be useful where accurate comparisons of fruit growth are required.

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Paclobutrazol and Night Interruption Lighting Affect Episcia Growth and Flowering

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Additional index words. PP333, growth regulator, growth retardant, flame violet, short night, *Episcia cupreata*

Abstract. ***Episcia cupreata* (Hook.) Hanst. 'Pink Panther' plants were drenched with 0, 0.07, or 0.21 mg a.i. paclobutrazol and given night interruption lighting (NIL) of 4 hr (2200–0200 HR) at 2.6 μmol·s^{-1}·m^{-2} or no light interruption. Paclobutrazol and NIL did not affect days to first flowering, while flower numbers per plant increased exponentially over time on paclobutrazol-treated and control plants. NIL increased flowers per plant from day 47 on. Flower longevity was greater on paclobutrazol-treated plants than controls. Plant size (canopy radius) was reduced by paclobutrazol, which caused a greater flower density per canopy area. Chemical name used: (*R**, *R**)-(±) β-[(4-chlorophenyl)methyl]-α-(1,1-dimethylethyl)-1*H*-1,2,4-triazole-1-ethanol (paclobutrazol).**

Episcias are foliage plants valued for their interesting foliage and attractive flowers. Treatments that increase earliness of flowering or flower number and longevity would be beneficial. Additionally, episcias are stoloniferous herbs that tend to become leggy when grown in greenhouses, and methods to reduce runner length without adversely affecting flowering would improve conformation.

Harbaugh et al. (4) reported that flowering of 2 episcia cultivars was generally highest with light intensities in the 6–22 klx range; flowering was reduced at lower and higher light intensities. Flowering of another gesneriad, African violet (*Saintpaulia ionantha* H. Wendl.), increased as interior light intensity increased (3).

Paclobutrazol is a highly active growth regulator that has been shown to control the extension growth of many plant species (1, 2, 5, 7). However, paclobutrazol has delayed flowering of chrysanthemum (5) and apple (6). Therefore, this study was initiated to determine the effects of paclobutrazol and night interruption lighting (NIL) on the growth and flowering of episcias.

Five-centimeter-long unrooted tip cuttings of 'Pink Panther' were planted 5 Apr. 1984, one per 12.7-cm black plastic azalea pot containing Vergro Commercial Container Mix (Verlite, Tampa, FL 33680). This mix of 2 sphagnum peat : 1 vermiculite : 1 perlite (by volume) was amended with 0.59 kg Micromax (Sierra Chemical, Milpitas, CA 95035) per m^3. Temperatures were maintained between 17° and 34°C in a fan and pad-cooled glasshouse painted to exclude 88% of photosynthetically active radiation (PAR) (180 μmol·s^{-1}·m^{-2} maximum). Pots were watered 3 times per week and fertilized once per week with 480 ppm N from a 20N-8.8P-16.6K fertilizer (Miller Nutrileaf Greenhouse, Miller Chemical and Fertilizer, Corp., Hanover, PA 17331).

Three weeks after potting, treatments were initiated in a 2×3 factorial in a split-plot design with 6 single plant replications. Episcia growth and flowering are influenced by initial plantlet diameter (4), so plants were allocated to blocks according to size of canopy at the time of treatment. Soil drench applications of paclobutrazol (sub-plots in randomized complete blocks) were applied at 0, 0.07 or 0.21 mg a.i. per pot in 100 ml of deionized water. Light treatments (main plots in randomized complete blocks) included no supplemental lighting or 4 hr (2200–0200 HR) of supplemental NIL (2.6 μmol·s^{-1}·m^{-2} PAR from incandescent lamps).

Flower numbers and longevity were determined daily for 54 days after treatment initiation. Flower longevity measurements began from the time of anthesis and terminated when petals started to wilt or the corolla abscised, at which time flowers were removed from plants. Maximum radius of the foliar canopy for each plant was determined on day 47 from treatment initiation.

Neither supplemental NIL (data not shown) nor paclobutrazol treatments affected days to first flowering (Table 1). Flower numbers per plant increased exponentially over time for all paclobutrazol levels ($y = 0.086e^{0.077x}$, $r^2 = 0.93$; $y = 0.039e^{0.098x}$, $r^2 = 0.88$; and $y = 0.052e^{0.088x}$, $r^2 = 0.89$; respectively, for the 0, 0.07 and 0.21 mg a.i. paclobutrazol per pot treatments). Analysis of covariance using the natural logarithm of flower numbers per plant showed that the slopes of these curves were heterogeneous ($P < 0.0006$). Paclobutrazol had a significant ($0.022 > P > 0.0001$ based on F values) influence on flower numbers per plant starting on day 42 and continuing through ex-

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Table 1. Effect of paclobutrazol soil drenches on subsequent plant size and flowering of *Episcia cupreata* 'Pink Panther'.

Paclobutrazol rate (mg a.i. per 12.7-cm pot)	Days to first flowering	Flower longevity (days)	Total flowers per plant	Maximum plant radius (cm)	Canopy area per flower[z] (cm^2)
0.0	20.7	4.7	13.8	31.6	564.8
0.07	26.8	5.7	13.7	22.6	225.8
0.21	26.8	5.3	9.2	11.5	130.9
		Treatment SS (%)[y]			
Paclobutrazol (L)	57.1NS	17.2NS	90.3**	98.3**	76.7**
Paclobutrazol (Q)	42.9NS	82.8**	9.7NS	1.7NS	23.3**
Night interruption lighting	100.0NS	100.0NS	100.0NS	100.0NS	100.0NS

[z]Determined on day 47 after treatment initiation.
[y]Linear (L) or quadratic (Q) significant at the 1% (**), 5% (*), or not significant (NS). There were no significant interactions.

periment termination on day 54. Plants treated with the 0.07 and 0.0 mg a.i. paclobutrazol per pot rates had the highest and lowest flower numbers per plant, respectively, over that time period. Flower numbers per plant were increased on plants under NIL from day 47 on ($0.044 > P > 0.040$ based on t tests), with plants receiving NIL having 30–43% more flowers per plant (7.2–9.9) than those not receiving NIL (5.0–7.7). There were no interactions between paclobutrazol and NIL treatments.

Flower longevity was greater ($P = 0.0018$) for paclobutrazol-treated plants compared to controls (Table 1). The high paclobutrazol level reduced the total flower numbers per plant; however, due to the small plant canopy caused by shortened internodes at that rate, canopy area per flower was reduced compared to the other treatments. Therefore, plants treated at the high paclobutrazol rate appeared more floriferous than plants treated with lower rates. NIL had no effect on plant radius or flower longevity, total numbers per pot, or density.

Soil drench paclobutrazol applications at the 0.07 mg a.i. per 12.7-cm azalea pot resulted in satisfactory growth reduction, enhanced flower longevity, and improved floral display of 'Pink Panther', and did not delay flowering as has been found for other crops (5, 6). Higher application rates than 0.07 mg appear unnecessary and could reduce vegetative growth and flowering excessively. Night interruption lighting does not appear sufficiently beneficial to warrant commercial use on this episcia.

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Early Scale Propagation Results in Forcible Bulbs of Easter Lily

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Abstract. **Bulb scales from different anatomical positions of Easter lily (*Lilium longiflorum* Thunb.) were field-propagated after the parent bulb had been treated for 0, 5, 10, or 15 weeks at 0°, 10°, 20°, or 30°C. Increasing the duration of bulb storage prior to propagation decreased the harvest weight of newly generated bulbs. Outer or middle scales increased weights of bulbs and numbers of forcible commercial bulbs. The innermost scales resulted in low weights and few forcible commercial bulbs.**

In Japan and the United States, commercial-sized Easter lily bulbs are produced after 2 or 3 growing seasons from scaling. In the Netherlands, there is a research program to produce forcible commercial bulbs after only one growing season from scaling. Towards this end, the following 2 points must be determined: 1) when to start scale propagation, and 2) what part of the parent bulb scales should be used. Van Tuyl (6) established a scale treatment method for the Easter lily. However, this treatment was begun in November after storing the parent bulbs at low temperatures (usually 0°–2°C). Low-temperature storage of parent bulbs delays leaf emergence from scale bulblets and decreases the appearance of the epigeous type plants (ETP) (5), which are desirable for bulb growth (7). These effects may delay bulb growth. Dutch growers traditionally use even the very small scales that are located on the inner side of the parent bulb (inner scale), although the data of Matsuo et al. (1–4) suggested that the inner scales may not be useful for practical scale propagation because of a low percentage of leaf emergence and less ETP compared to the outer or middle scales.

This study was designed to ascertain the date of propagation and the morphological location of the bulb scales for practical scale propagation of the Easter lily.

Bulbs of 'White American' (>20 cm in circumference) were lifted from a trial field

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