Micropropagation of Ficus carica L.

C.A. Pontikis¹ and P. Melas²
Department of Pomology, Agricultural College of Athens, Botanikos, Athens 301, Greece

Additional index words. figs, in vitro propagation, phloroglucinol

Many plant species now can be propagated successfully through tissue culture. In vitro work with figs has been restricted to attempts to elongate single shoot tips to obtain plants free of fig mosaic virus (3). The present work was undertaken to develop a method for rapid propagation of Ficus carica L. ‘Kalamon’ to overcome supply problems for high density fig orchards.

Aspects of shoot cultures were initiated from actively growing shoot tips (2–5 mm) collected in spring from 1 year old potted ‘Kalamon’ plants, propagated by hardwood cuttings (1), grown under greenhouse conditions. Shoots were surface sterilized in a solution containing 0.55% sodium hypochlorite and 0.01% Tween-20 for 5 min and rinsed 6 times in sterile distilled water.

Shoot tips were placed singly in 2 x 15 cm test tubes containing 10 ml of culture medium. After 4 weeks, cultures were transferred to 250 ml Erlenmeyer flasks containing 125 ml of the same medium. Tubes were closed with aluminum foil cups and flasks with cotton wool bungs. Cultures were kept at 25 ± 2°C with a 16 hr photoperiod (40 μmol s⁻¹ m⁻²) under Sylvania cool-white fluorescent tubes.

The nutrient media consisted of MS salts (2) plus 0.56 mm (100 mg/liter) myo-inositol; 87.6 mm (30 g/liter) sucrose; 7 g/liter Oxoid No. 3 agar; 1.2 μM (0.4 mg/liter) thiamine HCl; 2.2 μM (0.5 mg/liter) 6-benzylaminopurine (BA); 0.5 μM (0.1 mg/liter) indolebutyric acid (IBA); 0.29 μM (0.1 mg/liter) gibberellic acid (GA₃) and 0.0 or 0.5 mm (89 mg/liter) phloroglucinol (PG). The pH was adjusted to 5.2 with HCl or NaOH prior to autoclaving at 121°C for 20 min.

Shoot tips produced 1–2 new shoots during the first 4 weeks on PG medium, and, after an additional 8 weeks, cultures produced 15–20 shoots 2–4 cm long. No shoot proliferation was observed on cultures without PG. The discoloration of medium, due to the leaching of polyphenols from the explants (3), was very slight and did not affect growth.

Single shoots were subcultured to 2 x 15 cm test tubes containing 10 ml of a rooting medium, which was the shoot development PG medium (without BA) with one of the following auxin treatments: 2.5 μM (0.5 mg/liter) IBA plus 2.7 μM (0.5 mg/liter) naphthaleneacetic acid (NAA); 4.9 μM (1 mg/liter) IBA and 9.8 μM (2 mg/liter) IBA. Rooting after 4 weeks is summarized in Table 1. Roots arose mainly from the part of the shoot above the surface of the rooting medium.

Rooted plantlets were transferred from the tubes to sterile vermiculite and covered with polyethylene to maintain humidity. Following acclimatization, plants were successfully transferred to pots containing equal parts of peat and vermiculite (v/v).

Literature Cited

Table 1. The effect of root types on the top growth of Astrophytum and Ferocactus Cacti. The values are means of 6 plants.

<table>
<thead>
<tr>
<th>Root type</th>
<th>Avg wt of explants (g)</th>
<th>Astrophytum</th>
<th>Ferocactus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seedling primary</td>
<td>5.9 c¹</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>Seedling adventitious</td>
<td>9.8 b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rootstock-Astrophytum</td>
<td>6.8 c</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rootstock-Ferocactus</td>
<td>12.0 a</td>
<td>13.8</td>
<td></td>
</tr>
</tbody>
</table>

¹Means separated by Duncan’s multiple range test, P = 5%.

Effects of Rootstock on Cactus Grafted with an Adhesive

N. Zieslin and A. Keren
Department of Ornamental Horticulture, Faculty of Agriculture, The Hebrew University of Jerusalem, P.O. Box 12, Rehovot 76-100, Israel

Additional index words. cyanocrylate, Ferocactus melocactiformis, Astrophytum myriostigma

The commercial formulation of grafting adhesive is based on cyanocrylate as an active ingredient with a proper solvent and catalyst. Before grafting, the upper 5–10 mm of the stock are removed transversally. A similar cut should be made at the basal part of the scion. There is no need for drying the cut-surface: a wet surface will accelerate the graft union. A minimal amount of adhesive should be squeezed from the tube on the outer ring (cortex) of the cut without covering the central core (Fig. 1). For convenience, covering the basal part of the scion with the adhesive is preferable. Vascular differentiation, however, will take place even though the graft surface to surface connection is incomplete (2). The stock and scion cut surfaces should be held together for 5–7 seconds to complete the graft.

In order to prevent glue coagulation on the glue-tube mouth, the wet cut-surface of the plant should not be touched by the tube.

For investigating rootstock-scion interactions, seeds of cactus species: Ferocactus melocactiformis De Canl (F) and Astrophytum myriostigma Lern. (A) (Fig. 2) were sown 22 June 1982, in a cactus seed germination mixture. In June 1983, some of the seedlings were excised from the roots, and the explants

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Table 1. Effect of auxins on rooting of 'Kalamon' fig explants in vitro after 4 weeks.

<table>
<thead>
<tr>
<th>Auxin treatment (mg/liter)</th>
<th>Rooted explants (percent)</th>
<th>Mean no. roots/explant</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBA, 1</td>
<td>80³ a</td>
<td>2.7 a</td>
</tr>
<tr>
<td>IBA, 2</td>
<td>25 c</td>
<td>2.4 a</td>
</tr>
<tr>
<td>IBA, 0.5 plus NAA, 0.5</td>
<td>40 b</td>
<td>2.5 a</td>
</tr>
</tbody>
</table>

³Each value represents the average of 4 replications; 10 explants per treatment in each replication. Mean separation in columns by Duncan’s multiple range test, 5% level.