Table 1. Means of scores of damage by the two-spotted spider mite and of the amount of cuticle on leaves of the same Impatiens species and hybrids.

<table>
<thead>
<tr>
<th>Line</th>
<th>Scores*</th>
<th>Amount of cuticle (mg/disc)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Spring</td>
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<tr>
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<td>Stoplight</td>
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<td>4.7 ab</td>
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<tr>
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<td>4.7 ab</td>
</tr>
<tr>
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<td>4.0 bcd</td>
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<td>4.3 abc</td>
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<td>Red Magic</td>
<td>4.0 abc</td>
<td>4.3 abc</td>
</tr>
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<td>Summer Star</td>
<td>4.0 abc</td>
<td>4.3 abc</td>
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<td>October Charm</td>
<td>3.7 bcd</td>
<td>4.0 bcd</td>
</tr>
<tr>
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<td>3.7 cde</td>
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<tr>
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<td>3.3 cdef</td>
<td>3.0 ef</td>
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<tr>
<td>P.I. 354256</td>
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<td>3.7 cde</td>
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<td>3.0 ef</td>
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<td>3.0 defg</td>
<td>3.0 ef</td>
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<td>ISU 78226</td>
<td>3.0 defg</td>
<td>3.0 ef</td>
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<td>Ring Master</td>
<td>2.7 fghi</td>
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<tr>
<td>P.I. 354258</td>
<td>2.3 fghi</td>
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</tr>
<tr>
<td>ISU 622-1</td>
<td>2.3 fghi</td>
<td>2.0 g</td>
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<td>ISU 7884-C</td>
<td>2.1 fghi</td>
<td>2.3 fghi</td>
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<tr>
<td>ISU 77109-1D</td>
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<td>1.7 gh</td>
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<tr>
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<td>1.7 gh</td>
</tr>
<tr>
<td>ISU 77229-9</td>
<td>1.3 i</td>
<td>1.0 h</td>
</tr>
</tbody>
</table>

*1 = highly resistant, 5 = susceptible. Mean separation in columns by Duncan’s multiple range test. 5% level.


Influence of Production and Postharvest Light Levels on the Interior Performance of Two Species of Scheffleras

John H. Braswell, Thomas M. Blessington, and James A. Price

Department of Horticulture, Mississippi State University, Mississippi State, MS 39762

Additional index words. acclimatization, chlorophyll, foliage plants

Abstract. Brassia actinophylla Endl, was larger in growth and better in quality when produced under 828 and 414 μE m²s⁻¹. Schefflera arboricola Hayata ex Kanehira increased in growth and quality when produced under 414 and 276 μE m²s⁻¹. Both species increased in growth and generally maintained good quality after a post holding period in an interior environment. Plants produced under the lower production light levels maintained good growth after 3 months indoors under interior light levels of 24, 16 and 8 μE m²s⁻¹. S. arboricola maintained better quality than B. actinophylla when held under the lowest interior light level.

Two species of scheffleras are widely used in the interior plantscape: B. actinophylla a

larger-growing species and S. arboricola a dwarf species with smaller leaflets and very tolerant of low light levels (6). Reduced light during production increases the ability of foliage plants to survive when placed under low interior light levels (4, 8) by lowering the light compensation point (3). The objectives of this study were to determine the effects of production light levels on growth, chlorophyll content, and quality at the end of production and after placement under different interior light levels.

A 3 x 3 factorial experiment in a randomized complete block design was established on December 3, 1979, with B. actinophylla and S. arboricola. The experiment was designed to test 3 production light levels and 3 interior light levels. Treatments were replicated 4 times with 1 plant per pot as an experimental unit. The production phase (Phase I) of the experiment was terminated May 3, 1980. Experimental units were then moved to an interior environment (Phase II) where they were held for 3 months.

Uniform seedlings of 6–9 cm in height were potted 1 per 15 cm diameter pot containing a 1 soil:2 peat:1 perlite mixture (v/v/v) amended with 5.3 kg/m³ dolomitic limestone. Micronutrients were added, by saturation of the root media, using STEM in solution at the rate of 64 mg/liter. Osmocote 14N–6.1P–11.6K was surface applied immediately after potting at the rate of 6 g/15 cm pot. Soluble fertilizer 20N–8.8P–16.6K was applied weekly at the rate of 200 mg N/liter in the irrigation water and was terminated one month prior to the end of the production phase. The experiment was conducted in a greenhouse with temperatures of 20°C minimum and 29°C maximum. Plants were watered once per week during cool months and twice per week during the warmer months.

Maximum production light levels in the greenhouse were 828, 414 and 276 μE m²s⁻¹ provided by polypropylene shade cloth. Following the production phase the plants were moved to an interior environment (Phase II) where they were held for 3 months. Phase II consisted of a light-temperature (20 ± 1°C)
controlled room with a relative humidity of 50±10%. Interior light levels were 24, 16 and 8 μE m⁻²s⁻¹ at plant height from Cool White fluorescent tubes for 12 hr daily. Light levels were determined weekly by using a Lambda LW-188 B light meter (Li-Cor, Inc., Lincoln, Nebraska) with a LJ-190 SB Quantum Sensor in the wavelength range of 400 to 700 nm Photosynthetic Active Radiation (PAR). The plants were watered once per week. No additional fertilizer was applied during the interior post holding phase.

Data collected at the end of Phase I were plant height, plant width, stem diameter, number of internodes, internode length, number of leaves, plant grade (1 = poor, not saleable; 3 = good, saleable; and 5 = excellent quality) and chlorophyll content, fresh weight and plant grade. Leaf drop was collected weekly.

Phase I. Production light levels influenced growth and quality of both species at the end of Phase I (Table 1). Growth index, stem diameter, number of internodes, internode length and leaf count were greatest for B. actinophylla when produced under 414 and 828 μE m⁻²s⁻¹. Plant grade was best for those plants produced under 414 μE m⁻²s⁻¹. Overall growth and plant grade was lowest on those plants produced under 276 μE m⁻²s⁻¹. S. arboricola had the largest growth index when produced under 414 μE m⁻²s⁻¹. Number of internodes, leaf count and chlorophyll were unaffected by production light levels. The difference in plant growth response to light levels indicates differences in optimum and saturation light levels for the 2 species. Others (2, 7) have reported differences in photosynthetic rates, light saturation point (LSP), and light compensation points (LCP) of sun and shade tolerant plants. These data indicate a lower LSP and LCP for S. arboricola which enables the plant to grow under a lower light level than B. actinophylla.

Phase II. Both species showed increased growth after 3 months in the interior post holding phase. Chlorophyll content of both species was greater on those plants held under 24 and 16 μE m⁻²s⁻¹ (Table 2). Leaf drop showed no difference regardless of production light or postholding light levels. B. actinophylla had a smaller growth index and stem diameter when produced under 828 μE m⁻²s⁻¹ and held under 16 and 8 μE m⁻²s⁻¹. Internode length was less on those plants produced under 828 and 414 μE m⁻²s⁻¹ and held under the lower light levels. S. arboricola produced under 276 μE m⁻²s⁻¹ had a smaller growth index when held under 8 μE m⁻²s⁻¹ but otherwise maintained good growth and plant grade under all interior light levels. S. arboricola maintains its growth under light levels usually considered unacceptable low for most other foliage plants (6).

Our results indicated that under the higher production light levels of this study B. actinophylla grew more rapidly and produced larger plants whereas S. arboricola were smaller and of poorer quality. S. arboricola adapted readily to the interior environments as indicated by growth regardless of the interior light levels. B. actinophylla showed reduced growth when held for 3 months under the lowest interior light level. S. arboricola maintained good plant grade when held under the lowest light level.

<table>
<thead>
<tr>
<th>Production light levels (μE m⁻²s⁻¹)</th>
<th>Growth¹ index (cm)</th>
<th>Stem diam (mm)</th>
<th>Internodes (no/plant)</th>
<th>Internode length (cm)</th>
<th>Leaf count (no/plant)</th>
<th>Chlorophyll (mg/cm² x 10⁻²)</th>
<th>Plant² grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. actinophylla</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>828</td>
<td>28.6a</td>
<td>8.1a</td>
<td>12.3a</td>
<td>3.4b</td>
<td>30.8a</td>
<td>5.3a</td>
<td>3.7b</td>
</tr>
<tr>
<td>414</td>
<td>28.1a</td>
<td>7.9a</td>
<td>12.4a</td>
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<td>31.0a</td>
<td>5.4a</td>
<td>4.1a</td>
</tr>
<tr>
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<td>6.6b</td>
<td>11.7b</td>
<td>2.6c</td>
<td>26.3b</td>
<td>5.9a</td>
<td>3.4c</td>
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<tr>
<td>S. arboricola</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>828</td>
<td>21.4c</td>
<td>6.6b</td>
<td>16.2a</td>
<td>5.9b</td>
<td>99.6a</td>
<td>4.7a</td>
<td>3.5b</td>
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<tr>
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<td>7.0a</td>
<td>16.1a</td>
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<td>96.7a</td>
<td>5.1a</td>
<td>3.8a</td>
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<td>276</td>
<td>23.3b</td>
<td>6.9a</td>
<td>16.0a</td>
<td>6.6a</td>
<td>94.6a</td>
<td>4.7a</td>
<td>3.8a</td>
</tr>
</tbody>
</table>

¹Growth index = plant height + plant width + 2. ²Length of the top 6 internodes. ³Plant grade (1 = poor, not saleable; 3 = good, saleable; 5 = excellent quality). ⁴Mean separation within columns within species by Duncan’s multiple range test, 5% level.

**Table 1. Influence of production light levels on growth and quality of two species of scheffleras after production (Phase I).**

<table>
<thead>
<tr>
<th>Interior light levels (μE m⁻²s⁻¹)</th>
<th>Growth¹ index (cm)</th>
<th>Stem diam (mm)</th>
<th>Internode length (cm)</th>
<th>Chlorophyll (mg/cm² x 10⁻²)</th>
<th>Leaf drop (no/plant)</th>
<th>Fresh wt (g)</th>
<th>Plant² grade</th>
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<td></td>
<td></td>
<td></td>
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<td>9.2a</td>
<td>4.4a</td>
<td>8.1a</td>
<td>1.5a</td>
<td>99.1a</td>
<td>4.0a</td>
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<td>4.0b</td>
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<td>87.9a</td>
<td>3.7a</td>
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<td>7.0b</td>
<td>3.5b</td>
<td>6.5b</td>
<td>3.7a</td>
<td>58.5b</td>
<td>2.8b</td>
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<tr>
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<td>5.0a</td>
<td>6.7a</td>
<td>4.3a</td>
<td>58.2b</td>
<td>2.8b</td>
</tr>
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<td>2.6a</td>
<td>53.0a</td>
<td>3.0a</td>
</tr>
<tr>
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<td>3.5a</td>
<td>5.9b</td>
<td>3.3a</td>
<td>50.9a</td>
<td>2.9a</td>
</tr>
<tr>
<td>S. arboricola</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
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</table>

6Growth index = plant height + plant width + 2. ²Length of the top 6 internodes. ³Plant grade (1 = poor, not saleable; 3 = good, saleable; 5 = excellent quality). ⁴Mean separation within columns within species by Duncan’s multiple range test, 5% level.

**Literature Cited**


**Table 2. Influence of production and interior light levels on growth, quality and chlorophyll content of two species of scheffleras following a 3 month post holding period indoors (Phase II).**
Single Node Stem Propagation of *Alyxia olivaeformis*¹

M. J. Tanabe²

College of Agriculture, University of Hawaii, Hilo, HI 96720

Additional index words: maile, plant propagation, auxin, indolebutyric acid

Abstract. Rooting percentage, number, length and quality of single node maile stem cuttings (*Alyxia olivaeformis* Gaud. F. Fusiiformis) were increased by 3000 ppm and 8000 ppm indolebutyric acid (IBA) concentrated dip solutions. Hardwood cuttings root better than semihardwood cuttings.

Maile, a valuable native foliage plant, is propagated almost exclusively by seeds (3). Interest in cultivating this plant has increased but seed availability remains inconsistent. As genetic variability of seed affects important qualities of this lei plant vegetative propagation would be desirable.

A preliminary, unpublished study conducted in 1980 showed low rooting percentage and quality of maile single node stem cuttings propagated without intermittent mist and without rooting compounds; semihardwood and hardwood cuttings rooted better than softwood cuttings. This study investigated the effectiveness of synthetic auxins in improving rooting of single node semihardwood and hard-wood cuttings. Semihardwood cuttings included partially matured wood and hardwood cuttings fully matured wood.

Single node semi-hardwood and hardwood cuttings 10-cm long were taken from 2-year-old greenhouse grown *Alyxia olivaeformis* plants on July 31, 1980. Leaf surface area was reduced by one-half and cuttings were placed in water prior to treatment. Treatments used for both semi-hardwood and hardwood cuttings were: untreated control, 3000 ppm and 8000 ppm IBA concentrated dip, 3000 ppm IBA + 3000 ppm naphthaleneacetic acid (NAA) concentrated dip, and 3000 ppm NAA concentrated dip. The auxin solutions were prepared by dissolving auxin in 50% ethyl alcohol (1). Basal end of cuttings were dipped in auxin solution for 5 sec and cuttings inserted in No. 2 vermiculite in flats. The medium was drenched with Benlate (0.45 g/liter) and flats placed in a shade cloth covered greenhouse under 27 klx with average maximum and minimum temperature of 27° and 20°C. Cuttings were irrigated once each day by spray stakes. Observations on rooting response were made after 11 weeks and cuttings were measured for percent rooting (cutting having 1 or more roots), root number, and length and rated on a quality scale of 1 to 4 with 1 = no rooting, 2 = small root system, 3 = intermediate root system and 4 = extensive root system. The experiment was established as a completely randomized design with 4 replications and 28 cuttings per treatment.

Table 1. Rooting of *Alyxia olivaeformis* single node semi-hardwood and hardwood cuttings as influenced by rooting compounds.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Concen (ppm)</th>
<th>Rooting (%)</th>
<th>No. roots</th>
<th>Root length (mm)</th>
<th>Root quality rating²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semi-hardwood cuttings</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>---</td>
<td>24 b</td>
<td>2.3 b</td>
<td>22.3 a</td>
<td>1.2 b</td>
</tr>
<tr>
<td>IBA</td>
<td>3000</td>
<td>48 ab</td>
<td>5.3 ab</td>
<td>28.3 a</td>
<td>1.6 ab</td>
</tr>
<tr>
<td>IBA</td>
<td>8000</td>
<td>57 a²</td>
<td>6.5 a</td>
<td>34.8 a</td>
<td>1.7 a</td>
</tr>
<tr>
<td>NAA</td>
<td>3000</td>
<td>39 ab</td>
<td>3.8 ab</td>
<td>29.8 a</td>
<td>1.4 ab</td>
</tr>
<tr>
<td>IBA + NAA</td>
<td>3000 + 3000</td>
<td>28 b</td>
<td>5.5 ab</td>
<td>32.5 a</td>
<td>1.3 ab</td>
</tr>
<tr>
<td><strong>Hardwood cuttings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>---</td>
<td>52 b</td>
<td>1.7 c</td>
<td>19.3 b</td>
<td>1.3 b</td>
</tr>
<tr>
<td>IBA</td>
<td>3000</td>
<td>82 a²</td>
<td>5.3 ab</td>
<td>37.3 a</td>
<td>1.9 a</td>
</tr>
<tr>
<td>8000</td>
<td>64 ab</td>
<td>8.8 a</td>
<td>40.8 a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAA</td>
<td>3000</td>
<td>50 b</td>
<td>4.3 bc</td>
<td>30.3 a</td>
<td>1.6 ab</td>
</tr>
<tr>
<td>IBA + NAA</td>
<td>3000 + 3000</td>
<td>54 b</td>
<td>6.8 ab</td>
<td>36.5 a</td>
<td>1.8 a</td>
</tr>
</tbody>
</table>

¹Received for publication April 6, 1981.

The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked advertisement solely to indicate this fact.

¹I thank Rodney Fujii and Bachrun Waite for their technical assistance.

Semi-hardwood cuttings treated with 8000 ppm IBA showed increased rooting response in comparison to untreated control. Rooting percentage increased 2-fold and root number nearly 3-fold. Root quality was also higher than the untreated control (Table 1).

Rooting percentage, root length and root quality for hardwood cuttings were increased with 3000 ppm IBA in comparison to untreated control. There was at least a 3-fold increase in root number with 8000 ppm IBA and a combination of 3000 ppm IBA and 3000 ppm NAA. This synergistic effect is similar to that observed with other plants (2, 4).

A trend of increased rooting percentage for hardwood cuttings as opposed to semi-hardwood cuttings was evident. This was especially apparent with the untreated control for the hardwood cuttings which showed greater than a 2-fold higher rooting percentage than the untreated control for semi-hardwood cuttings.

Literature Cited


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