

## Working Plan

SX 80500 Q

### Chemical site preparation of grassy sites using Glyphosate

#### Objectives

- a) To site prepare grassy clearcuts using Glyphosate (Roundup) herbicide.
- b) To compare several spray concentrations and methods for ground application of herbicides.
- c) To obtain estimates of operational costs of ground applied chemical site preparation.

#### Introduction

Grass competition for light, nutrients and moisture often results in poor performance of conifer seedlings used for reforestation projects in British Columbia. Controlling the grasses which are often natural (Calamagrostis canadensis, C. rubescens and C. purpuracens) or artificially seeded for range purposes (Phleum pratense and Dactylis glomerata) can be accomplished by heavy grazing, mechanical site preparation or chemical site preparation.

Chemical site preparation offers a number of distinct advantages (Stewart, 1976) which suggest that the use of chemicals should be investigated.

#### Advantages cited include:-

- often the least expensive method of site preparation
- large areas can be treated quickly with minimum manpower and supervision
- produces least disturbance and does not compact, loosen or move top soil, or expose surface soil to erosion
- can be used on all terrain

Conventional application methods for herbicide application include the use of fixed wing aircraft or helicopters. An alternative to this often environmentally unsatisfactory approach is to use ground operated application techniques, such as the ultra low volume sprayers now available which localize the application of herbicide.

One of the newer herbicides Glyphosate, a fairly short lived, non-selective herbicide which is translocatable within the target species and is quite effective on grasses and other deep rooted species appears to be a suitable herbicide for controlling grasses as a means of chemical site preparation (Ayling & Graham 1978; Noste and Phipps 1978)

#### Methods

##### Experiment I

In this trial two different spray applicators (back pack model and ultra low volume sprayer) will be used to apply glyphosate at two concentrations (1300 g/ha and 2000 g/ha) in a row type coverage.

An untreated control will be included as well.

At each planting site (Merrit and Ft. Nelson) the experiment will be replicated six (6) times. Within each treatment, plots in the form of rows of 30 trees will be established.

For the Ft. Nelson site, 2+0 or 2+1 white spruce seedling will be planted in 1980 (30X30 = 900 seedlings); at Merrit, 2+1 interior Douglas fir will be planted in 1981.

See figures 3a, and 3b for location maps of trial areas at Ft. Nelson and Merrit.

The coding of the treatments is as follows:-

- 00 Control (No spray)
- 11 Knapsack Sprayer + 1300 g/ha
- 21 Knapsack sprayer + 2000 g/ha
- 12 ULV Sprayer + 1300 g/ha
- 22 ULV Sprayer + 2000 g/ha

Refer to figure 1 for treatment layout.

After the treatments have been applied the areas will be planted with the appropriate seedlings. The seedlings are to be planted at 2 m spacing within the treatment rows in unprepared planting spots.

900 2+1 or 2+0 white spruce seedlings are to be planted at Ft. Nelson in 1980 and 900 2+1 interior Douglas fir seedling are to be planted near Merrit in 1981.

Metal collars could be used to allow easier locating of the seedlings with a metal detector.

#### Assessment

#### Survival

After the first growing season (Sept.-Oct.), the survival of seedlings in each block will be assessed by counting seedlings which have green foliage as alive.

Data will be recorded on FS 793 -2M forms, information will be collected on:- Condition, Alive-Injury, Dead-Cause, Shade and Status.

#### Growth

The length of the current terminal shoot or the most dominant lateral in cases where the terminal is missing should be measured to the nearest 5 mm.

Each living seedling from the 30 tree plots should be measured.

Data will be collected until differences are no longer significant between treatments (5 yrs.)

#### Grass Cover

Circular (1 m dia.) plots will be used to assess the amount of grass competition around 10 seedlings from each treatment row.

#### Analysis

Data (survival and growth) will be analysed by analysis of variance.

Treatments	<u>df</u>
reps.	4
T X R	5
Total	20
	29

Specific differences between treatments can be analysed by multiple range or t-test between treatment means as appropriate.

#### Experiment II

This experiment is an operational trial of the ultra low volume sprayer. Two patterns of herbicide application, in rows (50% coverage) and total spray (100% coverage) are also to be considered.

The main function of this experiment is to gather data to estimate the operational costs of herbicide application. Thus the experiment will not be replicated as experiment I will provide information on seedling survival and growth effects which can be used to estimate the cost effectiveness of the herbicide treatments. The treatments are as follows for experiment II:-

Unit B - 100% coverage

Unit C - 50% coverage

In all cases the herbicide is Glyphosate and is applied at 1500 kg/ha.

The treatment blocks are to be 57 X 140 m and selected to be on relatively homogenous sites. (See figure 2).

Planting

The spacing of planted seedlings is to be 2.5X3 m in all the treatment blocks in order that between tree competition does not confound the effects of herbicide application.

Seedlings for the Ft. Nelson (1980) planting are to be 2+1 or 2+0 white spruce and for the Merrit planting (1981) are to be 2+1 interior Douglas fir.

Seedlings should be planted in unprepared planting spots with shovel or mattocks.

AssessmentCosting

Data should be collected during the herbicide treatments to determine:-

- a) No. of man hrs /ha for each treatment
- b) Equipment and chemical costs /ha for each treatment
- c) Suitability of equipment - i.e. down time, refilling time, ease of operation etc.

Survival/Growth

In order to obtain an estimate of the treatment effectiveness, survival plots should be established on each treatment blocks. Survival and growth of 50-100 seedlings should be recorded after the first growing season.

ResponsibilitiesSimpson (Research Branch)

- assist in field layout of experiment
- oversee treatment application and planting
- coordinate assessment (survival & growth)
- prepare final report

Gilmour/Ackerman (Silviculture Branch)

- obtain necessary permits
- layout of plots and obtain seedlings
- treatment application and planting of trees
- assist in assessment of survival and growth and collect cost data
- prepare final report

References

Ayling, R.D. and B. Graham 1978

A survey of herbicide use in Canadian Forestry For. Chron. 54: 302-308.

Noste, N.V. and H.M. Phipps 1978

Herbicide and container system effects on survival and early growth of conifers in Northern Wisconsin. For. Chron. 54: 209-212.

Stewart, R.E. 1976

Chemical site preparation in the inland Empire in "Tree planting in the inland Northwest" procd. of conference at Wash. St. Univ., Feb. 17-19, 1976.