EFFECT OF LOW TEMPERATURE ON POLLEN VITALITY OF LARIX OLGENSIS

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ABSTRACT  After the treatment of pollen of larix olgensis at the different low temperature, the pollen vitality was observed by using fluorescent staining method. Several conclusions were obtained: 1) 0°C — 3°C is the best temperature range for storing pollen of Larix olgensis. 2) At the same temperature, humidity is the key factor influencing the pollen vitality. 3) Different clones shows different resistance to low temperature. Among the ten clones 2# clone shows the highest resistance.

Key Words: Larix olgensis, pollen vitality

In recent years, many researchers have done a great deal of researches on effect of low temperature on plant, especially on effect of low temperature on photosynthesis (1), respiration (3) and isoenzyme (4) of plant. But no report about effect of low temperature on pollen vitality has been published.

We collected branches of ten clones from seed orchard of larix olgensis at Qingshan Forestry Farm, treated them at different temperature and humidity. After treatment, we observed the pollen vitality by using fluorescent staining method. At last, we analyzed the effect of low temperature on pollen vitality through adopting statistical methods and physiological method. This research has a guiding significance both in helping us to understand the rules for flowering and fruiting and improvement of seed production of seed orchard of larix olgensis

MATERIAL AND METHOD

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Flower branches of ten clones (1#, 2#, 6#, 7#, 8#, 9#, 12#, 16#, 18# and 42#) were collected from the fifth block of seed orchard of *larix olgensis* at Qingshan Forestry Farm, Linkou County. The branches were water cultured in laboratory (the room temperature is 20°C). According to the experimental objection, the pollen, collected from each clone, was treated certain times at the different low temperatures in the refrigerator, and their pollen vitality was measured.

The method of measuring pollen vitality is fluorescent staining. Five and ten field of view were observed at each sheet glass.

The percentage of vitality were transferred through formula of anti-sine.

**RESULT AND ANALYSIS**

**Effect of Different Temperatures on Pollen Vitality**

The 12# clone pollen was collected and kept in the test tube, and treated two hours at the temperatures of -8°C, -6°C, -3°C, 0°C, 3°C and 8°C. The contrast was set up at room temperature. After this treatment, we observed the pollen vitality and analyzed the result by using the method of analysis of variance and multiple range analysis. The results showed in Tables 1 and 2.

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Sum of squares</th>
<th>d.f</th>
<th>Mean square</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>1930.0669</td>
<td>6</td>
<td>321.67782</td>
<td>25.12 * *</td>
</tr>
<tr>
<td>Error</td>
<td>358.5815</td>
<td>28</td>
<td>12.80648</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2288.6484</td>
<td>34</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The theoretical value of $F_{0.01}(6,28) = 3.35$

The result of analysis of variance shows that the treatment of different temperatures has significant difference on pollen vitality. At the $-3°C - 0°C$, the pollen shows the highest vitality, both lower and or higher than this temperature range, the pollen vitality is reduced. We think that, maybe the $-4°C - -3°C$ is the turning point of freeze of *Larix olgensis* pollen, though in the temperature of $-3°C - 0°C$

<table>
<thead>
<tr>
<th>Temperature</th>
<th>-8°C</th>
<th>-6°C</th>
<th>+20°C</th>
<th>+8°C</th>
<th>+3°C</th>
<th>0°C</th>
<th>-3°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.P.V. *</td>
<td>21.65</td>
<td>29.84</td>
<td>30.89</td>
<td>33.84</td>
<td>39.56</td>
<td>42.75</td>
<td>44.56</td>
</tr>
</tbody>
</table>

LSD$_{0.05}$

Note: ( * : M.P.V represents mean pollen vitality)

- 28 -