FOREST RESEARCH REPORT

NOVA SCOTIA DEPARTMENT OF LANDS AND FORESTS
P. O. BOX 68, TRURO, N.S. B2N 5B8

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CONTROL OF RASPBERRY AND GRASS WITH LIQUID HEXAZINONE IN NOVA SCOTIA

INTRODUCTION

Velpar ® L (active ingredient: Hexazinone 240 grams/litre) is a herbicide currently registered in Canada for site preparation by broadcast ground application and conifer release with undiluted spot treatments (CPPA, 1986). This herbicide provides both pre- and post-emergent control of various weed species. It can be absorbed through foliage but since translocation is primarily upward through the xylem, root absorption is more effective (WSSA, 1983; Alm and Whorton, 1988). Campbell (1983) stated that hexazinone can effectively control raspberry, grass and other herbaceous weeds for up to four growing seasons.

In the spring of 1984, two trials were established to determine the efficacy of three different rates of Velpar ® L in controlling raspberry and grass under Nova Scotia conditions. One trial was located at Delaney Settlement, Colchester County (45°28'N, 63°18'W), on a site dominated by raspberry; the other at Mt. Thom, Pictou County (45°30'N, 62°58'W), on a site dominated by grass.

SITE HISTORY AND METHODS

The Delaney Settlement site supported a mixedwood stand prior to clearcutting during the winter of 1981. In 1982 this well drained sandy loam site was prepared with a Craig Roller and Velpar ® L was applied in the spring of 1984.

The Mt. Thom site, a medium textured, well drained old hay field, had no site preparation prior to the Velpar ® L treatments in the spring of 1984.

Both experimental sites were divided into 12, 0.04 ha (0.1 ac) blocks. These blocks were chosen based on their uniformity of site and target vegetation. At Delaney Settlement, before treatment, the target vegetation (raspberry) covered between 80 and 100% of the ground surface in each block. Lesser amounts of grass, red maple, bunchberry, goldenrod and pearly everlasting were also present. At Mt. Thom, the target vegetation (grasses) formed a continuous cover in all the blocks: minor amounts of goldenrod, aster and chickweed were also noted. Three replicates of four treatments (Control, 9.38, 13.54 and 17.71 l/ha) were

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assigned randomly to the 12 blocks at each site. The selected treatment rates were chosen to fall within the recommended rates of 9-18 l/ha as indicated on the product label for areas of woodland management. One additional block was manually weeded at Delaney Settlement. The three different rates of Velpar ® L were applied using a carbon dioxide pressurized backpack sprayer with eight 80015 Tee-Jet flat fan nozzles on a 3.2 m boom. The total solution applied was 292 l/ha.

All blocks were assessed during the summers of 1985 and 1987 and additionally in 1986 at the Delaney Settlement site. Four assessment plots, each three metres away from the block centre were established in the north, south, east and west directions within each tenth-acre block. Concentric plots having radii of 1.78 m and 0.58 m, respectively, were used to assess woody and non-woody vegetation.

In each plot, the height and percent cover of the various species of vegetation were measured. These measures were then combined to form a competition index:

$$CI = H \times C$$

where
CI = Competition Index
H = Average height (metres) of a given species
C = % of ground covered by the same species

The CI, percent cover and height were then averaged over all plots treated with a given rate of Velpar ® L. The average CI was used to represent the effect of treatment on the larger vegetation (i.e. raspberry, shrubs and tree species) while average percent cover was used to assess the shorter vegetation (i.e. grass, bunchberry, chickweed, etc.).

RESULTS AND DISCUSSION

DELANEY SETTLEMENT

Raspberry

All blocks sprayed with Velpar ® L had a much lower CI, compared to the control and manually treated blocks (Figure 1). In fact, in the first year following treatment with Velpar ® L, raspberry averaged less than 1% cover and 11 cm in height for all treatment blocks compared to 77% cover and 78 cm in the control (Appendix I). Three years after treatment (1987) good control of the raspberry was still being maintained. The percentage cover averaged from 6% to 10% in the treated blocks as compared to 65% for the control. Alternately, the manually weeded block had a higher raspberry competition index for the first two years following treatment compared to the control (Figure 1).

Because of the excellent control, even at the lowest rate, experiments were subsequently established to determine the minimum rate of Velpar ® L required to adequately control raspberry. These trials will be reported on at a later date.

Non-Target Species

Remeasurement of plots one year after treatment indicated that the higher the rate of Velpar ® L applied, the greater the reduction in the cover of non-target

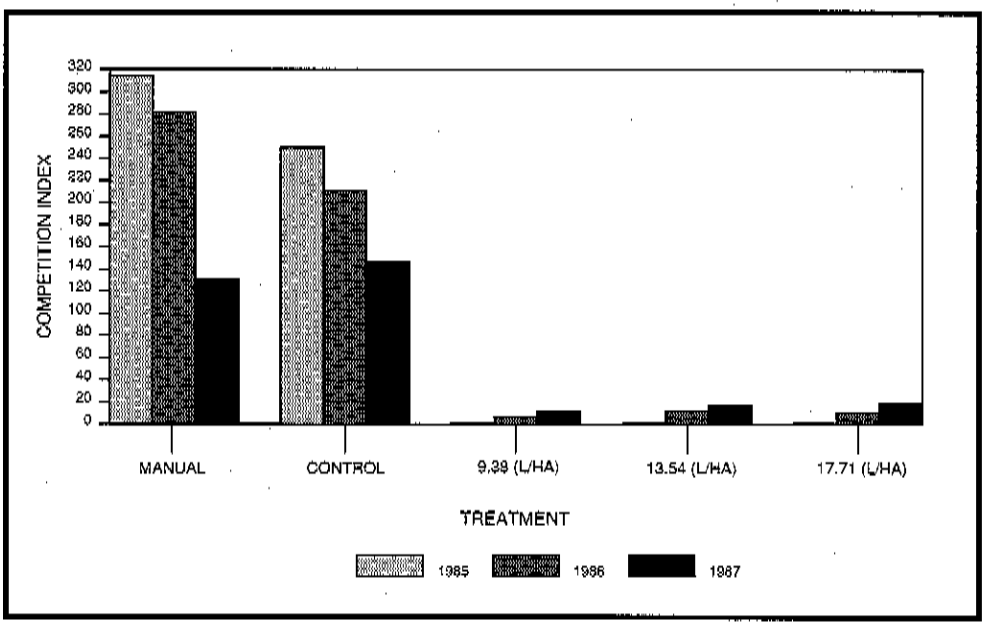

Figure 1. Competition index for raspberry by treatment rate and year of measurement. (Delaney Settlement)

species (i.e., bunchberry, grass, hemp nettle and moss Figure 2 and Appendix I). In the second year the percent cover of these species increased, and by the end of the third year it exceeded the control values in all but the highest-rate treatment plots. This increase is attributed to the reduced raspberry competition.

MT. THOM

Grass

All three treatment rates provided excellent grass control for the first year (Figure 3). The greatest reduction occurred in the block treated with the highest rate of Velpar ® L (17.71 l/ha). In this block the

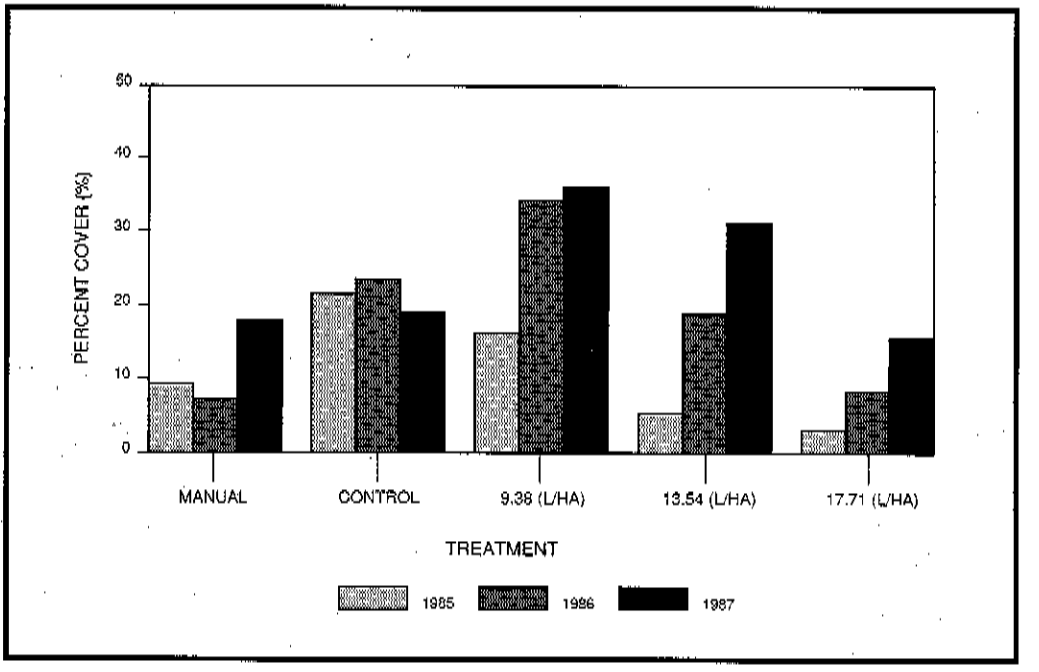

Figure 2. Percent cover of non-target species by year of remeasurement and treatment rate. (Delaney Settlement)

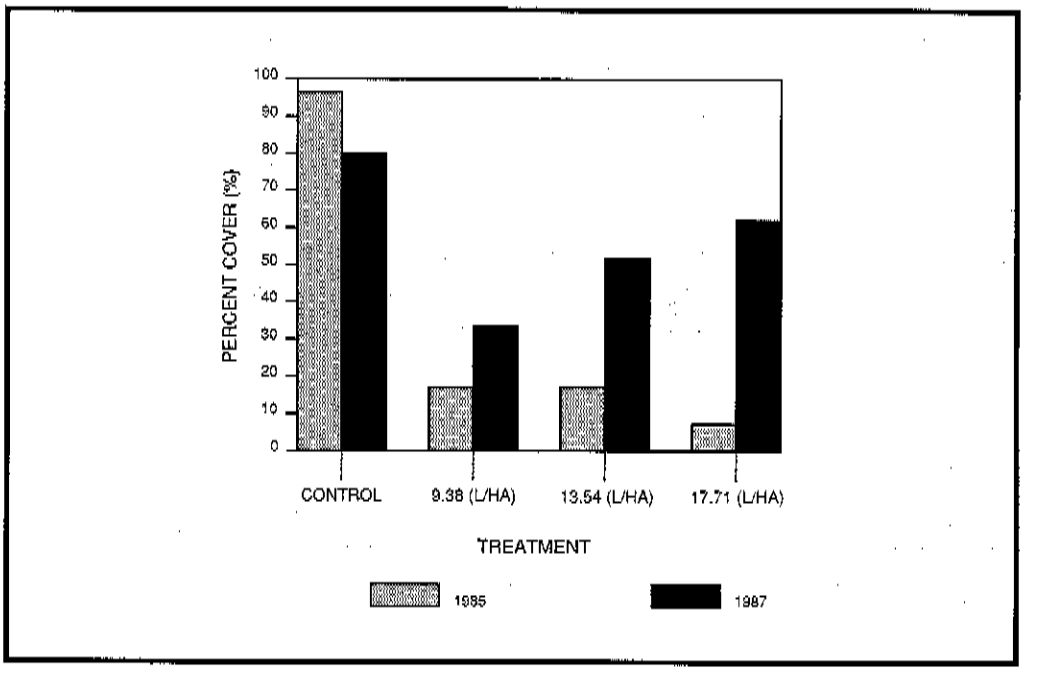

Figure 3. Percent cover of grass by year of remeasurement and treatment rate. (Mt. Thom)

percentage cover averaged 7% compared to 97% in the control block. Three years after treatment (1987) the percent cover of grass in the block receiving 17.71 l/ha had increased to 62%, (Figure 3 and Appendix II). Even so, observations indicated that the root density was low in the treated blocks in comparison to that of the controls. The reduced root density should result in faster tree growth due to decreased competition for moisture and nutrients.

Non-Target Species

In the fall of 1984 all of the treated blocks were virtually bare of vegetation. During the spring and summer of the following year, however, the treated blocks were rapidly invaded by hemp nettle and to a lesser extent goldenrod. By the fall of 1985, 80 to 90% of the treated blocks were covered primarily by these two species. The invasion of the treated blocks was not uniform: the higher rates favoured hemp nettle, the lower rates goldenrod. In fact, no goldenrod was found in the plots treated with the highest rate of Velpar ® L, i.e. 17.71 l/ha. Three years after treatment (1987) the percentage of non-target species had decreased due to the (re)establishment of grass species (Figure 4).

SUMMARY

The major findings of this research trial to determine the efficacy of spring applied Velpar ® L at three different rates on two sites are as follows:

1) Raspberry can be controlled with treatment rates of 9.38 l/ha and greater for at least four growing seasons after treatment.
2) Grass can be controlled for at least two to four growing seasons after spring application with treatment rates of 9.38 l/ha and greater. One important observation is that even after four years the density of grass roots in the treated blocks was considerably less than in the controls.
3) Because of the effective control provided by the lowest treatment rate applied, additional experiments have been established to determine the minimum rates of Velpar ® L required to control various target species.

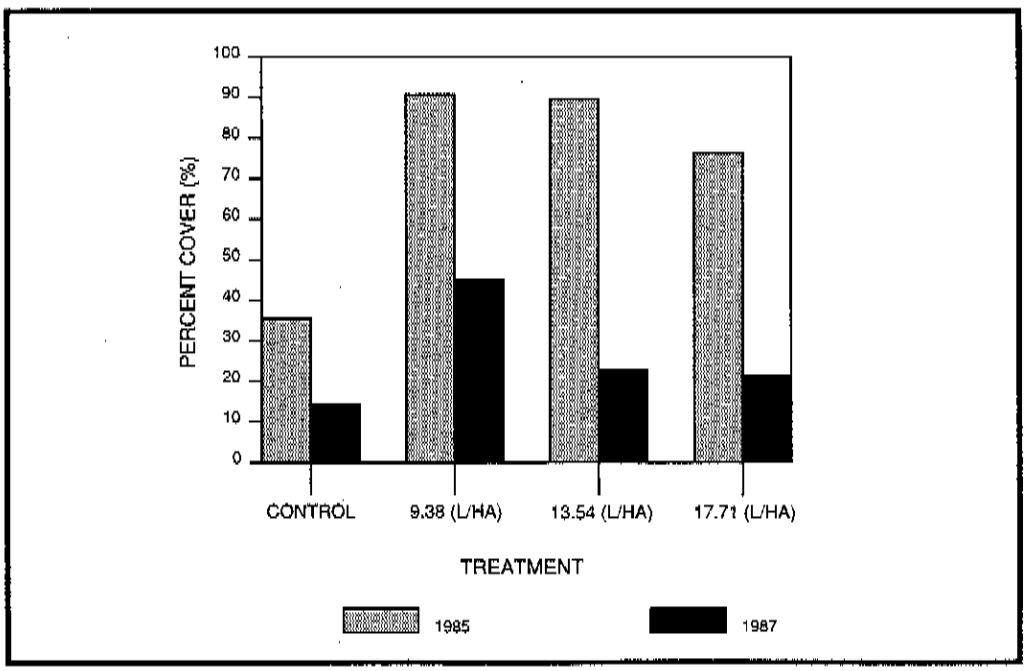

Figure 4. Percent cover of non-target species by year of remeasurement and treatment rate. (Mt. Thom)

4) The major species to (re) establish on the raspberry site were bunchberry, hemp nettle and scattered grass. Because of their short height and low root density on this site, these species are weak competitors.
5) On the grass site, the predominant species to (re)establish was hemp nettle with lesser quantities of goldenrod and sorrel.
6) Due to the prolific sprouting capability of raspberry, manual weeding increased rather than decreased the quantity of raspberry on the site. For two years after treatment the CI for the manually weeded plot was higher than for the control.

LITERATURE CITED

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APPENDIX 1

Average percent cover and average height on the Delaney Settlement raspberry site by species and year of assessment.

SPECIES	YEAR	TREATMENT									
		MANUAL		CONTROL		9.38 (l/ha)		13.54 (l/ha)		17.71 (l/ha)	
		PC%	HT	PC%	HT	PC%	HT	PC%	HT	PC%	HT
Raspberry	1985	93.8	0.83	77.5	0.78	0.5	0.10	0.5	0.11	0.8	0.11
	1986	100.0	0.70	80.4	0.63	2.0	0.26	6.8	0.27	14.3	0.27
	1987	57.5	0.58	64.6	0.55	6.3	0.30	10.2	0.31	10.4	0.37
Trees and Shrubs	1985	2.8	0.58	10.8	0.65	3.2	0.38	4.7	0.35	4.2	0.41
	1986	0.8	0.76	13.9	0.92	2.8	0.46	6.8	0.44	8.1	0.41
	1987	1.3	0.82	13.8	0.89	2.0	0.52	8.1	0.51	8.3	0.67
Other Ground Vegetation	1985	8.8	0.35	21.6	0.27	16.3	0.18	5.2	0.15	2.8	0.14
	1986	7.5	0.50	23.4	0.30	34.2	0.22	18.5	0.20	8.3	0.19
	1987	17.8	0.40	19.0	0.30	35.7	0.25	30.9	0.24	15.3	0.36

PC% - Average percent cover.
HT - Average height in metres.

APPENDIX II

Average percent cover and average height on the Mt. Thom grass site by species and year of assessment.

SPECIES	YEAR	TREATMENT							
		CONTROL		9.38 (l/ha)		13.54 (l/ha)		17.71 (l/ha)	
		PC%	HT	PC%	HT	PC%	HT	PC%	HT
Grass	1985	97.5	0.33	15.9	0.34	16.5	0.36	6.7	0.16
	1987	80.0	0.32	32.9	0.34	51.3	0.38	61.7	0.36
Other Ground Vegetation	1985	55.2	0.31	89.5	0.34	91.2	0.28	76.1	0.23
	1987	13.8	0.27	46.4	0.25	22.7	0.24	21.5	0.21

PC% - Average percent cover.
HT - Average height in metres.

FOREST RESEARCH SECTION
FORESTRY BRANCH
N.S. DEPT. OF LANDS AND FORESTS

FOREST RESEARCH SECTION PERSONNEL

Technicians: Dave Arseneau, Steve Brown, George Keddy, Randy McCarthy, Keith Moore, Bob Murray, Peter Romkey, Ken Wilton
Chief Technician: Cameron Sullivan
Data Processing: Sylvia Chase, Jeanette Kaulback
Foresters: Blair Andres, Brian Chase, Tim McGrath, Peter Neily, Tim O'Brien
Supervisor: Russell McNally
Director: Ed Bailey
Secretary: Angela Walker