FINAL REPORT
RNX 7902

WESTERN HEMLOCK
ETHREL TRIAL

SILVICULTURE BRANCH
February 1981
SILVICULTURE TRIALS and TESTS

REPORT SX RNX 7902

INTERIM

FINAL X

DATE 81.02.27

TITLE Western Hemlock Ethrel Trial

Report Prepared by: P. F. Robson (Signature) (Typed)

Report & Distribution Approved by: R. G. Brown (Signature) (Typed)

(a) Wide Distribution
(b) Limited
   (i) Internal - Branch only
   (ii) External - Designated X
   (iii) Ministry Only

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District Manager, Campbell River
Silviculture Branch Library

Approved: Manager (Signature) (Typed) R. C. Jones
1. **Trial Number**
   RNX 7902

2. **Title**
   Western hemlock ethrel trial.

3. **Location**
   Plots 1-4 Paterson Lake and
   Plots 5-8 Eric Lake,
   Salmon River, approx. 40 km west of Campbell River.

4. **Object**
   To assess the effectiveness of ethrel in inducing frost hardiness in western hemlock that is to be fall planted.

5. **Treatment and Code**
   Ethrel treated = ET
   Untreated (control) = UN
   PSB 211

6. **Plot Layout**
   At each of two locations:
   4 plots x 4 lines per plot x 50 trees per line = 800 trees in all.

7. **Planting Dates**
   79.10.10-11

8. **Assessments**
   79.11.16
   80.05.14

9. **Seedlots**
   Plots 1-4: Hw 92L1/B3/3445/530 m/Sayward
   Plots 5-8: Hw 92F3/B2/3436/680 m/Sproat L.

10. **Site Factors**
    | Paterson L. | Eric L. |
    |-------------|---------|
    | CWHxb-s     | CWHxa   |
    | C4          | B2      |
    | 1020        | 1020    |
    | 585         | 700     |
    | BH          | FH      |
    | 10          | 40      |
    | NE          | SE      |
    | Mid-slope   | Upper slope |
    | Sandy loam  | Loam    |
    | 10          | Mostly min. soil |
    | Medium      | Light   |
    | 20/30       | 5/10    |
11. Weather at Planting

<table>
<thead>
<tr>
<th>Date</th>
<th>Soil Condition</th>
<th>Weather</th>
</tr>
</thead>
<tbody>
<tr>
<td>79.10.10</td>
<td>Uniformly damp</td>
<td>Light rain, 4°C</td>
</tr>
<tr>
<td>79.10.11</td>
<td>&quot;</td>
<td>Overcast, cool, 6°C</td>
</tr>
</tbody>
</table>

12. Condition etc. of Stock at Planting

<table>
<thead>
<tr>
<th></th>
<th>Ethrel Treated</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Lifted</td>
<td>79.10.05</td>
<td>79.10.05</td>
</tr>
<tr>
<td>b) Nursery storage</td>
<td>79.10.05-08</td>
<td>79.10.05-08</td>
</tr>
<tr>
<td>c) Field storage</td>
<td>79.10.09-11</td>
<td>79.10.09-11</td>
</tr>
<tr>
<td>d) Condition: Roots</td>
<td>Satisfactory</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>&quot; : Tops</td>
<td>Fair 19-20 cm</td>
<td>Fair 20-21 cm</td>
</tr>
<tr>
<td>e) Root Growth Capacity</td>
<td>1.1</td>
<td>3.4</td>
</tr>
<tr>
<td>f) Ethrel applied</td>
<td>79.09.17, 79.09.24</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>and 79.10.01</td>
<td></td>
</tr>
</tbody>
</table>

13. Table 1: Minimum Temperatures - Readings from Two Mini-Maxi Thermometers at Each Planting Site, °C

<table>
<thead>
<tr>
<th>Date</th>
<th>Paterson L.</th>
<th>Eric L.</th>
</tr>
</thead>
<tbody>
<tr>
<td>79.10.31</td>
<td>-6, -7</td>
<td>-10, -10</td>
</tr>
<tr>
<td>79.11.16</td>
<td>-4, -5</td>
<td>-5, -5</td>
</tr>
</tbody>
</table>

There is no information on the date of the first frost at either location because the hygrothermograph malfunctioned.

Table 2: Incidence of Frost Damage of Ethrel Treated and Untreated Hw, Five and Thirty Weeks after Planting

<table>
<thead>
<tr>
<th>Location</th>
<th>Percent Frost Damaged*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>After 5 Weeks</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Paterson L.</td>
<td>8</td>
</tr>
<tr>
<td>Eric L.</td>
<td>24</td>
</tr>
</tbody>
</table>

* Includes Dead

Table 3: Percent Dead, by Cause of Mortality, of Ethrel Treated and Untreated Hw After Thirty Weeks, i.e. After the First Winter*

<table>
<thead>
<tr>
<th>Location</th>
<th>Treated</th>
<th>Untreated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Browsing</td>
<td>Frost</td>
</tr>
<tr>
<td>Paterson L.</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Eric L.</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

*Before the onset of summer drought.
14. Comments

a) Owing to the trial stock being of less than plantable size at the time ethrel should have been applied in the nursery, it was allowed to grow for another month before treatment. This delay made the ethrel less effective than it might have been and undoubtedly influenced results in the field.

b) Five weeks after planting the influence of ethrel in reducing frost damage was either nil or very slight.

c) In the following spring, at one location, more treated trees were found to be frosted than the untreated; at the other there was a notable reduction in damage in favour of the treated.

d) Even where most effective, ethrel permitted over two-thirds of the planted trees to be frosted.

e) Survival after one winter was satisfactory at both locations. At Eric Lake (the more severe site), survival of the treated stock was less than the untreated.

15. Other

A freeze test was undertaken in connection with the field trial the results of which have been reported by K. Bartlett as RNX 7968; see Appendix 2. Results of the freeze test also failed to demonstrate the effectiveness of ethrel.

To test ethrel under more favourable conditions, another trial (SX 80102 Q) was proposed for the fall of 1980. Although ethrel was applied at the optimum time, the weather failed to co-operate. Unduly mild weather persisted throughout the fall and while planting was suspended in anticipation of frost, the effect of the ethrel wore off, i.e. the stock lost its frost hardiness. The project was then cancelled.
DATE: 80/02/08

FILE No. RNX 7968

SUBJECT: Hu Dormancy Trial —
Nursery Assessment

ATTENTION OF: N.E. Sjoberg

REMARKS: This trial was undertaken in response to work done by Kin wah Cheung (E.P. 721-02-04). Kin wah Cheung recommended three weekly applications of ethrel spray applied in August to induce early dormancy in hemlock seedlings for fall planting. We were unable to spray at the recommended times due to the inadequate size of stock. However, we had hoped that even late spraying would impart some benefit to the seedlings and in any case would give experience with handling and using ethrel for future work.

Treatments

1. Ethrel — spray consisted of 1000 ppm ethrel (4.16 ml/l) plus 1000 ppm Tween 20 (1 ml/l) in water solution
   - 8 l of solution were used to drench foliage on 20 blocks

2. Control — spray consisted of 1000 ppm Tween 20 (1 ml/l)
   - 8 l used

Spray Dates

1. Sept. 17, 1979
2. Sept. 24, 1979
3. Oct. 1, 1979

Results

1. Top Growth:
   Height increments in Fig. 1, p. 3, indicate ethrel treated seedlings put on less growth than the control, especially §3436. Throughout the test there was little difference in color of foliage between treatments.

2. Root Growth
   Root growth capacities in Fig. 2, p. 4, indicate a sharp reduction occurred in ethrel treated seedlings commencing with the first spray. This difference was maintained from then on.
3. **Frost Hardiness Tests**

The first freeze test was done on Oct. 10 (24 days after the first spray). Results of $-2^\circ C$ testing (Fig. 3, p. 5) indicate 100% survival for ethrel and control seedlings (excepting 90% for the control in #3445). However, at $-4^\circ C$ the control survival exceeded ethrel by 10-20% indicating the control had also hardened off by this time. At the lowest temperature ($-8^\circ C$) all seedlings were killed except for 10% of ethrel in #3436.

The second test, done on Oct. 17 (31 days from the first spray), indicates no difference in survival between treatments of #3436. The two treatments showed 100% survival down to $-4^\circ C$ but only 10% at $-8^\circ C$. In #3445 the control was 10% less at $-4^\circ C$ but surprisingly 40% higher survival at $-8^\circ C$.

**Conclusions**

Ethrel treated seedlings did not exhibit any greater degree of frost-hardiness than the control. Probably, cooler temperatures occurring in September 1979, combined with a decreasing photoperiod, initiated the dormancy process in the control and nullified the application of ethrel.

These same results were also observed by Pete Robson in the preliminary assessment of field planted seedlings (report attached).

**Recommendations**

I recommend that this trial be repeated using stock that has reached optimum size for treatment by August 15. It is imperative that this date be attained in order for any benefits to materialize from the ethrel sprays.

\[\text{K. Bartlett}\]

\text{Silviculture Branch}

KB:1j