WORKING PLAN

SX 89204Q
Addition of Slow Release Fertilizer at time of sowing

RALPH WINTER
COLENE WOOD

Silviculture Branch
90-05-02
TITLE: Evaluation and Comparison of Fertilization at time of sowing with Oscmocote and Nutricote.

INTRODUCTION: Studies by Burdett (1984), Thompson and Brockley have indicated benefits due to fertilization at time of planting. This trial will examine the benefits of adding slow release fertilizer at the time of sowing, comparing the resultant survival and growth of outplanted seedlings.

OBJECTIVES: 1. To compare:
   a) outplanted seedlings which have had fertilizer incorporated at the time of sowing, with
   b) control seedlings

Comparisons will consist of measuring the seedlings' height growth, root collar calliper, survival and root development. Subjective comparisons of vegetative competition will also be recorded.

Liaison with Prince George District is encouraged for collaboration of trial results.

STOCK: Sw 2+0 PSB 313B Seedlot 4177 Puckle Road Nursery Pl 2+0 PSB 313 Seedlot 3679 Puckle Road Nursery

All stock was operationally grown and stored no special handling or treatments applied prior to outplanting.

TREATMENTS: All treatments will be applied at the time of planting, as follows:
<table>
<thead>
<tr>
<th>TREATMENT NO.</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control. 1+0 PSB313A with no special fertilizer treatment.</td>
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<tr>
<td>2</td>
<td>1+0 PSB313B with 13 kg/m3 of 12 month Osmocote in the growing medium.</td>
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<tr>
<td>3</td>
<td>1+0 PSB313B with 20 kg/m3 of 12 month Osmocote in the growing medium.</td>
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<tr>
<td>4</td>
<td>1+0 PSB313B with 14.6 kg/m3 of 360 day Nutricote in the growing medium.</td>
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<tr>
<td>5</td>
<td>1+0 PSB313B with 20 kg/m3 of 360 day Nutricote in the growing medium.</td>
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<tr>
<td>6</td>
<td>1+0 PSB313B with 11 kg/m3 of 8-9 month Woodace S Core in the growing medium</td>
</tr>
</tbody>
</table>

LOCATION: The Sw will be planted at Red Rock Nursery and Prince George District cut blocks, Openings.

The Pli will be planted in the Kamloops Region.

TRIAL DESIGN: For each tree species two location replications for all 6 treatments will be established. For each treatment 140 seedlings (4 replications of 35 seedlings) are required at each location. A total of 840 seedlings will be marked at one location. A total of 1680 seedlings will be planted and marked at the two locations for each species.

Of the 35 seedlings in each row:

10 - measured for height and caliper and estimated for vegetation competition (#11-20)
25 - measured for survival (#1-25)
10 - available for root examination and destructive sampling (#26-35)
Trees will be spaced 0.5 m apart in rows with rows spaced 1.0 m apart in the Nursery locations. Trees will be spaced 2.0 m apart in rows with rows spaced 3.0 m apart in field locations.

METHOD:

Seedlings will be planted using a planting shovel.

Vegetation competition will be subjectively determined by estimating the percentage of occupancy by all potentially competing species of vegetation within a 30 cm radius plot surrounding the seedling (to the nearest 10%). A list of the species considered competition will be kept.

At each remeasurement, the survival and condition of each seedling will be recorded. Condition codes are:

(0) = Dead
(1) = Good- dark green needles, better than average growth, no damage/disease
(2) = Fair- yellow-green needles, moderate growth
(3) = Poor- chlorotic, may have dead leaders or branch tips, less than average growth or growth stressed

In addition, damaged seedlings will be coded:

(4) = Dead terminal
(5) = Frost damage to buds
(6) = Animal damage
(7) = Other damage/disease (comment as well)

SCHEDULE:

<table>
<thead>
<tr>
<th>MEASUREMENT</th>
<th>S/90</th>
<th>F/90</th>
<th>F/91</th>
<th>F/94</th>
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<tbody>
<tr>
<td>Height/Calliper</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Survival</td>
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<td>X</td>
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<tr>
<td>Vegetative Comp.</td>
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<td>Photography</td>
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<td>Establish Report</td>
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<td>Interim Report</td>
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<td>Final Report</td>
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REPORTS: Establish Report (Fall 1990) - this report will include original stock measurements and summary; maps (1:100 000) showing location of test sites, (1:15 000) showing location of trial plots within treatment blocks and sketches showing the row order for stock treatment types, a completed FS 739, ecological evaluation and planting report, and representative photography. Trial locations will be documented on mylars and History Records. Map clearance will be requested.

DISTRIBUTION: Research Officers - All Regions
Silviculture Officers - All Regions
Resource Officer Silviculture - Prince George District and Kamloops District.
Silviculture Branch Agrologist Manager, Nursery and Seed Extension Services
MoF Library
******************EXAMPLE OF A TYPICAL LAYOUT OF A TRIAL******************

**Sx Trial Number** Sx892040

**PLOT MAP SHOWING LOCATION OF TREATMENTS AND ROWS**

Fertilizer trial layout for Redrock field site:
There will be 0.5 meters between each tree.
There will be 1.0 meters between each row.

Fertilizer trial layout for the district field site:
There will be 2.0 meters between each tree.
There will be 3.0 meters between each row.

There will be sections staked.
There will be a 4 foot cedar stake placed at the beginning and end of each row.
There will be a 1.5 foot cedar stake place after the 10 trees, 20 trees and 25 trees. This will facilitate easier establishment and location of seedlings.

<table>
<thead>
<tr>
<th>ROW #</th>
<th>Species</th>
<th>Treatment</th>
<th>Survival</th>
<th>Excavations</th>
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<tbody>
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<td>Sw</td>
<td>Control</td>
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<tr>
<td>2</td>
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<td>13 kg/m³ 12 mo Osmoc</td>
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<td>3</td>
<td>Sw</td>
<td>20 kg/m³ 12 mo Osmoc</td>
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<td>5</td>
<td>Sw</td>
<td>20 kg/m³ 360 Nutrico</td>
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<td>6</td>
<td>Sw</td>
<td>Woodace 8-9 month</td>
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<td>Sw</td>
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<td>20 kg/m³ 360 Nutrico</td>
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<td>24</td>
<td>Sw</td>
<td>Woodace 8-9 month</td>
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</tbody>
</table>

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use for Ht. & RCD measurements
sect 1  sect 2  sect 3  sect 4
**EXAMPLE OF A TYPICAL LAYOUT OF A TRIAL**

**SX TRIAL NUMBER** SX89204Q

**PLOT MAP SHOWING LOCATION OF TREATMENTS AND ROWS**

- Fertilizer trial layout for Kamloops field site:
  - There will be 0.5 meters between each tree.
  - There will be 1.0 meters between each row.

- Fertilizer trial layout for the district field site:
  - There will be 2.0 meters between each tree.
  - There will be 3.0 meters between each row.

- There will be sections staked.
- There will be a 4 foot cedar stake placed at the beginning and end of each row.
- There will be a 1.5 foot cedar stake place after the 10 trees, 20 trees and 25 trees. This will facilitate easier establishment and location of seedlings.

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<thead>
<tr>
<th>ROW #</th>
<th>species</th>
<th>TREATMENT</th>
<th>SURVIVAL</th>
<th>EXCAVATIONS</th>
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<tr>
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<td>Pli</td>
<td>Control</td>
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<td>2</td>
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<td>Woodace 8-9 month</td>
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---26-35---

---11-20---

*use for Ht. & RCD measurements*

sect 1  sect 2  sect 3  sect 4
RE: SX 89204Q ADDITION OF SLOW RELEASE FERTILIZER AT TIME OF SOWING

Request for Sowing for Trial on Slow Release Fertilizer

As per our telephone conversation last week could you please do some sowing of nursery stock for outplanting in the spring of 1990.

Introduction

At the November 12, 1986 meeting on the fertilization of stock after planting, it was agreed that Research Branch would perform further work on the nutritional requirements of white spruce, that broadcast application of slow release fertilizers was not economic, and that Silviculture Branch would provide further material for planting that would contain varying rates of long term release nutrients incorporated into the plug. This trial will assess the results of these additions in the nursery phase, and provide stock for a planting trial.

Experimental Design

All treatments will be comprised of 3-PSB 313A (198) blocks. The outplanting trial will require 400 trees per treatment.

All treatments will need to be double sown and thinned to one seedling per cavity.

We would like to extend this trial to look at incorporating slow release fertilizers into Interior Lodgepole Pine and Interior Douglas fir as well as White Spruce.

Seedlots to be used.

Please select seedlots from the following geographical areas for this trial.

<table>
<thead>
<tr>
<th>SPECIES FOR TRIAL</th>
<th>GEOGRAPHICAL AREA OF SEED SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW</td>
<td>PRINCE GEORGE DISTRICT</td>
</tr>
<tr>
<td>FDI</td>
<td>KAMLOOPS/SALMON ARM/VERNON</td>
</tr>
<tr>
<td>PLI</td>
<td>KAMLOOPS/SALMON ARM/VERNON</td>
</tr>
</tbody>
</table>
All treatments will be based on standard 3 peat: 1 vermiculite growing medium containing 3 kg/m3 Green Valley 20 mesh and finer dolomite lime and Micromax trace elements at 750 g/m3.

Treatments

1. Control. No slow release nutrients. The control and all other treatments will receive 500 g/1000 l Green Valley 20-20-20 as a "grower" formulation and the same fertilizer at 250g/1000 l as a "finisher". (This will probably need to be amended for PLI and FDI sowing.

2. Incorporate 13 kg/m3 of 12 month Osmocote into the growing medium.

3. Incorporate 40 kg/m3 of 12 month Osmocote into the growing medium.

4. Incorporate 14.6 kg/m3 of 360 day Nutricote into the growing medium.

5. Incorporate 40 kg/m3 of 360 day Nutricote into the growing medium.

6. Incorporate pelletized WOODACE FERTILIZER into the the growing medium.

These 6 treatments will need to be done for PLI, FDI and SW.

Requirements

For Interior Lodgepole pine

Six treatments x 3 blocks =

18 x 313a’s x 198 cavities = 3564 x 2 seeds = 7128 seeds.

Arrange to package and store 400 trees/treatment approximately December 1989.

For Interior Douglas Fir

Six treatments x 4 blocks =

18 x 313a’s x 198 cavities = 3564 x 2 seeds = 7128 seeds.

Arrange to package and store 400 trees/treatment approximately December 1989.
For White Spruce

Six treatments x 4 blocks =

18 x 313a's x 198 cavities = 3564 x 2 seeds = 7128 seeds.

Arrange to package and store 400 trees/treatment approximately December 1989.

Observations Required

Morphological measurements will be required for each treatment at the end of the growing season. At least one tissue analysis should be conducted. Record any other observations relating to growth and nutrient toxicity symptoms.

If possible can you do sowing in the next week to produce the following types and quantities of stock.

Ralph Winter
Silviculture Branch
Surveys and Sx Trials Specialist
SX89204Q  Lillooet/Whistler
ADDITION OF SLOW RELEASE FERTILIZER AT TIME OF SOWING

Observations:

The 1991 growing season, this location had a high percentage of trees that were leaning or bent over from snow press as well as slash. 1992 growing season most of the trees effected the previous year have straightened up. Some of the seedlings that were severely bent last season have improved, but still have slight bends, which were coded #9

All trees are growing exceptionally well. Only a insignificant amount of trees were coded poor.

Visually there is no significant difference between treatments.

Vegetation around tree is not being effected by the fertilizers in the plug.

Codes to Coding

0  =Dead
1  =Good
2  =Fair
3  =Poor
4  =Missing
5  =Multiple Top
6  =Frosted
7  =Animal Damage
8  =Animal Damage
9  =Bend on Stem

DT =Dead Top
C  =Chlorotic
DB =Dead Bud
FT =Frosted Top
BS =Bent Stem
SN =Small Needles
LN =Loosing Needles
FH =Frost Heaved

NEXT REMEASUREMENT FALL 1995

Remeasurement will consist of:

  Height
  RCD
  Survival
  Excavations
  Photography
Observations:

Trees throughout trial the past 2 assessments have had extensive winter desiccation. Fall 1992 assessment 100% of trees have frost damage, which has caused a considerable amount of trees to become multiple tops. The extent of frost damage was result of the Prince George region having a lack of snow pack. In February the temperature dropped very low for a couple of weeks, and in March the temperature rose to plus 17 and held there during the day and the trees started to flush, and then the temperature dropped below zero and in result all flushing has had frost damage.

RCD has boomed over height growth because of the winter desiccation and frost damage.

All treatment have much better root egress than control.

Include in file is weather records for Prince George January through May.

Codes to Coding

0 =Dead
1 =Good
2 =Fair
3 =Poor
4 =Missing
5 =Multiple Top
6 =Frosted
7 =Animal Damage
8 =Animal Damage
9 =?

DT =Dead Top
C =Chlorotic
DB =Dead Bud
FT =Frosted Top
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SN =Small Needles

NEXT REMEASUREMENT FALL 1995

Remeasurement will consist of:

Height
RCD
Survival
Excavations
Photography
SX89204Q  England Creek
ADDITION OF SLOW RELEASE FERTILIZER AT TIME OF SOWING

Observations:

Trees throughout trial the past 2 assessments have had extensive winter desiccation, due to lack of snow fall. Lack of snow pack has made a major effect on height growth. Leaders have been killed and caused alot of multiple tops, which in turn has retarded the height growth.

Trees have been affected by the vast amount of grass growing at this location.

Vegetation around tree is not being effected by the fertilizers in the plug.

Mortality is exceptionally high due to winter desiccation and vegetation press.

Area very wet at assessment.

Codes to Coding

0 =Dead
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