Rooting of Cuttings from Micropropagated Stock Plants of Japanese Persimmon

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Summary

The rooting ability of cuttings, collected from micropropagated and severely pruned stock plants of three Japanese persimmon cultivars, was investigated. The leaf- bud softwood cuttings from micropropagated stock plants of all three cultivars rooted well. The rooting percentages of the cuttings from micropropagated ‘Jiro’ and ‘Nishimurawase’ stock plants were as high as those from root suckers; those of cuttings from ‘Hiratanenashi’ and ‘Jiro’ stock plants, grafted on seedlings and severely pruned, were low. Hardwood cuttings from the grafted micropropagated stock plants rooted well; their rooting percentage was similar to that from the grafted root suckers of ‘Nishimurawase’. However, cuttings from the grafted stock plants, grafted on seedlings, failed to root.

Key Words: cutting, Japanese persimmon, juvenility, micropropagation, rooting.

Introduction

Japanese persimmon (Diospyros kaki Thunb.) has been thought to be difficult to propagate by cuttings (Tao and Suguri, 1992). Recently, we succeeded in inducing roots on cuttings of Japanese persimmon cultivars and their rootstocks by using root suckers (Tetsumura et al., 2000, 2001a, b, 2002). However, maintaining roots and root crowns as sources of root suckers is not easy. Hartmann et al. (1997) recommended that stock plants for cuttings of selected fruit tree rootstocks and woody ornamentals be maintained as hedges. Moreover, micropropagated stock plants produced more cuttings with a higher capacity of rooting than did the conventionally propagated stock plants, when maintained by severe hedge pruning (Howard et al., 1989a, b). We established micropropagated stock plants of Japanese persimmon cultivars and stock plants grafted on seedlings. They were pruned severely, and the rooting ability of their cuttings were compared with that of cuttings from root suckers.

Materials and Methods

One-year-old micropropagated nursery stocks and those grafted on seedlings were planted in the University farm in January 1997, and cut back to a height of 40 cm each winter to be used for softwood cuttings. In mid-June and early-July, leaf-bud cuttings were prepared from the shoots of stock plants as well as from the root suckers of own-rooted micropropagated trees. Ten cuttings were obtained from each cutting source; their bases were dipped for 5 sec in 50% aqueous ethanol solution, containing 3000 ppm IBA. The cuttings were then imbedded in a mixture of Kanuma soil and peat moss (1:1 v/v), placed in a ventilated, plastic-covered propagation frame, and misted intermittently, as described previously (Tetsumura et al., 2001b). The rooting percentage, the number of roots per rooted cutting, and the length of the longest root were recorded 60 days after planting. The experiments with ‘Hiratanenashi’ and ‘Nishimurawase’ were conducted in 1998, 1999, and 2000, and those with ‘Jiro’ in 1998 and 1999.

For hardwood cuttings, one-year-old nursery stocks of ‘Nishimurawase’ were planted in January 1996, and cut back to 20-cm each winter. Some shoots of the stock plants and root suckers were grafted with iris huss at their bases from June to December every year, while others remained exposed (unmounded). All cuttings were harvested in mid-December and stored at 3 °C. In late-March, the cuttings were cut into 25-cm lengths, and their bases were soaked in a 25 ppm IBA solution for 24 hr and then in 0.5% benomyl solution for 30 min. The cuttings were then imbedded and rooted as above, similar to those used for the softwood cuttings, except that bottom heat was supplied at 28 °C (Tetsumura et al., 2001a). The rooting percentage, and lengths and numbers of shoots on the cuttings were recorded at the end of the growing season. The experiments were conducted in 1998, 1999, and 2000, using 10 cuttings per source.

All percentage data were subjected to analysis of variance after transformed to arcsin; their means were.
Table 1. Rooting of the leaf-bud cuttings taken from various cutting sources of three Japanese persimmon cultivars. All cuttings were treated with 5000 ppm IBA solution for 5 sec. Severe pruning was applied to the stock plants.

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Source of cutting</th>
<th>Rooting (%)</th>
<th>No. of roots per rooted cutting</th>
<th>Longest root (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hiratanenashi</td>
<td>Micropropagated stock plants</td>
<td>43b</td>
<td>2.7 ± 0.5</td>
<td>13.1 ± 0.4</td>
</tr>
<tr>
<td></td>
<td>Stock plants grafted on seedlings</td>
<td>2c</td>
<td>1.0 ± 0.0</td>
<td>6.0 ± 0.0</td>
</tr>
<tr>
<td></td>
<td>Root suckers</td>
<td>72a</td>
<td>3.2 ± 0.4</td>
<td>13.5 ± 0.4</td>
</tr>
<tr>
<td>Jiro</td>
<td>Micropropagated stock plants</td>
<td>58a</td>
<td>2.7 ± 0.9</td>
<td>9.2 ± 1.5</td>
</tr>
<tr>
<td></td>
<td>Stock plants grafted on seedlings</td>
<td>3b</td>
<td>2.0 ± 0.0</td>
<td>2.0 ± 0.0</td>
</tr>
<tr>
<td></td>
<td>Root suckers</td>
<td>53a</td>
<td>3.3 ± 0.7</td>
<td>8.0 ± 1.2</td>
</tr>
<tr>
<td>Nishimurawase</td>
<td>Micropropagated stock plants</td>
<td>72a</td>
<td>4.3 ± 0.8</td>
<td>15.8 ± 0.8</td>
</tr>
<tr>
<td></td>
<td>Stock plants grafted on seedlings</td>
<td>25b</td>
<td>4.6 ± 0.8</td>
<td>11.6 ± 1.1</td>
</tr>
<tr>
<td></td>
<td>Root suckers</td>
<td>77a</td>
<td>4.3 ± 0.5</td>
<td>14.0 ± 0.8</td>
</tr>
</tbody>
</table>

* Mean separation within cultivars by Fisher’s protected LSD test (P<0.05).
* Mean ± SE.

Results and Discussion

Leaf-bud cuttings from micropropagated stock plants rooted well; the rooting percentages of ‘Jiro’ and ‘Nishimurawase’ were as high as those from root suckers (Table 1). Severe hedge pruning made the cuttings root well. Rooting percentages of leaf-bud cuttings from severely unpruned micropropagated trees of ‘Nishimurawase’ and those grafted on seedlings were 37 % and 10 %, respectively (Tetsumura et al., 2001b). Although ‘Hiratanenashi’ and ‘Jiro’ stock plants, grafted on seedlings, were also severely pruned, their leaf-bud cuttings scarcely rooted. Abundant development of roots on cuttings was important for successful transplanting (Tetsumura et al., 2000). The micropropagated stock plants and the root suckers produced well-rooted cuttings (Table 1), and these might grow well after transplanting.

None of the shoots of the moulded micropropagated stock plants rooted in situ; it would not be possible to use the stock plants as stoolbeds. However, hardwood cuttings from moulded micropropagated stock plants rooted well; the rooting percentage was as high as that from moulded root suckers (Table 2). None of the cuttings from the unmoled micropropagated stock plants and the moulded and unmoled stock plants, grafted on seedlings, rooted. Cuttings from unmoled root suckers rooted to some degree as found previously (Tetsumura et al., 2001a). At the end of the growing season, there were no differences in lengths and numbers of shoots of rooted hardwood cuttings among different cutting sources (data not shown).

These results indicate that the rooting ability of cuttings is probably related to juvenility of stock plants.

Table 2. Rooting percentage of the hardwood cuttings of Nishimurawase’s Japanese persimmon taken from various cutting sources. All cuttings were treated with 25 ppm IBA solution for 24 hr.

<table>
<thead>
<tr>
<th>Source of cutting</th>
<th>Rooting (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounded micropropagated stock plants</td>
<td>47ab</td>
</tr>
<tr>
<td>Unmounded micropropagated stock plants</td>
<td>0c</td>
</tr>
<tr>
<td>Mounded stock plants grafted on seedlings</td>
<td>0c</td>
</tr>
<tr>
<td>Unmounded stock plants grafted on seedlings</td>
<td>0c</td>
</tr>
<tr>
<td>Mounded root suckers</td>
<td>53a</td>
</tr>
<tr>
<td>Unmounded root suckers</td>
<td>27b</td>
</tr>
</tbody>
</table>

* Mean separation by Fisher’s protected LSD test (P<0.05).
plants, lost their rooting capacity quickly, cuttings from micropropagated stock plants maintained a high rooting ability for three years in this study (data not shown). In conclusion, we agree with Howard (1987) that micropropagation is a useful tool for producing stock plants from hedges and stololds as sources of cuttings.

**Acknowledgements**

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**Literature Cited**


Tetsumura, T., R. Tao and A. Sugiura. 2000. Single-node stem cuttings from root suckers to propagate a poten-


**組織培養繁殖した母株から得た
カキ挙し穂の発根**

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**摘 要**

組織培養繁殖した母株より採取したカキ品種
の挙し穂の発根能力について調査した。供試した3品種すべてにおいて、組織培養繁殖した母株より得た挙し穂は良好に発根した。'次郎'および'西村早生'の組織培養繁殖した母株より得た挙し穂の発根率は、むねはえから得た挙し穂のものと同程度に高かった。しかし、実生台に接ぎ木し、強せん定した'平核無'および'次郎'の母株より得た挙し穂は、ほとんど発根しなかった。組織培養繁殖した母株に盛り土処理した'西村早生'から得た休眠枝挙し穂は良好に発根し、その発根率は盛り土処理したむねばえから得たものと同程度に高かった。しかし、盛り土処理をしても実生台に接ぎだ母株から得た休眠枝挙し穂は全く発根しなかった。

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