Multiple Tops and Rosette Buds

Morphological Study

Interim Report

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REPORT SX  

Conjunction with  

87101Q

INTERIM  

FINAL  

DATE  Feb. 4, 1988

TITLE  Multiple Tops and Rosette Buds Morphological Study.

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Multiple Tops and Rosette Buds Morphological Study

In conjunction with the field trial Sx 871010, a similar multiple top and rosette bud morphological trial was established at Chilliwack River Nursery in April 1987. The objectives of the trial at the nursery are to determine the long-term morphological characteristics of seedlings with multiple and rosette terminal buds and to provide an accessible inspection location for nursery personnel and field foresters. The first year results of the trial are discussed in this report.

Method

75 seedlings from seedlot 4130 and 45 seedlings each from seedlots 4285 and 1656 were selected and divided into multiple terminal bud cluster, rosette bud and control categories. With the exception of the terminal bud deformation, all the seedlings selected meet current ministry stock specifications. The three seedlots are a 1½x1½ interior spruce stock type out planted in the spring of 1987. They were all grown at the Surrey Nursery. On April 4, 1987 the selected seedlings were planted at the Chilliwack Nursery in the following design:

Row 1  Seedlot 4130  25 seedlings multiple terminal bud.
2 "  4130  25 seedlings rosette terminal bud.
3 "  4130  25 seedlings control (1 terminal bud).
4 "  4285  15 seedlings multiple terminal buds.
5 "  4285  15 seedlings rosette terminal bud.
6 "  4285  15 seedlings control (1 terminal bud).
7 "  1656  15 seedlings multiple terminal buds.
8 "  1656  15 seedlings rosette terminal bud.
9 "  1656  15 seedlings control (1 terminal bud).

In September 1987, all the seedlings were examined for survival, expressed terminal dominance, 1987 terminal leader growth, and general form. The terminal leader growth measurement was taken from the shoot that had visually established dominance by height (greater than 2.5 cm) or was co-dominant with another shoot.

Results and Discussion

Table 1 below indicates that there was little difference in the overall 1987 terminal growth for the three categories. The average growth for the multiple bud category seedlings was 7.52 cm, the rosette bud category seedlings was 6.79 cm and the control seedlings was 6.66 cm. On a seedlot basis seedlot 4130 had the lowest terminal growth average 6.03 cm, seedlot 1656 had an average of 7.46 cm and seedlot 4285 had an average of 8.25 cm. As table 3 shows, the overall poor growth of seedlot 4130 is due to the poor growth of the seedlings in the rosette bud and control categories. For all seedlots the best growth occurred in the multiple terminal bud category. Several years will be required however to ultimately compare the seedlots. The survival of all the seedlots after one growing season is 100% however 14 seedlings from seedlot 4285 and 10 seedlings from seedlot 1656 are chlorotic and show visual stress symptoms.
Table 1  First Year Morphological Assessment  Overall Development

<table>
<thead>
<tr>
<th>Category</th>
<th>1987 Ave. Ht. Growth(cm)</th>
<th>1 Terminal Leader % of Cat.</th>
<th>2 Terminal Leader % of Cat.</th>
<th>&gt;2 Terminal Leader % of Cat.</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mult. Terminal</td>
<td>7.52</td>
<td>14.5</td>
<td>51</td>
<td>34.5</td>
<td>100</td>
</tr>
<tr>
<td>Rosette Bud</td>
<td>6.79</td>
<td>32.1</td>
<td>21.4</td>
<td>46.5</td>
<td>100</td>
</tr>
<tr>
<td>Control</td>
<td>6.66</td>
<td>92.8</td>
<td>5.4</td>
<td>1.8</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2  First Year Morphological Assessment  Seedlot (Overall)

<table>
<thead>
<tr>
<th>Seedlot</th>
<th>1987 Ave. Ht. Growth (cm)</th>
<th>1 Terminal Leader %</th>
<th>2 Terminal Leader %</th>
<th>&gt;2 Terminal Leader %</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>4130</td>
<td>6.03</td>
<td>44</td>
<td>17.3</td>
<td>38.7</td>
<td>100</td>
</tr>
<tr>
<td>4285</td>
<td>8.25</td>
<td>55.5</td>
<td>26.7</td>
<td>17.8</td>
<td>100</td>
</tr>
<tr>
<td>1656</td>
<td>7.46</td>
<td>42.2</td>
<td>40.0</td>
<td>17.8</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3  First Year Morphological Assessment  Seedlot (Specific)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Multiple Bud</th>
<th>Rosette Bud</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4130 4285 1656</td>
<td>4130 4285 1656</td>
<td>4130 4285 1656</td>
</tr>
<tr>
<td>1987 Ave. Ht Growth(cm)</td>
<td>7.02 8.50 7.52</td>
<td>5.88 8.06 6.79</td>
<td>5.20 6.79 6.65</td>
</tr>
<tr>
<td>Survival %</td>
<td>100 100 100</td>
<td>100 100 100</td>
<td>100 100 100</td>
</tr>
<tr>
<td>1 Terminal Leader %</td>
<td>4 20 27</td>
<td>28 53 20</td>
<td>100 93 80</td>
</tr>
<tr>
<td>2 Terminal Leader %</td>
<td>48 53 53</td>
<td>4 20 53</td>
<td>0 7 13</td>
</tr>
<tr>
<td>&gt;2 Terminal Leader %</td>
<td>48 27 20</td>
<td>68 27 27</td>
<td>0 0 7</td>
</tr>
</tbody>
</table>
Morphologically, only 14.5% of all the multiple terminal bud seedlings formed a single dominant leader after the first year. 51% formed 2 co-dominant leaders and 34.5% had more than 2 leaders. As table 3 indicates only 4% of the seedlings of the multiple terminal category from seedlot 4130 showed an expressed dominant leader. Seedlot 4285 had 20% and seedlot 1656 had 27% of the seedlings from this category express a single dominant leader. The lack of dominant leaders for all three seedlots did not slow the overall terminal growth for the seedlots as it was greater than the other categories. It was observed however that many of the terminals had thinner stems than the terminals from the other categories (control especially) as a result it is believed heavy brush or snow would deform many of them.

Table 1 shows that 32.1% of all the rosette bud seedlings formed a single dominant leader. 21.4% formed 2 co-dominant leaders and 46.5% had more than 2 leaders. It was observed that many of the dominant leaders had come from a top lateral bud. The growth from the rosette buds ranged from approximately 3-6 cm and was weaker than the lateral bud growth. Overall visually there still appears to be a lot of confusion within the seedlings as to their terminal dominance development. Individually 53% of the seedlings of this category from seedlot 4285 formed an expressed dominant leader. Seedlot 4130 had 28% and seedlot 1656 had 20% of the seedlings express a single dominant leader. Correspondingly the growth of the 4285 seedlings was superior than the other two seedlots. Finally as table 3 indicates 68% of seedlot 4130 seedlings from this category had greater than 2 dominant terminal leaders. This is the main reason this seedlot has more than twice the number of seedlings than seedlots 4285 and 1656 with more than 2 terminal leaders.

Interestingly 20% of the control seedlings from seedlot 1656 and 7% from seedlot 4285 had 2 or more terminal leaders after the first year. This accounts for 7.2% of all the seedlings from this category and draws attention to the concern of discarding multiple tops during grading. Of the 7.2%, a visual inspection of the terminal buds that did not flush this year revealed that many but not all were dead. Future assessments of this growth characteristic are certainly necessary. Finally for the control seedlings, although the terminal growth was marginally less than the other two categories for all seedlots, the terminal shoot thickness and rigidity was superior. It is believed these seedlings would resist heavy snow and brush loads better than the terminals of the other two categories.

Conclusion

After one growing season 14.5% of the multiple terminal seedlings, 32.1% of the rosette bud seedlings, and 92.8% of the control seedlings had expressed dominant terminals. There was little difference in the measured terminal height growth for the three categories however there was a visual difference in the terminal stem forms. The multiple terminal category seedlings had the best height growth but had the thinnest and weakest terminals. The control category seedlings had the poorest terminal growth yet had the thickest and strongest terminals. Most of the rosette bud category expressed terminals came from a top lateral bud instead of one of the rosette buds. After one year it appears the control category seedlings would withstand heavy brush and snow the best.
Seedlot 4285 growth was superior for each category and it established the most dominant leaders, 55.5%. Seedlot 4130 had the poorest growth and the most seedlings with 2 or more terminal shoots, 38.7%. However it did not exhibit visual stress symptoms or chlorotic seedlings as seedlots 4285 and 1656 did. It is believed that at least 2 more growing seasons are required before the seedlots can be ultimately compared for performance.

There will be a re-examination and final report during the fall of 1980.
Rosette Bud Growth
1 year after outplanting
All buds flushed
Bud Cluster
1 year after outplanting
No dominance

Bud Cluster
1 year after outplanting
1 terminal expressing dominance