SX 84711 Q

Field Test of Two Silviculture Injection Systems - Prince George
(Punch and Fill and the Lance)

WORKING PLAN

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August, 1984
Field Test of Two Silviculture Injection Systems - Prince George

Objectives

1. To test two silviculture injection systems (Punch and Fill and the Lance), under near operational conditions to determine productivity and capabilities.

2. To provide a demonstration area comparing these herbicide treatments with a manual treatment (power saws) located nearby.

Introduction

Chemical injection for deciduous tree control traditionally involves the use of an axe to flail the stems, and an oil can to place the herbicide in the cut. Because of the difficulties involved with safety and precise application rates, two new systems have been developed. The "Punch and Fill" technique delivers a precise amount of chemical, limits operator exposure to the chemical, requires less effort and fewer fill-up times. The Lance Injector also delivers a constant amount of chemical and reduces hazard both to the operator and the environment. These systems need to be tested operationally, to determine equipment suitability and productivity.

Methods

Within the permit area, two trial blocks will be established. Each block will be approximately 1 ha. One block will be treated with the "Punch and Fill" using 100% Roundup, and the other block will be treated with the Lance Injector, using 100% Roundup. All aspen stems will be treated.

The number of injections (chemical applied) per stem varies with the stem diameter. The recommended rate of application for Roundup is 1 ml / 5 cm D.B.H. This appears to offer good control of stems up to 20 cm D.B.H. Studies carried out by Silviculture Branch (SX 83401 Q - Alder Control Trial, Duncan and SX 83404 G - Aspen Control Trial, Mackenzie), indicate that the prescribed rate does not adequately control stems with a D.B.H. greater than 20 cm. Data received from these trials indicate that larger stems require a proportionally greater amount of chemical.

For this project, stems under 20 cm D.B.H. will receive 1 ml / 5 cm D.B.H., and above 20 cm D.B.H., a rate of 1 ml / 2.5 cm D.B.H. will be applied.
On small stem injection trials, the stem can be measured and then treated with the appropriate number of injections. On an operational project, this procedure would prove very time consuming. Therefore, it was decided that the criteria for determining the number of injections would be based on circumference rather than diameter. To achieve the desired rate on this project, stems under 20 cm D.B.H. will receive 1 injection / 12.8 cm (5") circumference, and stems greater than 20 cm D.B.H. will receive 1 injection / 10.5 cm (4") circumference.

Assessment

The following data will be collected for each block:

- main crop - stems/ha, average D.B.H. and range, height
- understory - stems/ha, average D.B.H. and range

During treatment, the area treated, amount of chemical used, and length of treatment will be recorded.

Trees will be assessed for mortality in August, 1985.
Field Test of Two Silviculture Injection Systems
Pr. George - Chuckinka F.R.

On August 11 & 12, 1984, two stem injection systems, developed by Silviculture Branch, were tested on Aspen under near operational conditions to determine productivity and capabilities. In the two days of treatment, a total of 12.63 hrs. of on-site time were required to treat 1.2 ha, with both the Lance and Punch & Fill injection systems using 100% Roundup product. A breakdown of production with both methods is shown in Table 1.

Table 1. Production estimates for two injection methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Area Treated (ha)</th>
<th>Stems /ha.</th>
<th>Total hrs.</th>
<th>Hrs. /ha</th>
<th>Hrs./1000 stems</th>
<th>Stems/hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punch &amp; Fill</td>
<td>0.72</td>
<td>1550</td>
<td>6.63</td>
<td>9.2</td>
<td>5.9</td>
<td>169</td>
</tr>
<tr>
<td>Lance</td>
<td>0.48</td>
<td>2200</td>
<td>6.0</td>
<td>12.4</td>
<td>5.7</td>
<td>175</td>
</tr>
</tbody>
</table>

With the exception of stand density, both treatment blocks appear homogenous. Stand information is shown in Table 2.

Table 2. Stand Data

Density

Plot 1 - Punch & Fill
Main Crop - 1100 s.p.h.
Understory - 550 s.p.h.
Total - 1550 s.p.h.

Plot 2 - Lance
Main Crop - 1400
Understory - 800
Total - 2200 s.p.h.

Avg. stems/ha - 1875

Diameter

Main crop avg. d.b.h. - 21.2 cm
range - 12 cm - 28 cm

Understory avg. d.b.h. - 10.3
range - 1 cm - 18 cm
Average Main Crop height - 22 m
Average Crown Closure of main crop - 60%
Conifer regeneration - approx. 1000 Se stems/ha.

Injection Rates

The number of injections (chemical applied) per stem varies with the stem diameter. The recommended rate of application for Roundup is 1 ml/5 cm DBH which appears to offer good control of stems up to 20 cm DBH. Studies carried out by Silviculture Branch (SX 83401 Q - Alder Control Trial, Duncan and SX 83404 C - Aspen Control Trial, Mackenzie), indicate that the prescribed rate does not adequately control stems with a DBH greater than 20 cm. Data received from these trials indicate that these larger stems require a proportionally greater amount of chemical than smaller stems.

For this project, stems under 20 cm DBH received 1 ml/5 cm DBH, and above that diameter, a rate of 1 ml/2.5 cm was applied.

On small stem injection trials, the stem can be measured and then treated with the appropriate number of injections. On an operational project, this procedure would prove very time consuming. For this project it was decided that the criteria for determining the number of injections would be based on circumference rather than diameter. To achieve the desired rate on this project, stems under 20 cm DBH received 1 injection every 12.8 cm (5") around the circumference and stems greater than 20 cm DBH received 1 injection every 10.5 cm (4") around the circumference.

Discussion

On an operational project, with site conditions such as those which exist on this area, higher production should be achieved by using the 'Punch & Fill' system in comparison with the Lance injector. The major advantages of the 'Punch & Fill' system are:

1. it is easier for the worker to get closer to the stem in dense clumps,
2. while injecting the previously extracted core the worker can also be creating the next core, and
3. the worker has the option of treating stems by creating cores or conventional frills depending on the size of the stems.
The lance injector appeared to be heavy, awkward to manoeuvre (in this particular stand) and incapable of storing an adequate supply of herbicide. Currently the capacity of the lance is 750 ml, which would allow the worker 1.5 to 2 hrs. of treatment time. Greater capacity would reduce downtime due to refilling but increase the weight. In addition, problems can occur if the lance nozzle becomes plugged by any small particles that get trapped when filling the reservoir with herbicide.

Assessment

During August 1985 plots will be established within the treated areas, and adjacent untreated area, to determine the degree of control achieved. Stems remaining alive will be inspected to determine if an adequate number of injections were applied.
Vegetation - Chuckinka Forest Road

Woody Species

Alnus tenuifolia nutt.
Cornus sericea L. subsp. sericea
Lonicera involucrata (Richards) Banks
ex Spring.
Ribes lacustre (Pers.) Poir in Lam.
Rubus parviflorus (Nutt.)
Rubus pedatus
Salix spp.
Spirea douglasii Hook. var. menziesii
Calder & Taylor
Vaccinium membranaceum Doug. ex Hook
Viburnum edule (Michx.) Rat.

slide alder
red ozier dogwood
blacktwin berry
prickly gooseberry
thimbleberry
strawberry bramble
willow
pink spirea
black huckleberry
highbush - cranberry

Herbaceous Species

Actaea rubra (Ait.) Willd.
Cornus canadensis L.
Epilobium angustifolium L.
Gymnocarpium dryopteris (L.) Newm.
Petasites palmatus (Ait.) Gray
Smilacina racemosa (L.) Dest.
Thalictrum occidentale Gray

baneberry
bunchberry
fireweed
oak fern
colt's foot
false Solomon's Seal
western meadow-rue