Short communication

Seasonal variation in rooting ability of myrtle (Myrtus communis L.) cuttings

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Abstract

Cuttings of both ‘Rehovot’ and ‘Tzfat’ land-races of myrtle, when sampled throughout the year, had a significant temporal variation in the percentage of successful rooting. The rooting percentage of cuttings taken during December–February reached 70%, while only 20% of the cuttings taken during May–August successfully rooted. The ‘Rehovot’ type was sensitive to aeration in the rooting medium, while the ‘Tzfat’ type rooted equally well in all media. Treating cuttings with 2,6-dihydroxy-acetophenone before dipping in rooting hormone (IBA) did not enhance rooting of ‘Rehovot’, but increased rooting in ‘Tzfat’ myrtle by an average of 6%. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

Myrtle (Myrtus communis L.) is a drought-tolerant evergreen shrub that can be used as an ornamental hedgerow or as a flowering potted plant (Holcomb and Michalas, 1992). The leaves and berries are a source of essential oils that have medicinal, insecticidal and sensory value (Khosh-Khui et al., 1984; Milhau et al., 1997; Mulas et al., 1996). Terminal myrtle shoots with intact trifoliate leaf nodes
are used during the Jewish holiday of Sukkot (as described in Leviticus XXIII:40); the retail value of this market alone is approximately $2 million annually.

Rooting ability of myrtle varies considerably (Mulas et al., 1996), and local Israeli growers consider the plant difficult to root. In general, seasonal timing of cutting preparation and type of rooting medium are major factors in successful propagation of woody plants by cuttings (Barnes and Lewandowski, 1991; Holcomb and Michalas, 1992; Southworth and Dirr, 1996). Epstein et al. (1993) found that poor rooting may be due to irreversible conjugation of applied auxins that are frequently used to stimulate root initiation in plant cuttings, and suggested the use of 2,6-dihydroxy-acetophenone (DHAP), which prevents auxin conjugation (Lee and Starratt, 1986), as a rooting adjuvant. We investigated the effect of time of cutting, rooting medium, and the use of DHAP on the rooting ability of two Israeli land races of myrtle.

2. Materials and methods

2.1. Propagating material

Two locally-recognized Israeli land races of myrtle were used. The ‘Tzfat’ type is characterized by ovate leaves, while the leaves of the ‘Rehovot’ type are lanceolate. Semi-hardwood cuttings 15 cm long were prepared from cultivated 7–10 year old ‘Tzfat’ and ‘Rehovot’ myrtle shrubs growing in Bet Dagan (central Israel) or in the Jezreel Valley (‘Zfat’ type only) in northern Israel.

2.2. Sampling time

From February 1996 until May 1997, semi-hardwood cuttings from both ‘Rehovot’ and ‘Tzfat’ types were taken every 1–2 months. From June 1997 until March 1998, only ‘Tzfat’ was sampled.

2.3. Hormone treatment

All cuttings were dipped in Hormoril T-8 powder (Asia-Reisel, Tel Aviv, Israel), which contains 0.8% indolebutyric acid and 5% thiabendazole, before being placed in the rooting medium.

2.4. DHAP treatment

In 1997–1998 we applied Hormoril with and without a pretreatment of 2,6-dihydroxyacetophenone (DHAP) (Sigma). The lower 4 cm of the cuttings were
placed for 4 h in an aerated solution of 2 mol⁻³ l⁻¹ DHAP in 50% isopropanol, and the cuttings were then dipped in rooting hormone. Control cuttings were placed in aerated 50% isopropanol without DHAP before hormone treatment.

2.5. Propagating media

The propagating media were purchased from Soli Corporation of Kiryat Gat, Israel. We compared a growing medium that contains peat, tufa, and slow-release fertilizers with the same medium plus 30% perlite (v/v), and with rooting medium which contains peat, tufa, fertilizers, and chunks of artificial sponge.

In all experiments, rooting was done in “mini-greenhouses”, which in preliminary experiments were shown to be a superior means of attaining and maintaining rooted cuttings, compared to standard rooting flats. Polystyrene flats 50×30×10 cm were filled with a propagating medium, cuttings were placed in the medium, and the flat was then enclosed in a clear polyethylene sheet that was supported on metal wire arches that rose 30 cm over the cuttings. The condensate which was present inside the polyethylene sheets attested to the maintenance of high humidity during initial stages of rooting, which is critical to success in propagation of myrtle cuttings (Holcomb and Michalas, 1992). The “mini-greenhouses” were placed in a glasshouse with peak daytime temperatures ranging from 18°C in the winter to 35°C in the summer. Cuttings were watered weekly and the polyethylene sheet was removed after three months. Percentage rooting was determined at least four months after each set of cuttings was inserted in the medium.

All treatments in both varieties were performed in four replications of 15–25 cuttings each. In the completely randomized factorial design, treatments were date of sampling, type of propagating medium and presence or absence of DHAP.

3. Results and discussion

Seasonal variation in rooting efficiency is very common in woody plants, but the optimal time for rooting must be established individually for each species (Howard, 1996). Time of sampling had a clear effect on percent rooting of myrtle cuttings, while source (land-race) of cuttings was immaterial. Nearly 70% of the cuttings that were taken during winter (December–February) rooted, while those taken in May–August averaged only 20% rooting (Fig. 1). The same general time course of rooting was obtained with both ‘Rehovot’ and ‘Tzfat’ land-races from February 1996 to March 1998, but data presented in Fig. 1 are only from the first year. In both seasons, the periodicity in rooting was maintained regardless of propagating medium (data not shown).
Although time of sampling was the most critical factor in determining the percentage of rooting, the aeration of the propagating medium also had a marked effect on ‘Rehovot’. Addition of 30% perlite (v/v) to growth medium enhanced rooting of ‘Rehovot’ by one-third (Table 1), although it did not affect ‘Tzfat’. There were no differences in final rooting percentage when comparing growth medium plus 30% perlite with commercial rooting medium (which contained chunks of sponge to provide aeration). Holcomb and Michalas (1992) also found that a peat:perlite mix was superior to peat alone in promoting rooting of myrtle.

Treatment with DHAP, which is supposed to enhance rooting by preventing auxin conjugation (Epstein et al., 1993), did not affect rooting in ‘Rehovot’ at all, which reached 70% in winter, and only 37% in the spring. DHAP significantly (p ≤ 0.08) enhanced rooting in the ‘Tzfat’ variety over the entire period.

Table 1
Effect of propagating medium on percentage of rooting in ‘Rehovot’ and ‘Tzfat’ myrtle (*Myrtus communis* L.) land-races

<table>
<thead>
<tr>
<th>Propagating medium</th>
<th>Variety</th>
<th>Rehovot</th>
<th>Tzfat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth</td>
<td></td>
<td>42 (4.8)</td>
<td>61 (5.3)</td>
</tr>
<tr>
<td>Growth + perlite</td>
<td></td>
<td>64 (4.3)</td>
<td>66 (6.9)</td>
</tr>
<tr>
<td>Rooting</td>
<td></td>
<td>64 (3.7)</td>
<td>62 (5.3)</td>
</tr>
</tbody>
</table>

Data are representative of results from multiple experiments during 1996 and 1997. Standard error is in parentheses.
investigated, with an average increase of 6% (Fig. 2). The seasonal variation in rooting (which was significant at $p \leq 0.001$) is evidently not based on a periodicity in auxin conjugation, since DHAP was similarly effective during both fall-winter and spring–summer. ‘Rehovot’ might be insensitive to auxin conjugation, or perhaps the length of exposure to DHAP or its concentration were insufficient. Previous investigators have exposed cuttings to $0.2 \text{ mol}^{-3} \text{l}^{-1}$ DHAP for 6–12 h (Epstein et al., 1993; Lee and Starratt, 1986) prior to auxin treatment; it is possible that the 4 h exposure we used (Epstein, personal communication) was inadequate for substantial enhancement of rooting in myrtle in general and in the ‘Rehovot’ land-race in particular.

Although aeration and treatment with DHAP enhanced rooting in ‘Rehovot’ and in ‘Tzfat’, respectively, neither technique completely overcame the intrinsic seasonal periodicity in rooting of myrtle cuttings. Propagation of *Myrtus communis* L. is best achieved with material obtained in late autumn–winter.

**References**


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![Fig. 2. Rooting of ‘Tzfat’ myrtle cuttings taken at intervals during 1997. Cuttings were dipped in 0.8% indolebutyric acid (auxin), with and without a pretreatment in $0.2 \text{ mol}^{-3} \text{l}^{-1}$ 2,6 dihydroxyacetophenone (DHAP) in 50% isopropanol, before insertion in growth medium with 30% perlite. Standard error is indicated.](image-url)