1987 Pemberton Seedling Trial
SURVIVAL STUDIES
FINAL REPORT - JUNE 1988

Objectives:

1) To determine the mean and range of survival for Douglas Fir seedlings outplanted on the same mesic site in the Pemberton area.

2) To observe the timing of mortality and the physical development of dead seedlings at the time of death.

3) To note prominent variations in survival and to field check plantations of those seedlings.

4) To develop a research proposal for survival studies in 1988.

Introduction

The Pemberton seedling trial was planned during the winter and early spring of 1986-87 at which time a location and procedures were outlined. A few of the intended plans and procedures are as follows.

Number of seedlings planted - The intended plan was to plant 50 seedlings of each seedlot received at the Pemberton Reefer. This plan was carried out as intended.

Method of planting - Seedlings were shovel/mattock planted by our Tree Storage Contractor (Wimatken Silviculture). Actual planting completed by Wim Tewinkel and/or his assistant.

Handling - Seedlings were cold stored at the Pemberton Reefer and planted as soon as possible after receipt (1-2 days). Pelton's stock was stored outside of reefers with boxes open to light and planted within 1-2 days.

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Method of Evaluation

Seedlings were evaluated for general condition and on-going seedling activity approximately every two weeks from the time of planting until July 31 and then monthly in August and September (final check was done in early October). The number of seedlings alive and dead were tabulated and comments were made with regard to bud swell, flushing and any other appropriate items noted. Seedlings were classified by percentage of live growth in combination with general needle and stem condition. Approximate guidelines were as follows:

- 0% Live Growth - Dead
- 1- 40% Live Growth - Poor
- 41- 75% Live Growth - Fair
- 76-100% Live Growth - Good

Continuing Studies

In April of 1988, 15 seedlings from six FDC seedlots within the Pemberton Trial were transplanted to an operational block nearby at Birkenhead River.

Seedlots Transplanted

S. Lot 1261 - Peltons         S. Lot 4407 - Elmore
S. Lot 1261 - Elmore          S. Lot 4407 - Peltons
S. Lot 1261 - Green Timbers   S. Lot 1009 - Elmore

Objective

To document the survival of Fdc grown on a good valley bottom site in the transition zone followed by transplanting on a harsher operational block within the transition zone.

Transplant Site Characteristics

Location: Birkenhead River
Biogeoclimatic Subzone: CwHcl
Elevation: 900 metres
Eco Assoc: 03
Aspect/Slope: South 40%
History Record Opening: 92J047-34

Monitoring

Monthly - June to October 1988
Interim Report - December 1988
Spring Check - May 1989
Fall Check - October 1989
Final Check and Report - Fall 1990
Pemberton Seedling Trial

1987

The following is an evaluation and comparison of FDC PSB 313 1+0 stock planted in the above trial.

Biogeoclimatic Unit - IDFel
Site Location - Poole Creek
- Est. 10km. south of Gates Lake

Site Description - Flat lowland adjacent to a small creek, a narrow valley that is topographically shaded.
- The site was cleared of vegetation prior to planting.
- Elevation approximately 400 metres.

Soil Description - A silty sand of compact nature.

Analysis

Mean survival FDC PSB 313 1+0 = 95.87%
Range FDC PSB 313 1+0 = 80% to 100%

Nursery Seedlot Comparisons

<table>
<thead>
<tr>
<th>Seedlot</th>
<th>Survival</th>
<th>Date Planted</th>
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<tbody>
<tr>
<td>FDC 1261 Peltons</td>
<td>92%</td>
<td>March 25</td>
</tr>
<tr>
<td>FDC 1261 Elmore</td>
<td>100%</td>
<td>March 12</td>
</tr>
<tr>
<td>FDC 1261 Green Timbers</td>
<td>100%</td>
<td>May 2</td>
</tr>
<tr>
<td>FDC 1890 Elmore</td>
<td>100%</td>
<td>May 31</td>
</tr>
<tr>
<td>FDC 1890 Surrey</td>
<td>96%</td>
<td>March 30</td>
</tr>
<tr>
<td>FDC 1276 Hammer</td>
<td>86%</td>
<td>March 12</td>
</tr>
<tr>
<td>FDC 1276 Peltons</td>
<td>94%</td>
<td>March 27</td>
</tr>
<tr>
<td>FDC 9835 Elmore</td>
<td>100%</td>
<td>May 31</td>
</tr>
<tr>
<td>FDC 9835 Peltons</td>
<td>98%</td>
<td>March 20</td>
</tr>
<tr>
<td>FDC 4407 Elmore</td>
<td>100%</td>
<td>April 29</td>
</tr>
<tr>
<td>FDC 4407 Peltons</td>
<td>96%</td>
<td>April 8</td>
</tr>
<tr>
<td>FDC 1009 Elmore</td>
<td>98%</td>
<td>March 30</td>
</tr>
<tr>
<td>FDC 1009 Peltons</td>
<td>80%</td>
<td>March 25</td>
</tr>
</tbody>
</table>

No conclusions can be reached from the above data as far as survival levels in relation to dates planted. With the exception of seedlot 1276 and seedlot 1009, all seedlots are relatively equal as far as survival is concerned.

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Timing of Mortality

Heaviest mortality occurred prior to June 30 (60%); the following is a breakdown with appropriate comments.

Mortality (April 1 – June 30)

<table>
<thead>
<tr>
<th></th>
<th>Comments</th>
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<tbody>
<tr>
<td>S. Lot 1009 Peltons April - 8 June - 2</td>
<td>Majority dead before bud flush</td>
</tr>
<tr>
<td>S. Lot 1276 Peltons May - 1 June - 1</td>
<td>Mortality during shoot growth period</td>
</tr>
<tr>
<td>S. Lot 4407 Peltons April - early May - 2</td>
<td>Mortality prior to bud flush</td>
</tr>
<tr>
<td>S. Lot 9835 Peltons June - 1</td>
<td>Mortality during shoot growth</td>
</tr>
<tr>
<td>S. Lot 1890 Surrey April - 1 June - 1</td>
<td>1 died prior to flush and 1 during shoot growth</td>
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</table>

A relatively dry late March and all of April may have had a minor effect on mortality. There appears to have been sufficient moisture during May.

Mortality (July 1 – October 5)

<table>
<thead>
<tr>
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<tr>
<td>S. Lot 1009 Elmore August - 1</td>
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<tr>
<td>S. Lot 1261 Peltons July - 1 August - 1 September - 1</td>
<td>Drying of seedlings noted</td>
</tr>
<tr>
<td>S. Lot 1276 Hammer July - 3 August - 2 September - 2</td>
<td>Signs of problems showing after flush and during shoot growth. Needles drying, turning yellow, signs of dying in new growth by late May.</td>
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Winter Mortality

<p>| |</p>
<table>
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<tbody>
<tr>
<td>S. Lot 1276 Peltons - 1</td>
</tr>
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Some extended dry spells at D'Arcy (up to 10 days), temperatures variable. The Owl Creek weather station did not show quite the same length of dry spells or high temperatures. Relative humidity was quite variable at both sites. August and September were generally dry months.

It is difficult to make any concrete conclusions as to the effect the summer dry spells had on the seedling mortality. As a number of seedlings appeared to be showing problems prior to this period the summer dry spells may have simply been the final straw. It is also known that problems were present with the seedlings from both Peltons and Hammer nurseries. Peltons stock experienced root dieback (see definition below), as did stock from Hammer nursery.

**Root Dieback**

Describes a condition where little or no new root growth is noted and many roots when examined are found to be dead on approximately the lower half of the root system.

**Field planting results of some of the above trial seedlots - FDC PSB 313 1+0**

**Peltons Seedlots PSB 313 1+0**

**S. Lot 1276 - BCFP - Block 70**
- 91.5% survival (Fall 1987)

**Site Description** - CWHc 1/03 Association
- 125 metres
- West aspect/20% slope

**Soil Description** - 25% sand/5% silt/50% stones/20% gravel

**S. Lot 9835 - Whonnock (North Lizzie)**
- Block 9-1 (planted April 21)
- 82% survival (Spring 1988)

**Site Description** - CBHb5/04 Association
- 865 metres
- SE aspect/50% slope

**Soil Description** - 50% sand/25% silt/25% gravel

**S. Lot 1276 - Whonnock (North Lizzie)**
- Block 24B (planted April 26)
- 65% survival (Spring 1988)

**Site Description** - CWHb5/03 Association
- 1000 metres
- West aspect/60% slope

**Soil Description** - sandy silt loam
S. Lot 1261 - Whonnock (North Lizzie)
- Block 25 (planted March 15)
- 64% survival (Spring 1988)

Site Description - IDFel/04 Association
- 425 metres
- West aspect/30% slope

Soil Description - sandy loam

S. Lot 1261 - Terminal (Ryan Farm)
- Block 19-2 (planted March 30)
- 89% survival (only 37% in good condition)
  (Fall 1987)

Site Description - CWHcl/03 Association
- 425 metres
- NE aspect/35% slope

Soil Description - sandy soil with 20% stones/25% gravel

Surrey Seedlots PSB 313 1+0

S. Lot 1890 - BCFS (Birkenhead River)
- Block 1 (92J047-17) - Planted March 31
- 96% survival (Spring 1988)

Site Description - IDFel/03 Association
- SW aspect/50% slope (0-70) average
- 650 metres

Soil Description - sandy loam with 20% stone/15% gravel
- moderate vegetation competition

S. Lot 1890 - BCFS (South Creek)
- 97% survival (92J055-36) - planted April 16
  (Spring 1988)

Site Description - CWHcl/03 Association
- North aspect/65% slope
- 415 metres

Soil Description - sandy/silt with 25% coarse fragment
- low vegetation competition

Elmore Nursery

S. Lot 1262 - BCFS (Birkenhead River)
- Block 1 (92J047-17) - planted March 31
  12617' - 96% survival (Spring 1988)

.../5
Site Description - IDFe1 (03 Association)
- SW aspect/50% average slope (0-70)
- 650 metres

Soil Description - sandy loam with 20% stone/15% gravel
- moderate vegetation competition

S. Lot 1275 - BCFS (Rutherford Creek)
- Block LB67 (92J026-40) - planted April 11
- 100% survival (Spring 1988)

Site Description - CWHcl (03 Association)
- North aspect/30% slope
- 650 metres

Soil Description - sandy loam
- low to moderate vegetation competition

Field Planting

Survival Results for FDC PBR 313 1+1

Campbell River Nursery

S. Lot 1890 PBR 313 1+1 - BCFS (Owl Creek) - planted March 29
- Block 1A (92J037-20)
- 32% survival (Spring 1988)

Site Description - IDFe1/04 Association
- East aspect/50% slope
- 550 metres
- High vegetation competition

Soil Description - sandy soil with moderate stoniness

S. Lot 1890 PBR 313 1+1 - BCFS (Rutherford Creek)
- Block LB1 (92J026-97) - planted April 9
- survival 89% (Spring 1988)

Site Description - CWHcl/04 Association
- North aspect/40%-60% slope
- 500 metres
- Low vegetation competition

Soil Description - silt/loam

* The above seedlot showed 96% survival in the seedling trial.
Conclusions

The following are some of the conclusions that can be obtained from the Pemberton Seedling Trial results.

1) The trial indicates that good quality stock planted on a reasonably good site can return good results and that in most cases even suspect stock (Peltons 1987) will show good returns.

2) The trial site consistently had higher survival than those experienced in operational plantations, the difference being quite dramatic in some cases.

3) It would appear that in most cases seedling quality has been good (some Peltons seedlots excepted) and may not be the major problem. Site quality of operational blocks may be the most significant factor in seedling survival.

4) In reference to 3) above, it may be that stock adaptation to the harsher operational blocks is the most significant factor to be overcome.

5) The continuation of research to develop seedlings specially adapted to the harsher transition zone sites may be required. One consideration may be the growing of seedlings in a nursery within the transition zone on a small scale. Also further experimentation with plug types, stem calipers and lengths is required.

6) Seedlot 1009 from Peltons showed very poor results in the trial; this would tend to confirm the concerns regarding root dieback.

7) The reason for the poor showing of seedlot 1276 from Hammer Nursery was also root dieback.

8) Red cedar, yellow cedar and spruce seedlots appear to be doing reasonably well, the lowest survival being 90% for CW 3546 (Reid Collins).
<table>
<thead>
<tr>
<th>SPECIES</th>
<th>SEED LOT</th>
<th>NURS</th>
<th>STOCK TYPE</th>
<th>% SURV</th>
<th>COND.</th>
<th>DATE PLANTED</th>
<th>LIFT DATE</th>
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<td>96</td>
<td>GOOD</td>
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<td>87-01-08</td>
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10-15 cm leader growth

10 cm leader growth

5-10 cm leader growth (1 about 15-20)

10 cm leader growth

Up to 15 cm leader growth

Up to 15 cm leader growth

Up to 12 cm leader growth
<table>
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<tr>
<th>SPECIES</th>
<th>SEED LOT</th>
<th>NURS.</th>
<th>STOCK TYPE</th>
<th>% SURV</th>
<th>COND.</th>
<th>DATE PLANTED</th>
<th>LIFT DATE</th>
<th>10-15 cm leader growth</th>
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## Pemberton Seedling Trial Analysis

**June 1988**

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<th>Species</th>
<th>Seed Lot</th>
<th>Nurs.</th>
<th>Stock Type</th>
<th>% Surv</th>
<th>Cond.</th>
<th>Date Planted</th>
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Slow growth
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<th>STOCK TYPE</th>
<th>% SURV</th>
<th>COND.</th>
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8 - 15 cm leader growth