugar Maple 1961	Sugar Maple 1963	
Artificially Seeded Quadrats (Blocks 1-4)	1/10 acre	761	173	23	17	6.2	33.2	4.2	21.4
	Girdled	429	61	31	22	1.8	20.6	3.8	19.2
	Control	220	26	31	15	1.0	2.8	4.0	7.0
1/4 acre	Cut	450	108	24	20	6.2	39.7	4.0	21.5
	Girdled	294	69	30	21	1.5	20.4	3.4	12.7
Naturally Seeded Quadrats.	1/10 acre	561	125	35	21	5.4	40.0	4.5	21.8
	Girdled	443	52	47	35	1.6	21.9	3.6	15.0
	Control	100	0	26	11	1.1	-	4.1	4.8
1960 Leaf Fall Removed (Blocks 1-2)	1/4 acre	278	74	27	23	5.2	42.2	4.5	21.2
	Girdled	309	65	49	33	1.5	24.2	3.8	18.2
1960 Leaf Fall Not Removed (Blocks 3-4)	1/10 acre	686	97	32	27	4.6	27.0	4.0	16.5
	Girdled	40	15	58	49	1.5	19.1	5.1	15.6
	Control	44	10	53	37	.8	3.3	3.5	5.1
1/4 acre	Cut	302	74	37	32	6.0	38.1	4.6	25.0
	Girdled	37	13	48	41	1.0	15.2	4.8	13.2