

and had a lower flower potential than 'Circus.' Cultivars which had the highest numerical overall rating were 'Applause,' 'Brandywine,' 'Karma,' 'Brightlight,' 'Echo,' and 'Joy.' A value of 4.0 or higher was considered worthy of further evaluation.

*Spring 1989.* This season began with ideal environmental conditions for chrysanthemum growth, with relatively cool days (high 70s and low 80s) and moderate nights (50-60°F). As the crop matured, rainfall decreased dramatically and hot sunny days prevailed, leading to excessive fading of the darker colored cultivars, such as 'Excel,' 'Hostess,' and 'Neoga.' Even with the high temperatures, 'Applause,' 'Gold Champ,' 'India,' 'Karma,' and 'Yellow Tan' remained bright and colorful when mature. Days to marketability ranged from 57.8 to 74.8, represented by 'Joy' and 'Fontana,' respectively (Table 2). Number of cultivars in the 8-, 9-, and 10-week response groups were 8, 23, and 8, respectively. Cultivars generally flowered 4-6 days later in 1989 than in 1988.

Plant height ranged from 10.4 ('Solo') to 18.4 ('Dare') inches. Only 18 of the 39 cultivars were within the 11 to 13 inch height range, with the majority of the remaining cultivars too tall. With the hot day and warm night temperatures late in the season, many of the cultivars had excessive internode elongation. Additional daminozide applications would have prevented this occurrence, although some cultivars, such as 'Dare' and the 'Charm' series would have needed a minimum of 2 more growth regulator applications to retard growth. Clubbiness of the terminal floral buds becomes a consequence of late growth regulator applications.

Number of laterals per pot ranged from 17.8 ('Dark Parasol') to 44.3 ('Songster'). 'Dark Parasol,' which is normally grown as a side-disbudded type and is a popular cultivar with few large flowers, did not have a "full" look when mature grown as a center-disbud. 'Cirbronze' produced the fewest floral buds per lateral (5.0) while 'Solo' had the most (10.0). Flower potential was least with 'Dark Parasol' (118) and greatest with 'Echo' (358). Although the ideal floral display is determined by both flower number and flower size, cultivars which had a flower potential less than 160 appeared sparse. Only 8 of the 39 cultivars exhibited a flower potential below this minimum.

Cultivars which were most adaptable under the cultural conditions established in this study were: white—'Karma,' 'Joy,' 'Echo,' 'Tara,' and 'Solo;' yellow—'Applause,' 'Rejoice,' 'Gold Champ,' 'India,' 'Kory,' and 'Yellow Tan;' orange—'Bronze Arola' and 'Cirbronze;' pink/rose—'Brandywine,' 'Pink Arola,' 'Chic,' and 'Circus;' red—'Lucido;' and lavender—'Ultralight.'

#### Literature Cited

1. U. S. Dept. Agr. 1985. Floriculture crops. 1984 summary and intentions for 1985. U.S. Dept. Agr. Stat. Reporting Serv. SpCr 6-1 (85).
2. U.S. Dept. Agr. 1989. Floriculture crops. 1988 summary. U.S. Dept. Agr. Stat. Board SpCr 6-1 (89).
3. Waters, W. E. and C. A. Conover. 1969. Chrysanthemum production in Florida. Fla. Agr. Expt. Sta. Bul. 730.
4. Wilfret, G. J. 1985. Evaluation of chrysanthemum cultivars grown as center-disbudded plants in containers. Proc. Fla. State Hort. Soc. 98:124-127.

*Proc. Fla. State Hort. Soc.* 102:280-282. 1989.

## PRODUCTION OF FOLIAGE BEGONIAS FOR THE INTERIORESCAPE MARKET

R. T. POOLE AND R. W. HENLEY<sup>1</sup>

*University of Florida, IFAS*

*Central Florida Research and Education Center—Apopka  
2807 Binion Road, Apopka, FL 32703*

*Additional index words.* Planting density, spacing.

**Abstract.** Most foliage begonias produced today for use indoors are grown in 3- to 6-inch diameter pots. Commercial interiorscapers looking for additional sources of color in planting design can find them in some of the foliage begonias. Four begonia cultivars—'Carpet', 'Mardi Gras', 'Shirt Sleeves' and 'Blue Boy'—were grown in a peat-lite mix in 6- and 8-inch pots with 1 or 2, 72-cell plugs per 6-inch pot and 1, 2, or 3 plugs per 8 inch pot. Plants were finished under 1200-1800 ft-c in a 70-90°F greenhouse. 'Carpet' was the most profitable cultivar followed by 'Mardi Gras', 'Blue Boy' and 'Shirt Sleeves'. Pots containing the most plugs were the most economical.

There are over 1,000 species of *Begonia* from the tropics and sub-tropics of both hemispheres. Many of the ornamental cultivars are complex hybrids developed over years of breeding. One group, the rhizomatous-rooted begonias, includes a large number of cultivars grown primarily for their large, colorful leaves. The foliage plant industry commonly refers to these as Rex begonias or foliage begonias. Since the industry's begonias include more than the Rex types, the term foliage begonias is used in this report.

Foliage begonias have been grown in limited numbers for many years. However, susceptibility to bacterial leaf spot and fungal root diseases, high soluble salts and brittle foliage have limited production. Improved irrigation systems that eliminate frequent wetting of the foliage usually prevent bacterial leaf spot without pesticide sprays. High quality peat-lite media and improved fungicides available to commercial growers have greatly reduced the incidence of pythium root and stem rot. Although brittle foliage is still a shipping consideration, improved packaging and handling procedures make shipment of begonias possible through most of the channels used for other foliage plants.

Florida foliage plant growers presently produce a few foliage begonias in pot sizes ranging from 3- to 6-inches in

Florida Agricultural Experiment Station Journal Series No. N-00105. Accepted for publication 11/29/89.

<sup>1</sup>Professor of Physiology and Professor, Foliage Extension Specialist, Ornamental Horticulture.

diameter. The most popular size is the 4-inch, primarily sold through mass market channels. This particular study was initiated to investigate the feasibility of growing large potted begonias in 6-inch standard and 8-inch azalea pots for the interiorscape market.

### Materials and Methods

Begonia 'Blue Boy', 'Carpet', 'Mardi Gras' and 'Shirt Sleeves' obtained as plugs May 17, 1988 from a 72-cell tray were planted in Vergro Container Mix in either 6- or 8-inch containers. There were four pots per treatment. Treatments were one or two plugs per 6-inch pot and 1, 2, or 3 plugs per 8-inch pot. Plants were grown in a glasshouse and received 1200-1800 maximum foot-candles. Temperatures ranged from 70-90°F. Plants were fertilized weekly with 400 ppm N from a 9-3-6 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O) solution and watered 1-2 times per week. Height and width were measured at 4-week intervals and plants were observed weekly to determine when they were ready for sale (RFS). Plants were RFS when they were approximately twice the container diameter. The following prices were used to determine the economics of the various cultivars and potting densities: cost of plugs-\$0.32; spacing for pro-

Table 1. Estimated net profit (\$) per pot per year from various *Begonia* cultivars and different planting densities<sup>1</sup>.

Plants/pot	'Blue Boy'	'Mardi Gras'	'Carpet'	'Shirt Sleeves'
1/6-inch	5.06	6.26	8.18	3.14
2/6-inch	5.22	6.42	9.30	5.46
1/8-inch	8.34	7.95	10.75	5.15
2/8-inch	9.03	9.03	13.75	7.28
3/8-inch	9.41	11.86	14.66	7.31

<sup>1</sup>Factors used: Cost/sq ft per year of glasshouse = \$5.42, plugs = \$0.32, production space, 6-inch=1.00 sq ft, 8-inch=1.25 sq ft. Sale price, 6-inch=\$2.40, 8-inch=\$3.50, days to ready for sale.

duction, 6"=1 sq ft (the average of 0.625 sq ft initially and 1.36 sq ft to finish), 8"=1.25 sq ft (the average of 1.0 sq ft and 1.5 sq ft); and cost per sq ft/year-\$5.42. To obtain gross profit, 365 was divided by RFS days, then the result multiplied by the sale price (\$2.40/6" pot, \$3.50/8" pot). Net profit was obtained by subtracting the total cost of greenhouse space and cost of the plugs from the gross profit (Table 1).

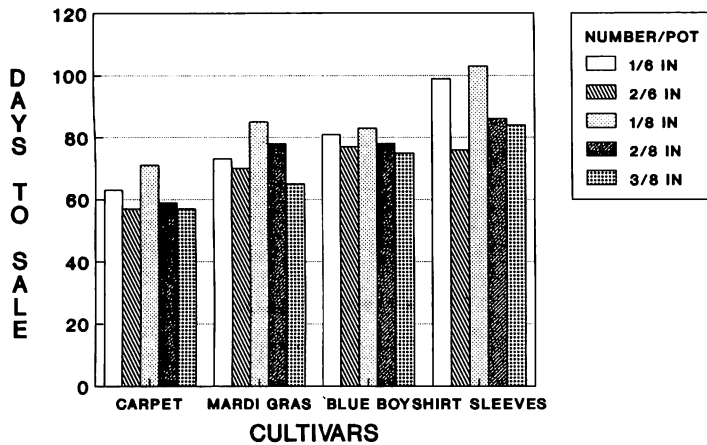


Fig. 1. Days to sale of begonia cultivars planted at different densities on May 17, 1988.

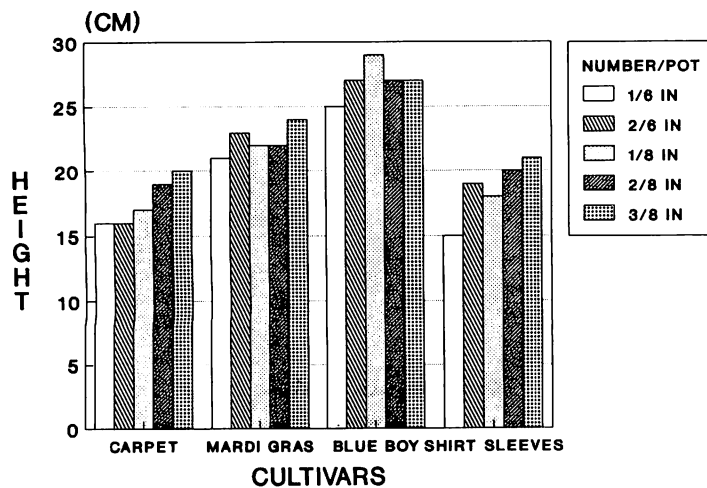


Fig. 2. Height when begonia cultivars planted at different densities were ready for sale.

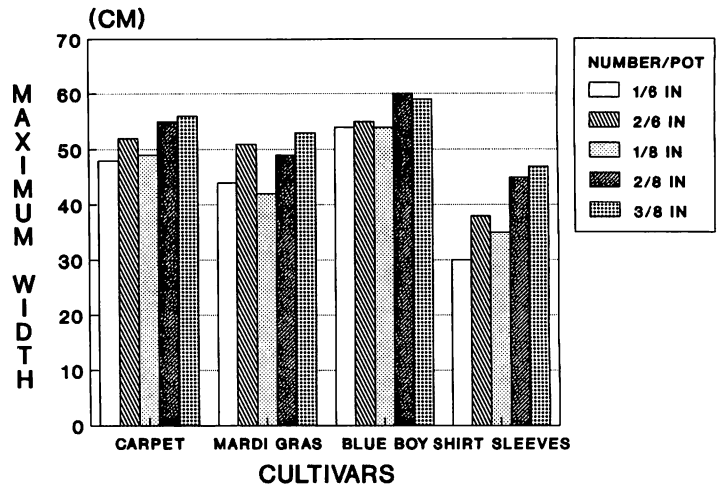


Fig. 3. Maximum width when begonia cultivars planted at different densities were ready for sale.

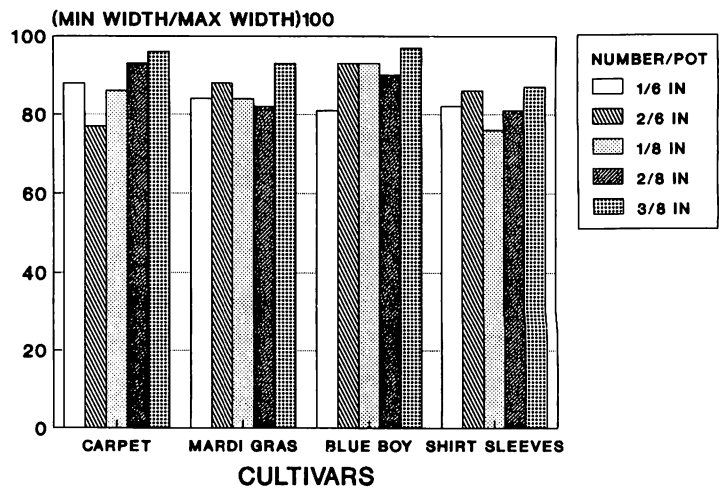


Fig. 4. Symmetry [(minimum width/maximum width)100] when begonia cultivars planted at different densities were ready for sale.

## Results and Discussion

'Carpet' was the first cultivar RFS, followed in order by 'Mardi Gras', 'Blue Boy' and 'Shirt Sleeves' (Figure 1), with about a month difference between 'Carpet' and 'Shirt Sleeves' and about 2 weeks between 'Carpet' and 'Mardi Gras'. Pots with the most plugs were RFS first and pots with only one plug per 8-inch pot was RFS 2-3 weeks later.

There was little difference in height of plants when RFS (Figure 2) due to planting density, but 3 plugs/8-inch pot produced slightly taller plants. There was apparently difference in height due to cultivars with 'Carpet' the shortest and 'Blue Boy' the tallest.

Width was slightly affected by planting density (Figure 3) with 'Carpet' being one of the widest. 'Blue Boy' was also wide, making it the largest of the cultivars tested. Differences in symmetry [(minimum width/maximum width)100] might be expected when comparing 2 plugs per pot to 1 or 3 plugs per pot, but all combinations were near 80, and in some cases 2 plugs per pot produced more symmetrical plant combinations than 1 plug per pot (Figure 4).

Profit was estimated to be highest for 'Carpet', followed by 'Mardi Gras', 'Blue Boy' and 'Shirt Sleeves'. Three plugs/8-inch pot would be the most profitable planting density, and 2 plugs/6-inch pot more profitable than one plug/6-inch pot (Table 1).

*Proc. Fla. State Hort. Soc.* 102:282-283. 1989.

## EVALUATION OF *MAGNOLIA GRANDIFLORA* 'GLEN ST. MARY' FOR USE IN INTERIOR ENVIRONMENTS

CHRIS A. MARTIN AND DEWAYNE L. INGRAM  
*University of Florida, IFAS*  
*Ornamental Horticulture Department*  
*Gainesville, FL 32611*

*Additional index words.* interiorscaping, nursery production, southern magnolia.

**Abstract.** *Magnolia grandiflora* 'Glen St. Mary' was grown for 12 months in a simulated interior environment after a 6 month exposure to treatment consisting of 2 irradiance levels (full sun and 80 percent shade) and 5 concentrations of soil-applied paclobutrazol (0, 6, 12, 25, and 50 mg/pot). The interior lighting was provided by 60 watt cool-white fluorescent lamps and maintained for 16 hours daily (30  $\mu\text{mol m}^{-2} \text{s}^{-1}$  at canopy height). Temperature was maintained at 25°C. Trees produced under full-sun survived longer in the interior environment compared to shade-grown trees which began to decline after 6 months. Increased paclobutrazol application rate reduced the length of tree survival.

The continuing popularity of interiorscaping necessitates research directed towards cultural practices which extend the useful life of plants, especially in low light environments. Plants growing in low light frequently exhibit symptoms such as etiolation, necrosis, chlorosis, and leaf drop (1). The useful life of plants has been shown to be affected by production light levels (7). Previous research suggested that the interior performance of *Ficus benjamina* was enhanced by growing plants under reduced production light levels (2, 3). However, Nell and Barrett (5) found that interior performance of poinsettia was enhanced by high production light levels even though poinsettias grown at low production light levels had lower light compensation points. Use of growth regulators during the production period may increase tree longevity by affecting carbohydrate storage.

*Magnolia grandiflora* 'Glen St. Mary' possesses a structure and form suitable for use in interior environments as

a substitute for the more common tropical tree species. The objective of this study was to evaluate the interior performance of *Magnolia grandiflora* 'Glen St. Mary' as a function of production irradiance level and paclobutrazol rate.

### Materials and Methods

A previous experiment was conducted to assess the growth response of 'Glen St. Mary' magnolia to 2 production irradiance levels of full sun and 80% shade and 5 concentrations of soil-applied paclobutrazol of 0, 6, 12, 25, and 50 mg/pot (4). Upon termination of the previous experiment, 40 trees grown in one-gallon polyethylene containers using Metro-Mix 500 growth medium (W. G. Grace and Co., USA) were moved into a simulated low light interior environment for a period of 12 months. The interior lighting was provided by 60 watt cool-white fluorescent lamps [30  $\mu\text{mol m}^{-2} \text{sec}^{-1}$  PPF measured at canopy height by a LI-COR quantum radiometer (LI-COR Inc., Lincoln, Neb.)] and maintained for 16 hours daily. Temperature was maintained at 24°C. Tree were watered to container capacity once per week or as needed and no additional fertilizer was applied.

A tree viability count and a visual rating of viable trees were conducted monthly. The visual rating scale was based upon leaf size and color, foliage density, and overall plant size. Trees were rated from 1 (poorest) to 5 (excellent).

The experimental design was a 2 by 5 factorial arrangement in a completely randomized block with 4 single tree replicates. The data were analyzed using analysis of variance and regression. Regression coefficients were tested for homogeneity of fit using the F test.

### Results and Discussion

The survivability of 'Glen St. Mary' magnolia in a simulated interior environment was affected by previous production treatments (4). Survival was longest for trees initially grown under full sun compared to trees grown in the shade (Figure 1). The mean length of survival increased quadratically with decreasing paclobutrazol rate applied during the production period (Figure 2). There was no

*Proc. Fla. State Hort. Soc.* 102: 1989.