Working Plan

Sx 86124Q

Co-operative Lodgepole Pine Chemical Root Prune Trial
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Introduction

Results of studies by Dr. Nigel Burdett and others indicate that chemical root pruning of Pinus contorta (Dougl.) may improve mechanical stability by promoting the development of lateral roots. Studies by Burdett et. al (1983) showed that Lodgepole Pine lateral roots grew straight out from the tap root close to the surface when previously pruned en situ in styroblocks. Burdett's report also suggested increased height of chemically pruned stock over unpruned stock. In certain areas of the Province of British Columbia there appears to be a problem with Lodgepole Pine toppling. It has been suggested that this was due to poor root growth and morphology of plug stock. Copper pruning of Lodgepole Pine plug stock may rectify the problem. It is proposed therefore that operational trials to test the effect of root culturing be conducted with Lodgepole Pine on a wide range of sites throughout the Province.

Objective

1) The purpose of this trial is to compare PSB 211 Lodgepole Pine plugs grown in chemically treated and untreated containers. This will be accomplished by comparing survival, height growth, root collar diameter and root development of the two treatments. An analysis of variance will be carried out on the variables of interest to determine any significant differences between the different treatments. Lean/toppling data will also be recorded in (degrees) after five years.

The H₀: or null hypothesis of this trial is that there is no significant difference ($p \leq 0.05$) between the growth and performance of copper pruned stock and regular stock. The H₁: hypothesis is that there is a significant difference.
Biological Constraints

Operational trials will be considered when the criteria listed below can be met:

1) Lodgepole Pine Stock PSB 211 stock has an RGC greater than 3.0.

2) Each site selected for the trial will be as homogenous as possible so as to minimize the amount of variation in slope, aspect, moisture, nutrients and site preparation for the trial area. Sites selected in each Region will have the same type of site preparation (all sites selected to have been broadcast burned within the last 2 years).

3) Sites are to be selected where Lodgepole Pine toppling is anticipated or likely to occur.
   a) High elevation sites (within the allowable range) will be selected.
   b) Areas with fine textured soils.
   c) Areas which have a large amount of duff.
   d) Areas which will be planted before June 30, 1987.

Participants

Prince George - Mike Bruhm
Prince Rupert - Gerry Pinkerton
Cariboo - Warren Mitchell
Nelson - Bruce Fraser
Kamloops - Mark Falizsweski
Silviculture Branch - Ralph Winter, Curt Clarke

Responsibilities

Silviculture Branch - Working Plan
- coordinating field programs with Regions
- compiling Regional data and reports.
Regions
- selection of candidate sites
- conducting field operations
- conducting subsequent survival and growth assessments
- submit raw data of assessments to the Silviculture Branch, providing site description observations, 739 Site Prescription, Planting report, photographs

Trial Design and Sampling

1) Layout:

a) A minimum of two 15-30 hectare plantations will be used in each region. Regions should attempt to find sites which are 200-300 (m) above the collection elevations shown in (b).

At each plantation or location a 5000 tree block of control, a 5000 tree block of T1 and a 5000 tree block of T2 will be established side by side.

To reduce bias, the site selected will be as homogenous as possible and the layout of the blocks will be in a randomized "1, 2, 3" layout (as shown on the attached sketch).

b) Four 50 tree staked lines will be set out in each block (or treatment) at each location. All trees within the lines are to be flagged for assessment. The starting point of each line will be selected randomly and the line will be oriented toward a randomly selected cardinal point. To avoid a fringe effect, the 50 tree staked lines will not be located within the outer two rows of each block.

Ten trees from each of the four 50 tree staked lines will be measured for height and caliper in each block. The 10 trees designated for measurement will start at the 20th tree in each line.
c. The Nurseries will ship 10 trees from each treatment and stock type to the Silviculture Branch, prior to the planting season, for dry weight measurements of roots and shoots.

The nurseries involved will also provide RGC values for the stock being shipped for planting and provide them to the Regions. Survival, height and caliper will be assessed after 2, 5 and 10 growing seasons. The amount of toppling or lean occurring on the stock will be measured (in degree increments from vertical position) at years 5 and 10. At years 2, 5 and 10, 10 trees will be excavated randomly from throughout various portions of the treatment block. In total (3 treatments x 10 trees per treatment) 30 trees will be excavated at years 2, 5 and 10 at each location. The height, caliper and tap root length will be measured for each excavated tree. An estimate will be made of the percentage of lateral roots growing at:
1) the top third of the plug.
2) the middle third of the plug.
3) the bottom third of the plug.

The excavated trees will be washed, packaged and sent to the North Road Lab in Victoria where the dry weights of shoot and roots will be measured. Photographs will be taken of excavated trees to show a representative amount of root growth for each treatment type. Photographs will be taken at years 2, 5 and 10.

To maintain control of the treatments in the field, i.e. to ensure each treatment is clearly identified on the ground and on maps and the assessment lines are properly laid out, the Regions will designate one individual in charge of trial establishment. The Regions will notify the Silviculture Branch of the appointment by March 31, 1987.

**Treatments**

The Control will be PSB 211 Lodgepole Pine with no copper pruning.
T1 - Treatment number one will consist of PSB 211 Pl which have been grown in styroblocks having their full cavity depth painted with a copper latex paint.

T2 - Treatment number two will consist of PSB 211 Pl which have been growing in styroblocks having only the top half of the cavities painted with copper latex paint.

Regional Seedling Requirements

<table>
<thead>
<tr>
<th>Region</th>
<th>Nursery</th>
<th>Seedlot</th>
<th>T0 (thousands)</th>
<th>T1</th>
<th>T2</th>
<th>Seed Zone</th>
<th>Elev (m)</th>
<th>Request Key</th>
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<tbody>
<tr>
<td>P. George</td>
<td>SRY</td>
<td>8557</td>
<td>10</td>
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<td>Bulkley</td>
<td>950</td>
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<td>KOK</td>
<td>3786</td>
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<td>10</td>
<td>10</td>
<td>QL</td>
<td>1350</td>
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<td>8140</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>Tod</td>
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<td>Nelson*</td>
<td>HRP</td>
<td>2485</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>Bsh</td>
<td>1128</td>
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</table>

5000 trees/block x 2 locations = 10,000 1+0 PSB 211 T0
5000 trees/block x 2 locations = 10,000 1+0 PSB 211 T1
5000 trees/block x 2 locations = 10,000 1+0 PSB 211 T2

* Kamloops Region will establish only one location.

Schedule of Assessments and Reports

<table>
<thead>
<tr>
<th>Measurements to be made</th>
<th>Establishment Spring 1987</th>
<th>Fall 1987</th>
<th>Fall 1988</th>
<th>Fall 1991</th>
<th>Fall 1996</th>
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<tr>
<td>Height (cm)</td>
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<td>Caliper (mm)</td>
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<td>Survival (%)</td>
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<td>Toppling/Lean</td>
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<td>Photographs</td>
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<td>Final Report</td>
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Establishment Report

Fall 1987 - this report should include original and first season stock measurements and summary, maps (1:15840 or 1:20,000) showing location of test sites, maps (1:5000 or 1:10,000) showing location of staked lines within treatment blocks, a completed FS 739 and a Planting Report. The Regions will ensure that trial locations will be documented on mylars and History Records, and a Clearance Request is submitted. A copy of a coding sheet is enclosed for recording heights and root collar diameters from establishment through to final assessment. The Silviculture Branch will be responsible for summarizing the Regional data and submissions by December 1, 1987.

Interim Report

Winter of 1988-89 and 1991/92 - an interim report will be prepared after Regional data and photographic submissions are received by the Branch.

Final Report

Winter 1996/97 - Silviculture Branch will be responsible for writing the Final Report from data and summaries submitted by the Regional participants.
Examples of the types of maps, forms and photographs that are to be submitted by each region for each location.

Regions are to ensure that the attached data coding sheet and data entry format are used as shown.
RECOMMENDED BLOCK LAYOUT

REGION

TREATMENT:  
T0) no copper pruning.
T1) full cavity copper pruning.
T2) half cavity copper pruning.

LOCATION A

10 m BUFFER

10 M  10 M  10 M  10 M

T0  T1  T2

LOCATION B

T1  T0  T2
<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TREATMENT</th>
<th>HTPL RCDPL</th>
<th>HT 1 RCD 1</th>
<th>HT 2 RCD 2</th>
<th>HT 3 RCD 3</th>
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<tr>
<td>1</td>
<td>1</td>
<td>2.5</td>
<td>3.1</td>
<td>20.2</td>
<td>3.5</td>
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All data is to be justified.