

WORKING PLANSX 86103 Q Root Culturing Effects on the Field Performance of Lodgepole PineIntroduction

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.

Objectives

- 1) To confirm experimental trial results under operational conditions.
- 2) To assess the effect of enhanced growth on roots and height due to copper-pruning.
- 3) To assess plantation establishment success with copper pruning.
- 4) To assess differences in Lodgepole pine toppling due to root culturing.

Biological Constraints

Operational trials will only be considered where the following conditions can be met.

- 1) Lodgepole Pine Stock PSB 211 stock has an RGC greater than 3.0 (preferred 4-5).
- 2) Each location or site selected for the trial will be as homogenous as possible. Sites will be selected so as to minimize the amount of variation in slope, aspect, moisture, nutrient and site preparation for the operational trial area. Sites selected in each Region will have had the same type of site preparation. (e.g. all test sites to have been broadcast burned within the last 2 years).
- 3) Sites are to be selected where Lodgepole Pine toppling is anticipated to be a problem 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.

- 4) The trial will only be carried out in the proper seedzone, biogeoclimatic zone and subzone and elevational range for the stock type.

Participants

Prince George - M. Bruhm, J. Revel
Prince Rupert - J. Pollack, G. Pinkerton
Cariboo - Al Randall
Nelson - C. Thompson, B. Fraser
Research Branch - N. Burdett, L. Ebell
Silviculture Branch - R Winter, C. Clarke

Responsibilities

- Research Branch
- liaison with Silviculture Branch
 - technical aspects of field problems
 - assist with data analysis and reporting.
- Silviculture Branch
- Working Plan
 - coordinating field program with regions.
 - compiling regional reports.
- Regions
- selection of candidate sites
 - conducting field operations
 - conducting subsequent survival and growth assessments
 - preparing interim and final reports providing site description observations, data analyses, etc.

Trial Design

1) Treatments:

PSB 211 Lodgepole pine stock will be used.

- T0 - The Control will be PSB 211 Lodgepole Pine with no copper pruning.
- T1 - Treatment number one will consist of PSB 211 P1 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 P1 which have been growing in styroblocks having only the top half of the cavities painted with copper latex paint.

2) 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) Regional Seedling Requirements.

REGION	NURSERY	SEEDLOT	T0 (thousands of trees)	T1	T2	SEED ZONE	ELEVATION (m) (Collection)	REQUEST KEY
P. George	SRY	8610	10	10		3100	1000	85G2007
Nelson	VRN	5260	10	10	10	2010	1600	85N6105
Cariboo	VRN	3618	10	10	10	5030	1429	85C5001
P. Rupert	KOK	4256*	10	10	10	5060	1000	85R2219
TOTALS			40k	40k	30k			

Regional Requirements

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
 TOTAL = 30,000 trees per Region

*(Note: Prince George will not be testing T2 due to stock treatment not being available).

- c) 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. 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.

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 22.5 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. At year 2 the foliage of these excavated trees will be analysed in order to determine differences in nutrient content. 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, 1986. The Branch can provide some assistance (Mr. C. Clarke).

Schedule of Assessments

Measurements to be made	Assessments			
	Establishment Spring/Summer 1986	Fall 1987	Fall 1990	Fall 1995
Height (cm)	X	X	X	X
Caliper (mm)	X	X	X	X
Survival (%)		X	X	X
Toppling or lean			X	X
Radical sample		X	X	X
Foliage analyses		X		
Photograph		X	X	X
Establishment Report	X			
Interim Report			X	
Final Report				X

Establishment Report

Winter 1986/87 - will entail original stock measurements and summary, maps (1:15840 or 1:20,000) showing locations of test sites, maps (1:5000 or 1:10,000) showing locations of staked lines within treatment blocks, completed FS 739 and Planting Report. History Records and mylars will be updated and a Clearance Request will be prepared.

Interim Report

Winter of 1990/91 - Interim Report.

Final Report

Winter 1995/96 - will include appropriate summaries and detail any recommendations for vegetation management.

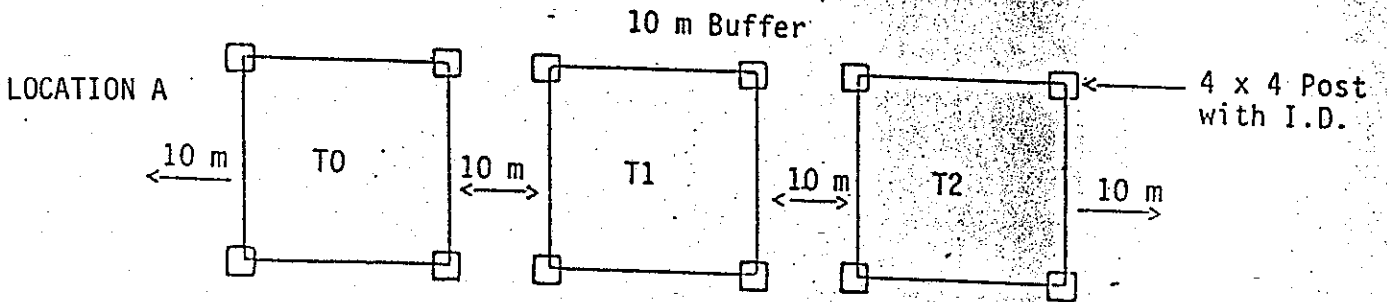
Review

Locations to be reviewed and reassessed in 2005.

RECOMMENDED BLOCK LAYOUT

REGION _____

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



LOCATION B

