SX94201Q - DELAYED RELEASE FERTILIZER TRIAL - Working Plan

Background

Fertilization at time of sowing may be more cost-effective for the field forester than fertilization at time of planting, as well as ensuring a more consistent supply of fertilizer to the tree. Silviculture Branch trials have demonstrated improved caliper and stem volume of outplanted seedlings when slow release (8-9 month) fertilizers were incorporated into the growing media (Low and Winter, 1991a, 1991b).

In 1993, a Silviculture Branch trial (SX93202Q) was initiated incorporating longer term (up to 3-4 year) slow release fertilizers into the growing media. Several different formulations from three different manufacturers were compared. Seedlings were grown at Saanich Test Nursery, and will be outplanted in spring 1994 in the Prince George District by the Regeneration section of Silviculture Branch. Some seedlings were also outplanted at Saanich Test Nursery in August, 1993. With all of these formulations there was considerable release of fertilizer in the nursery, however.

Uneven release of fertilizer in the nursery affects nursery culture, as well as leaving less fertilizer for the seedling after outplanting. Of greater benefit would be a fertilizer which does not release at all during the first year in the nursery, but which releases slowly after planting, at least into the second year in the field. Grace Sierra is using a new technology to produce an Osmocote prill coating with a delayed release. This product apparently does not begin to release for 8-9 months, then there is a linear release period of about 9 months at 70°C. The linear release period would presumably be of longer duration at lower temperatures.

Proposed Trial

The Osmocote formulation is 18-7-12. It will be mixed into the growing media at three different rates, as follows:

1. Control - no fertilizer in the growing media.
2. Osmocote 18-7-12 delayed release fertilizer at 6 kg/m²
3. Osmocote 18-7-12 delayed release fertilizer at 12 kg/m²
4. Osmocote 18-7-12 delayed release fertilizer at 18 kg/m²

The same interior spruce seedlot will be used as for the 1993 trial:

Sw 04205 B2\DPG\950 m.80% germ.\516 seeds/g.

The stock will be grown in styrobloc PSB 410's as 1 + 0 summer plant. Stock will be sown in January 1994, and planted in July 1994. Five styroblocs will be sown for each treatment. An
additional styrobloc will be loaded, but not seeded, for each treatment. The fertilizer prills will be analyzed at the time of lifting to determine what percentage of the fertilizer has already been released. Fertilizer release will also be tested directly by placing 1 kg of prills in 5L of water at the time of sowing, and monitoring the electrical conductivity of the solution over time.

Standard growing regimes will be used. Static height measurements will be taken throughout the growing season. Soil pH and conductivity will be monitored regularly. Samples for foliar analysis will be taken regularly as well. Height, caliper and dry weight measurements will be conducted on a random sample of fifteen seedlings per block, at the time of lifting.

The seedlings will be planted in the Prince George District. The outplanting and monitoring of these seedlings will be carried out by Rob Bowden of the Regeneration Section of Silviculture Branch. Some seedlings will also be outplanted at the Green Timbers Extension Services facility in Surrey.

References


1994 TRIALS - NURSERY EXTENSION SERVICES

SX93207Q - YEAR 2 - WORKING PLAN

Resistance Development of Western Red Cedar Against Keithia Blight Using Increased Levels of Copper, Zinc, Manganese and Iron.

Summary - Year 1

The purpose of this trial is to determine if high levels of heavy metal elements in foliar tissue create resistance to infection by the fungus that causes Keithia blight. The trial was sown at Saanich Test Nursery in April 1993 as a 2+0 stock type, using the seed orchard seed lot Cwr 06754. Container type used was a PSB 415B styroblock. Six blocks were sown for each of the following five treatments:

1. Control - standard fertilization regime
2. Cu chelate added to fertilizer
3. Zn chelate added to fertilizer
4. Mn chelate added to fertilizer
5. Fe chelate added to fertilizer

Fertilization commenced in May 1993. All treatments received Plant Prod 20-8-20 @ 50 ppm N as required, reduced to 25 ppm N in July for the rest of the growing season. Chelates were added at each fertilization in May and June, omitted in early July as foliar concentrations reached toxic levels, then applied at reduced rates for the remainder of the growing season. Applications of water were alternated with fertilizer throughout August and September. Stock was grown in a greenhouse with the sidewalls removed but with a poly roof on until October, when the blocks were shipped to Green Timbers and overwintered outdoors.

Foliar samples were sent for analysis once every three weeks beginning in July. The intent was to maintain foliar concentrations of the heavy metals that were at the top of or slightly above the normal range, without becoming toxic to the plant. This was not always achieved, however. Early in the growing season, many of the seedlings receiving heavy metals had weak stems and were not upright. Most of these seedlings recovered and grew upright, although there was some mortality in Treatment 4. Symptoms of Mn toxicity in Treatment 4 then appeared as brown, necrotic shoot tips. Average height at the end of the first growing season was 26.0 cm for the controls, slightly shorter for the heavy metal treatments.

Inoculum was introduced into the trial by placing older seedlings infected with Keithia in the centre of each block during late summer and fall. Fresh inoculum seedlings were inserted every two weeks. At the end of the first growing season there was no evidence of Keithia on any of the seedlings in this trial.

Proposed Working Plan for Year 2
The seedlings will be grown in the outside compound at the Green Timbers Extension Services facility. Fertilizer treatments will resume in the spring of 1994. Foliar samples for analysis will be taken every two or three weeks to monitor metal levels. The amount of chelates added to the fertilizer will be adjusted as required, to maintain a foliar concentration that is high but not toxic to the plants. Although the seedlings are overly tall they will not be top pruned, as removal of foliage may affect test results.

Levels of Keithia infection will be assessed in September, 1994. If any significant differences in levels of infection are found, an outplanting trial could be established to evaluate survival. A morphological analysis (height, root collar diameter, shoot and root dry weights) will be performed on a random sample of seedlings at this time.
1994 TRIALS - NURSERY EXTENSION SERVICES

SX93208Q - YEAR 2 - WORKING PLAN

Production of Western Larch Stecklings

Summary of Year 1

Donor stock was sown February 22, 1993. Two seedlots were sown, Lw 5102 and Lw 7058. One third of the seedlings from each seedlot were potted up in June to use for winter cuttings. The remainder of the seedlings were transplanted into larger cavity styroblocks (due to lack of enough drip irrigation facilities for more pots). The potting media consisted of hog fuel, peat moss, vermiculite, Osmocote 18-6-12, dolomite lime, Micromax trace element mix, and superphosphate 0-45-0.

The potted stock was pinched twice, once at the time of potting (June) and once in September. They were given heat, photoperiod lighting, and fertilizer at 200 ppm N until November, when stock was moved to the Green Timbers Extension facility. The stock in large cavity styroblocks was also moved to Green Timbers at this time.

Proposed working plan - Year 2

a) 1994 winter cuttings

The potted donor stock will be used for winter cuttings. Cuttings will be collected on three dates beginning ten weeks after dormancy was induced in the donor stock: approximately January 10, January 31, and February 21, 1994. Half of the cuttings from each collection date will be set immediately, while the remainder will be cold stored for three weeks at 2-4 C in sealed black bags before setting. Rooting hormone will be used on all treatments.

Cuttings will be set into a medium of 50:50 peat:perlite with 2 kg/m³ dolomite line and 300 g/m³ Micromax, in PSB 313B styroblocks. Rooting will take place in a greenhouse equipped with underbench heating and a fog system. Once rooted, the stecklings will be grown under a typical seedling growing regime.

b) 1994 summer cuttings

The donor stock which is currently in large cavity styroblocks will be potted up in January, 1994. Some of this stock will be used for 1994 summer cuttings, the rest will be kept for 1995 winter cuttings. The stock to be used for 1994 summer cuttings will receive heat, photoperiod lighting and fertilizer at 200 ppm N until May, 1994. Cuttings will be taken on three different dates in July and August, with half of the cuttings from each collection being set immediately and the other half cold-stored for three weeks before setting. The stecklings will be treated as similarly as possible to those set in winter.