HortScience 18(3):373–374. 1983.

Influence of Leaf Shine Compounds on Light Compensation Point of *Ficus benjamina*

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Additional index words. diffusive resistance, weeping fig

Abstract. **Leaf shine compounds applied to *Ficus benjamina* L. just prior to simulated shipment reduced their tolerance to low light stress as indicated by an increase in the light compensation point.**

Production of *Ficus benjamina* acclimatized to low light stress is of considerable interest to growers, marketers, and consumers. Collard et al. (1) found that increasing shade levels and decreasing fertilization during production reduced light compensation point (LCP) of *F. benjamina* and allowed moving such plants directly into interior plantscapes without leaf drop and without increasing production time or reducing quality. Milks et al. (5) confirmed the findings of Collard et al. and determined that acclimatized plants translocated more carbohydrates to root systems than nonacclimatized ones and, therefore, had stronger, healthier root systems.

Johnson et al. (3) and Joiner et al. (4) reported that light and nutrition during production interacted to determine leaf distribution, stomatal density, growth, and LCP of *F. benjamina*. Fonteno and McWilliams (2) indicated that LCP was lower in acclimatized plants since night respiration rates of leaves were reduced by the acclimatization process.

Most foliage plant growers normally spray plants with foliage shine materials prior to shipping to remove leaf residues and to make them more attractive for consumers. These experiments were established to determine if the shine materials affected LCP and, thus, keeping qualities in interiorscapes.

Two identical experiments were conducted on May 1, 1980 and January 27, 1981, testing 4 commercial leaf shine compounds in relation to LCP and normal plant proceses. Treatment applications were: no chemical control; 1% Volck oil spray (Chevron Chemical Co., Richmond, Calif.); undiluted Green-Glo (Green-Glo Products, Waco, Texas); Foliage Plant Leaf Polish (Best Line Products, Plymouth, Fla.), diluted 1:30 with water; and Luster Leaf (Luster Leaf Products, Inc., Atlanta, Ga.), diluted 1:9 with water. The experimental design was a randomized block with 5 replications of each treatment and 5 plants per replication. The shine compounds contain various ratios of a mineral oil base, vegetable oil solvent, detergent, and water.

F. benjamina were potted in 7.5-liter containers for each of 2 experiments in 3 Florida sedge peat : 1 builder's sand (by volume), amended with 4.2 kg dolomite and 1.8 kg Perk m^{-3} (a micronutrient blend manufactured by Estech General Chemical Corp., Chicago, Ill.). A total of 11.47 g of 19N–2.6P–8.3K Osmocote fertilizer per pot, equivalent to 600 kg $ha^{-1}yr^{-1}$ was surface-applied at the time of potting. Plants were grown 5 months under polypropylene shadecloth where they received light levels of 1100 μmol $m^{-2}s^{-1}$ photosynthetically active radiation (PAR), with 13° to 35°C minimum/maximum temperature, and were irrigated as needed. Data for Experiment 1 were taken from October 17 through November 5 and for Experiment 2 from June 2 through 29, after the upper leaf surfaces of one replication per week were sprayed thoroughly with the shine compounds (no effort made to cover both sides of leaves with the spray). Abaxial water-vapor resistance was determined 24 hr later at 1000 hr on the 3 most recently full expanded leaves per plant with a LI-COR Lambda diffusive resistance meter (Model LI-65); readings per plant were averaged. Temperature at time of diffusive resistance measurements averaged 35°C, light intensity 1000 μmol $m^{-2}s^{-1}$, and relative humidity 80 ± 10%. Plants were then placed in a control room under dark conditions for 5 days with temperatures of 16° to 18° and relative humidity of 55 ± 10% to simulate transportation to northern markets. Plants were then removed from the control room and LCPs determined by a procedure outlined by Johnson et al. (3).

Diffusive resistance data were converted to conductance (Table 1) to approximate transpiration, which was unaffected by treatment. The stomates were not covered or clogged by the materials as shown by scanning electron microscopy. Transpiration and gas exchange were basically unaffected.

Plant shine compounds increased LCP over controls, except for the Foliage Plant Leaf Polish in Experiment 2 (Table 2). This could have been due to reflective qualities of the shine materials. They may have reflected sufficient light during the LCP measurement process to require a higher input to produce the same photosynthesis rate as that of the control, giving an "artificial" increase in LCP. Treated plants lost about 3 times more leaves than did the controls within 2 weeks and, thus, the results indicate a need to increase light in interiorscapes to maintain quality of shine-treated plants compared with non-treated ones.

Large differences in LCP between the 2 experiments are explained in part by degree of acclimatization associated with winter- vs.

Table 1. Influence of leaf shine compounds on conductance of water vapor from leaves of *Ficus benjamina* measured with a LI-COR Lambda diffusive resistance meter (Model LI-65).

Treatment	Conductance (sec cm^{-1} ± SE) Expt. 1[z]	Expt. 2[y]
Control (no spray)	0.16 ± 0.02	0.36 ± 0.05
Oil Spray (Volck, 1%)	0.16 ± 0.04	0.33 ± 0.12
Green-Glo (no dilution)	0.17 ± 0.04	0.29 ± 0.11
Foliage Plant Leaf Polish (diluted 1:30)	0.16 ± 0.02	0.33 ± 0.09
Luster Leaf (diluted 1:9)	0.17 ± 0.04	0.30 ± 0.08

[z]Experiment concluded Oct. 17–Nov. 5, 1980.
[y]Experiment concluded June 2–June 29, 1981.

Table 2. Influence of leaf shine compounds on light compensation point of *Ficus benjamina*.

Treatment	Light compensation point (μmol) Expt. 1 (1979)	Expt. 2 (1980)
Control (No spray)	28.4 a[z]	40.8 a
Oil Spray (Volck, 1%)	38.0 b	56.2 c
Green-Glo (no dilution)	36.2 b	52.5 bc
Foliage Plant Leaf Polish (diluted 1:30)	34.2 b	47.3 ab
Luster Leaf (diluted 1:9)	34.6 b	51.0 bc

[z]Mean separation within treatments by Duncan's multiple range test, 5% level.

Received for publication October 2, 1982. Florida Agricultural Experiment Stations Journal Series No. 4175. 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.

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summer-grown plants. Plants in Experiment 1 were grown during the summer when light intensity and temperatures were highest, and production completed in the fall under lower light and temperature conditions; whereas, plants in Experiment 2 were grown during winter and spring when light intensity and temperatures were lower, but were sprayed in summer under a higher light–temperature regime. During Experiment 1, maximum day/night temperatures averged 37°/20°C for June–September and 29.4°/10° for October–November; monthly from February to June they were 27°/3.3°, 32°/2.7°, 33°/9°, 36°/15°, and 37°/14°, respectively. PAR averaged 2000 μmol $m^{-2}s^{-1}$ at midday during summer months and 1000 μmol $m^{-2}s^{-1}$ during winter months. *Ficus* completing production under the higher light and temperature regimes of summer months had a higher natural LCP than those shipped in the fall. Shine compounds used during the summer increased LCP more than those used on plants having a lower initial LCP.

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HortScience 18(3):374. 1983.

Flowering of *Aglaonema commutatum* 'Treubii' following Treatment with Gibberellic Acid

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Additional index words. inflorescence, plant breeding

Abstract. ***Aglaonema commutatum* Schott 'Treubii' sprayed once with 100, 200, or 400 mg/liter gibberellic acid (GA_3) in December flowered about 143 days after treatment. Significantly more flowers were produced at the 400-mg/liter treatment than at 100 or 200 mg/liter.**

Aglaonema species (*Araceae*) are important tropical foliage plants because of their adaptability to low light and humidity levels encountered under interior conditions. Diversity in plant size, growth habits, and foliar variegation patterns make *Aglaonema* an attractive genus for breeding and genetic studies. However, a lack of information concerning chromosome numbers, the presence of dichogamy and apomixis, the small number of pistillate flowers per inflorescence, and unpredictable flowering schedules have hampered breeding efforts.

Previous work has shown that several members of the Araceae flower in response to treatment with gibberellic acid (1, 2, 3, 4, 5, 6). *Dieffenbachia* flowered uniformly and produced more flowers as GA_3 concentration increased from 250 to 500 mg/liter (3). Flowers appeared normal and were fertile. This study was conducted in an attempt to induce uniform flowering of *Aglaonema commutatum* 'Treubii' using GA_3 treatment.

Thirty-six established single-stemmed plants growing in 20-cm pots containing a 2 sphagnum peat moss : 1 pine bark : 1 cypress shavings (by volume) medium, amended with 4.2 kg/m^3 dolomitic limestone, 1.8 kg/m^3 Micromax (micronutrient source), and 5.9 kg/m^3 14N–6P–12K Osmocote, were sprayed once on the upper and lower leaf surfaces until runoff (about 200 ml per plant) with 0, 100, 200, and 400 mg/liter of GA_3 in December 1981. Tween 20 at 0.5 ml/liter was used as a wetting agent. Plants were maintained under normal photoperiod in a shaded greenhouse at 180–200 μmol $m^{-2}s^{-1}$ light, with a temperature regime of 18°C night and 35° day. There was one plant per experimental unit and 9 replications per treatment in a randomized block design. The number of days to opening (determined by unfurling of the spathe) of the first inflorescence and the total number of inflorescences per plant were determined.

All plants sprayed with GA_3 had at least one open inflorescence within 148 days after treatment (Table 1) but there was no significant difference in mean number of days to flower among the 100, 200, and 400 mg/liter concentration of GA_3. One of 9 untreated control plants produced 3 blooms during the same period while none of the others showed any sign of flowering when the experiment was terminated after 165 days. Plants receiving the 400 mg/liter GA_3 treatment produced a mean of 6.7 blooms per stem, which was significantly higher than the 4.7 or 5.3 produced at 100- and 200-mg/liter treatments, respectively. All flowers were normal in appearance and produced pollen.

Table 1. Effect of a single gibberellic acid (GA_3) treatment on number of days to flower and number of inflorescences per plant of *Aglaonema commutatum* 'Treubii'.

GA_3 concn (ppm)	Mean days to first bloom[z]	Mean no. inflorescences
0	---[y]	0.3 a[y]
100	144 a	4.7 b
200	143 a	5.3 b
400	142 a	6.7 c

[z]Days after treatment until first inflorescence opened.
[y]One of 9 control plants flowered after 143 days, with 3 blooms. Mean separations within columns by Duncan's multiple range test, 5% level.

Although not included in the above experiment, stock plants of *Aglaonema rotundum* N.E. Br., *A commutatum* (Schott) Nicols. 'Tricolor', *A. nitidum* (Jack) Kunth *curtissii*, *A. pictum* (Roxb.) Kunth 'Tricolor', *A. crispum* (Pitcher & Manda) Nicols. 'Chartreuse Halo', *A.* X 'Manila', and *A.* X 'Abidjan' flowered within 5 months after a single treatment with 250 mg/liter GA_3. These plants flowered simultaneously for the first time and cross pollinations were made. As with *Dieffenbachia*, the ability to induce *Aglaonema* flowering with GA_3 application has increased breeding ease and efficiency.

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Received for publication November 27, 1982. Florida Agricultural Experiment Stations Journal Series No. 4331. 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.

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