Studies regarding vegetative propagation of *Rhododendron sutchuenense* Franchet species

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**Abstract**  
The genus *Rhododendron* belongs to the family Ericaceae, commonly called the heath family. The genus is one of the largest in the plant kingdom, made up of approximately 1100 species. Members of the genus range in size from alpines that may be 5 cm tall to tree size plant up to 24 m tall. *Rhododendron sutchuenense* Franchet is a shrub or small tree with 3-4 m high, persistent leaves, grown for beautiful flowers and decorative foliage. It is native to China and is growing in forests situated at an altitude of 2400-3200 meters. The multiplication were made by cuttings and during the experience was studied the influence of rooting substrate on roots system formation. Some soil mixtures were tested: A. perlite+peat, with a ratio 1:1, B. peat+sand 1:1, C. perlite+sand 1:1, D.perlite (control of experience). The best results for *Rhododendron sutchuenense* were obtained in mixture of peat+perlite 1:1 ratio, rooting occurred in 168 days.

**Key words**  
multiplication, cuttings, shrub, rooting substrate

The importance of the ornamental deciduous species and varieties comes off their complex role in the landscape design and natural environment. The parks, family and organization gardens as well as the entertainment areas play a major role in the modern development of the towns. The propagation of these ornamental varieties is usually difficult due to their specific biological features. Having in view the importance of these species in the landscape field as well as their difficult propagation, studies focused on: behavior of ornamental deciduous species in vegetative propagation process [4].

The propagation through cuttings is the most frequently used propagation method of flowery plants and is based on the feature owned by certain plants, the feature of being able to remake new plants out of organs or parts of organs, when they are detached from the mother plant and are put in optimal environment conditions [5].

The advantages of vegetative propagation are the obtaining of plants which are similar to the mother plants from both genotypic and phenotypical point of view and the obtaining of mature plants in a shorter period of time than the reproduction through seeds, thus easing the propagation of some flowery plants original from tropical and subtropical areas, which taking into account our conditions, cannot form seeds or these ones do not reach maturity.

Of all the well known methods of vegetative propagation, the most efficient one is the propagation through cuttings, which offer some advantages from both technical and economical point of view. The parts used are different from species to species: there can be cuttings through off shots, from stems, buds of leaves or roots. Rhododendrons, including azaleas, are a well known, diverse and popular group of plants with a long and rich horticultural history [2, 3].

**Materials and Methods**

The experience was monofactorial with four variants witch were placed in randomized blocks, in three repetitions. The rooting substrate was consisting in the following:

\[ V_1 \text{ perlite + peat 1:1; } \]
\[ V_2 \text{ perlite + sand 1:1; } \]
\[ V_3 \text{ peat + sand 1:1; } \]
\[ V_4 \text{ perlite (control). } \]

The peat provides from Lithuania, was crushed, fertilized and neutralized (TS 3 peat).

For the propagation of *Rhododendron sutchuenense*, on 20.08.2012 were collected 20 cuttings for each variant from the healthy mother plants, vigorous and free from diseases and pests. Cuttings were made from the middle-aged healthy stems. The prepared cuttings were treated with Incit 8 for a better rooting.

Potting up is a vegetative propagation method that is common used in greenhouses and nurseries for many species of shrubs and trees, which have the natural ability to form new individuals from parts of
plants put into rooting conditions. For multiplication by cuttings, organogenesis reproduces normal plant polarity, due to the natural auxinic movement to the distal pole, where it forms roots [4].

Cuttings used in the experiments were simple semi wooden cuttings, specific for persistent leaves, which were harvested in August, from mature plants aged 6 to 12 years, well adapted to environmental conditions of the area and have appropriate development. Harvesting was done with grape scissors and only annual lateral growth from the bottom side of the mother plant were used, this way the surface leaf was reduced in half as shown in Figure 1. Length of cuttings was averaging 5-7 cm. Base cuttings are prepared by injury meaning that a small portion of bark was removed.

The experimental variants were conducted in a 70 sqm greenhouse intended for plant breeding, both vegetative and generative. The greenhouse temperature and humidity was controlled (Fig. 2). After the cuttings were rooted they were covered with a plastic sheet for the atmospheric moisture to maintain a constant level with a value of 90-100% [6].

Temperature was maintained throughout the experiment at 22-24°C [3]. The depth to which the cuttings were placed was 2-4 cm, the leaves from the base were removed and the remaining rosette did not touch the rooted substrate.

All the data obtained was interpreted statistically by calculating the average and has tested the significance of differences between variants using LSD test [1].

In the Figure 3 the rooted are in perlite+peat (1:1) a substrate in which they obtained the best results in terms of propagation by cuttings.
Results and Discussions

Regarding the development of rooting system it can be concluded that this process devolved different, depending of the rooted substrate (Table 1).

The above table shows that rooting of Rhododendron species, in our case Rhododendron sutchuenense may take 6-7 months. The substrate composed of perlite and peat (1:1) resulted in faster rooting cuttings (168 days) compared to the substrate consisting only of perlite where rooting lasted 193 days. It is known that the rooting substrate is very important concerning rooting with influence regarding the percentage of rooting and the quality of roots [6].

From Table 2 it is observed that rooting substrate has a significantly influence on the rooting percentage of rhododendron cuttings. Thus in the V₃ peat + sand (1:1) the percentage of rooted cuttings is 58% compared to V₄ (perlite), where the percentage of control rooting is only 30%. Same with V₁, the rooting percentage is pretty good considering that rhododendrons are plants with a difficult vegetative propagation. [4].

Table 1

<table>
<thead>
<tr>
<th>Experimental variants</th>
<th>Date of cuttings preparation</th>
<th>Date of cuttings rooting</th>
<th>No. of days of rooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>V₁</td>
<td>Rh. sutchuenense - perlite+peat</td>
<td>20.08.2012</td>
<td>03.02.2013</td>
</tr>
<tr>
<td>V₂</td>
<td>Rh. Sutchuenense - perlite+sand</td>
<td>20.08.2012</td>
<td>15.02.2013</td>
</tr>
<tr>
<td>V₃</td>
<td>Rh. Sutchuenense - peat+sand</td>
<td>20.08.2012</td>
<td>25.02.2013</td>
</tr>
<tr>
<td>V₄</td>
<td>Rh. Sutchuenense - perlite (control)</td>
<td>20.08.2012</td>
<td>28.02.2013</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>Experimental variants</th>
<th>Rooting medium</th>
<th>Cutting number for rooting</th>
<th>Rooted cuttings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>V₁</td>
<td>perlite+peat (1:1)</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>V₂</td>
<td>perlite+sand (1:1)</td>
<td>60</td>
<td>22</td>
</tr>
<tr>
<td>V₃</td>
<td>peat+sand (1:1)</td>
<td>60</td>
<td>35</td>
</tr>
<tr>
<td>V₄</td>
<td>perlite (control)</td>
<td>60</td>
<td>18</td>
</tr>
</tbody>
</table>

Another important result was the average number of roots per rooted cuttings by rooting substrate and the length of the roots (Table 3).
Table 3

<table>
<thead>
<tr>
<th>Experimental variants</th>
<th>Rooting medium</th>
<th>The length of roots</th>
<th>Number of roots</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Absolute (cm)</td>
<td>+- D (cm)</td>
</tr>
<tr>
<td>V₁</td>
<td>perlite + peat (1:1)</td>
<td>3.55</td>
<td>0.20</td>
</tr>
<tr>
<td>V₂</td>
<td>perlite + sand (1:1)</td>
<td>3.40</td>
<td>0.05</td>
</tr>
<tr>
<td>V₃</td>
<td>peat + sand (1:1)</td>
<td>4.60</td>
<td>1.25**</td>
</tr>
<tr>
<td>V₄</td>
<td>perlite (control)</td>
<td>3.35</td>
<td>0.00</td>
</tr>
</tbody>
</table>

LSD (P 5%) 0.54 2.83
LSD (P 1%) 0.98 5.20
LSD (P 0.1%) 2.18 11.51

Statistical data (Least Significant Difference) show that in the substrate composed of peat+sand (1:1) the length of roots was longer, accounting differences of 1.25 cm which is distinct significant positive compared with the control variant (perlite). In the same rooting media the number of roots was higher than the control, achieving significant positive differences.

Conclusions

Analyzing the results concerning the multiplication technology by cuttings we can conclude the following:

The rooting process of *Rhododendron sutchuenense* took between 168-193 days according to the rooting substrate. Fastest rooted was in the mix of perlite + peat (1:1) and latest in perlite.

Analyzing the influence of substrate on rooting cuttings is observed that the best substrate was peat+sand, the rooting percentage was 58%.

References