To: A. E. McDonald

From: Silviculture Branch
Date: 86-04-11
File: 955-21

Re: Sx 86206Q Conifer Nutrient Trial

Introduction

This trial will compare the best treatments from previous trials, will evaluate new fertilizer formulations, and assess the effect of reducing nitrogen levels after minimum heights have been achieved as a means of controlling top growth and stimulating root growth. Most treatments will have a surplus supply of trace elements with the addition of FTE 503 to the soil mix. This will ensure that observed effects are due to nitrogen manipulation and not to trace element deficiencies.

Experimental Design

Treatments with lodgepole pine will be sown in PSB 211's and grown entirely in the open compound. Treatments in other species will consist of four 313A styroblocks. They will be greenhouse started and moved into full light as each treatment is to be changed from grower to finisher formulations.

All treatments will be based on a standard 3 peat 1 vermiculite growing medium containing 3 kg/m³ Green Valley 10 mesh and finer dolomite lime. All treatments except Osmocote 17-6-10 (#16) will also contain FTE 503 at 130 g/m³.

Definitions

The seedlots to be used are:
Sw (SZ 3110) 93H11/B3/4177/.914 - 89%
CW (SZ 1070) 92J11/B3/3456/.860 - 84%
Fdc (SZ 1090) 92M10/B3/7752/.460 - 94%
Pl (SZ 2030) 82L3/B2/2620/1.433 - 81%

All treatments should be double sown and thinned to one seedling per cavity.
## Elements - % Content of Fertilizer

<table>
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<th>Mg</th>
<th>S</th>
<th>Fe</th>
<th>Cu</th>
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## Formulations and Usage

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<td>Starter</td>
<td>10-51-16</td>
<td>7-40-17</td>
<td>11-41-8</td>
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<td>Grower</td>
<td>20-20-20</td>
<td>20-7-19</td>
<td>20-8-20</td>
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<td>Finisher</td>
<td>10-51-16</td>
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<td>Experimental Grower</td>
<td>X20-20-20</td>
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Fertilizer Amendment Rates

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<tr>
<td>FTE 503</td>
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<td>10 mesh and finer dolomite</td>
<td>3 kg/m³</td>
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<td>Osmocote 17-6-10</td>
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<td>Nutricote (Rate 2)</td>
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<td>Nutricote (Rate 3)</td>
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<td>Mag Amp 7-40-6</td>
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<td>STEM</td>
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- 1/2% of the weight of soluble fertilizer applied, or as per treatment 15 if no soluble fertilizers are being applied.

Soluble Fertilizers - Treatments 31-35

Throughout the growing season, the source of P and K will be mono potassium phosphate (0-52-34) at 250g/1000 L. Ammonium nitrate will be the source of nitrogen at 75 ppm N for starter, 125 ppm N for grower, and will vary from 25-125 ppm N for finisher depending on the treatment. Calcium and magnesium will be supplied by the dolomite lime in the growing medium. Trace elements will be supplied by FTE 503 in the medium, as well as by applications of STEM. The rate of STEM is the same as Treatment 15 and as those treatments receiving STEM but no soluble fertilizers.

Mono Potassium Phosphate - All Season

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Ammonium Nitrate NH₄NO₃ - Finisher Rates

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<td>(35)</td>
<td>375g</td>
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Starter

All treatments (31-35) receive 0-52-34 at 250g/1000L and 34-0-0 at 225g/1000L, supplemented with STEM.

Grower

All treatments (31-35) receive 0-52-34 at 250g/1000L and 34-0-0 at 375g/1000L, supplemented with STEM.
Finisher

Treatments (31-35) receive 0-52-34 at 250g/1000L and 34-0-0 from 75-375g/1000L as listed above. Supplement with STEM.

Treatments

Treatment 1. Control. Green Valley Regime
   - Starter: 10-51-16 at 75 PPM N
   - Grower: 20-20-20 at 125 PPM N
   - Finisher: 10-51-16 at 75 PPM N

Treatment 2. Green Valley - Reduced Rate of Finisher
   - Starter: 10-51-16 at 75 PPM N
   - Grower: 20-20-20 at 125 PPM N
   - Finisher: 10-51-16 at 50 PPM N

Treatment 3. Green Valley - Grower Only
   - Starter: 20-20-20 at 75 PPM N
   - Grower: 20-20-20 at 125 PPM N
   - Finisher: 20-20-20 at 75 PPM N

Treatment 4. Green Valley - Grower Only - Reduced Rate of Finisher
   - Starter: 20-20-20 at 75 PPM N
   - Grower: 20-20-20 at 125 PPM N
   - Finisher: 10-51-16 at 50 PPM N

Treatment 5. Green Valley - Experimental Grower Only
   - Starter: X20-20-20 at 75 PPM N
   - Grower: X20-20-20 at 125 PPM N
   - Finisher: X20-20-20 at 75 PPM N

Treatment 6. Peters - Forestry Regime
   - Starter: 7-40-17 at 75 PPM N
   - Grower: 20-7-19 at 125 PPM N
   - Finisher: 4-25-35 at 75 PPM N

Treatment 7. Peters - Reduced Rate of Finisher
   - Starter: 7-40-17 at 75 PPM N
   - Grower: 20-7-19 at 125 PPM N
   - Finisher: 4-25-35 at 50 PPM N

Treatment 8. Peters - Grower Only
   - Starter: 20-7-19 at 75 PPM N
   - Grower: 20-7-19 at 125 PPM N
   - Finisher: 20-7-19 at 75 PPM N
Treatment 9. Peters - Grower Only - Reduced Rate of Finisher
- Starter: 20-7-19 at 75 PPM N
- Grower: 20-7-19 at 125 PPM N
- Finisher: 20-7-19 at 50 PPM N

Treatment 10. Peters - Experimental Grower Only
- Starter: X10-15-20 at 75 PPM N
- Grower: X10-15-20 at 125 PPM N
- Finisher: X10-15-20 at 75 PPM N

Treatment 11. Plant Prod - Forestry Regime
- Starter: 11-41-8 at 75 PPM N
- Grower: 20-8-20 at 125 PPM N
- Finisher: 8-20-30 at 75 PPM N

Treatment 12. Plant Prod - Reduced Rate of Finisher
- Starter: 11-41-8 at 75 PPM N
- Grower: 20-8-20 at 125 PPM N
- Finisher: 8-20-30 at 50 PPM N

Treatment 13. Plant Prod - Grower Only
- Starter: 20-8-20 at 75 PPM N
- Grower: 20-8-20 at 125 PPM N
- Finisher: 20-8-20 at 75 PPM N

Treatment 14. Plant Prod - Grower Only - Reduced Rate of Finisher
- Starter: 20-8-20 at 75 PPM N
- Grower: 20-8-20 at 125 PPM N
- Finisher: 20-8-20 at 50 PPM N

Treatment 15. Plant Prod - Grower Only - Plus STEM
- Starter: 20-8-20 at 75 PPM N + STEM
- Grower: 20-8-20 at 125 PPM N + STEM
- Finisher: 20-8-20 at 75 PPM N + STEM

Treatment 16. Osmocote 17-6-10 (9 month) at 6.5 kg/m³
No supplements
- Starter: None
- Grower: None
- Finisher: None

Treatment 17. Osmocote 17-6-10 (9 month) at 6.5 kg/m³
FTE in soil medium
- Starter: None
- Grower: None
- Finisher: None
Treatment 18. Osmocote 18-6-12 (9 month) at 6.5 kg/m³
   - Starter: None
   - Grower: None
   - Finisher: None

FTE

Treatment 19. Osmocote 18-6-12 (9 month) at 6.5 kg/m³ plus STEM
   - Starter: None, plus STEM
   - Grower: None, plus STEM
   - Finisher: None, plus STEM

FTE

Treatment 20. Osmocote 18-6-12 (9 month) at 6.5 kg/m³
   Mag Amp 7-40-6 (3 month) at 5 kg/m³. Supplement with STEM
   - Starter: None, plus STEM
   - Grower: None, plus STEM
   - Finisher: None, plus STEM

FTE

Treatment 21. Osmocote 18-6-12 (9 month) at 6.5 kg/m³
   Supplement with starter, grower, finisher
   - Starter: 10-51-16 at 75 PPM N
   - Grower: 20-20-20 at 125 PPM N
   - Finisher: 10-51-16 at 75 PPM N

FTE+

Treatment 22. Osmocote 18-6-12 (9 month) at 6.5 kg/m³
   Supplement with finisher
   - Starter: 10-51-16 at 75 PPM N
   - Grower: 10-51-16 at 125 PPM N
   - Finisher: 10-51-16 at 75 PPM N

FTE+

Treatment 23. Mag Amp 7-40-6 (3 month) at 5 kg/m³
   Supplement with finisher
   - Starter: 10-51-16 at 75 PPM N
   - Grower: 10-51-16 at 125 PPM N
   - Finisher: 10-51-16 at 75 PPM N

FTE+

Treatment 24. Nutricote 16-10-10 (6 month) at 4.88 kg/m³ (Rate 2)
   - Starter: None
   - Grower: None
   - Finisher: None

FTE

Treatment 25. Nutricote 16-10-10 (6 month) at 9kg/m³ (Rate 3)
   - Starter: None
   - Grower: None
   - Finisher: None

FTE

Treatment 26. Nutricote 16-10-10 (6 month) at 7.3 kg/m³ (Rate 1)
   - Starter: None
   - Grower: None
   - Finisher: None
Treatment 27. Nutricote 16-10-10 (6 month) at 7.3 kg/m³
   Supplement with STEM
   - Starter: None + STEM
   - Grower: None + STEM
   - Finisher: None + STEM

FTE

Treatment 28. Nutricote 16-10-10 (6 month) at 7.3 kg/m³ + Mag Amp at 5kg/m³
   Supplement with STEM
   - Starter: None + STEM
   - Grower: None + STEM
   - Finisher: None + STEM

FTE

Treatment 29. Nutricote 16-10-10 (6 month) at 7.3 kg/m³
   Supplement with starter, grower, finisher
   - Starter: 10-51-16 at 75 ppm N
   - Grower: 20-20-20 at 125 ppm N
   - Finisher: 10-51-16 at 75 ppm N

FTE+

Treatment 30. Nutricote 16-10-10 (6 month) at 7.3 kg/m³
   Supplement with finisher
   - Starter: 10-51-16 at 75 ppm N
   - Grower: 10-51-16 at 125 ppm N
   - Finisher: 10-51-16 at 75 ppm N

FTE+

Treatment 31. Soluble Fertilizer Regime. Only N to be varied from grower to finisher. Supplement with STEM.
   - Starter: 75 ppm N + STEM
   - Grower: 125 ppm N + STEM
   - Finisher: 75 ppm N + STEM
   0-52-34 at 250g/1000L; NH₄NO₃ at 75g/1000L

FTE+

Treatment 32. Soluble Fertilizer Regime. Supplement with STEM.
   - Starter: 75 ppm N + STEM
   - Grower: 125 ppm N + STEM
   - Finisher: 50 ppm N + STEM
   0-52-34 at 250g/1000L; NH₄NO₃ at 150g/1000L

FTE+

Treatment 33. Soluble Fertilizer Regime. Supplement with STEM.
   - Starter: 75 ppm N + STEM
   - Grower: 125 ppm N + STEM
   - Finisher: 75 ppm N + STEM
   0-52-34 at 250g/1000L; NH₄NO₃ at 225g/1000L

FTE+

Treatment 34. Soluble Fertilizer Regime. Supplement with STEM.
   - Starter: 75 ppm N + STEM
   - Grower: 125 ppm N + STEM
   - Finisher: 100 ppm N + STEM
   0-52-34 at 250g/1000L; NH₄NO₃ at 300g/1000L
Treatment 35. Soluble Fertilizer Regime. Supplement with STEM.
   - Starter: 75 ppm N + STEM
   - Grower: 125 ppm N + STEM
   - Finisher: 125 ppm N + STEM
     0-52-34 at 250g/1000L; NH₄NO₃ at 375g/1000L

Requirements

- 35 treatments x 4 reps = 140 Styroblocks/specie.
- PSB 313 x 140 - 27,720 cavities x 2 seeds - 55,440 seeds each for spruce, Douglas fir and western red cedar.
- PSB 211 x 140 - 33,600 cavities x 2 seeds = 67,200 seeds for lodgepole pine.

Observations Required

Samples for tissue analysis should be submitted at the change from "Grower" to "Finisher" fertilizer applications and at the conclusion of fertilizer applications in late fall. All treatments will be processed for morphological description in late 1986. Subjective observations such as differences in colour, susceptibility to disease and difficulty in achieving terminal bud set should be recorded.

G. Matthews
Agrologist
Silviculture Branch

GM/dak
## Summary of Fertilizer Treatments

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<th>Type</th>
<th>*S</th>
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<td>75+</td>
<td>125+</td>
</tr>
<tr>
<td>FTE + Soluble Fertilizer - only N varied + STEM</td>
<td>SGF+</td>
<td>75+</td>
<td>125+</td>
</tr>
</tbody>
</table>

*S - Starter  
G - Grower  
F - Finisher