

## CHRYSANTHEMUM CULTIVARS EVALUATED AS CENTER-DISBUDDED

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**Abstract.** Forty-two and 39 chrysanthemum (*C. morifolium* Ramat.; syn. *Dendranthema grandiflora*) cultivars were evaluated during 1988 and 1989, respectively. Plants were grown in 6-inch diameter containers on raised beds in a polypropylene shade house (25% light exclusion). Cultural procedures included planting 4 rooted cuttings per pot, manually pruning the plant terminals after 10 days, night lighting from time of planting through 5 days after pinching, and applying 2 applications of daminozide as 2500 ppm foliar sprays. Days from lights out to marketability ranged from 54.1 ('Pekoe') to 82.5 ('Candlelight') in 1988 and 57.8 ('Joy') to 74.8 ('Fontana') in 1989. Plant height (inches) ranged from 9.9 ('Gold Champ') to 14.5 ('Dark Parasol') in 1988 and from 10.4 ('Solo') to 18.4 ('Dare') in 1989. The best cultivars, by color, 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.'

Production of multi-plant potted chrysanthemum (*C. morifolium* Ramat.) was an \$11.4 million industry in Florida during 1988 (2), with almost 4.1 million 5-inch or larger pots sold. This represented over a 56% increase in sales and a 37% increase in volume from 1984 (1). Most of these units consisted of 4 or 5 plants grown in 6 or 6.5-inch diameter pots which were sold locally or exported outside of Florida to florist shops and chain stores. The majority of the plants were grown as center-disbudded to produce multiple flowers per lateral (spray type) and the remainder were side-disbudded to allow 15-20 large terminal flowers to develop (standard type). The increase in production and sales has been attributed to greater consumer demand for flowering pot plants and to awareness of the vast range of colors and flower types available with chrysanthemums. This demand has been accompanied by an increase in new cultivars, with brighter colors and unusual flower characteristics, such as quilled or spoon florets or bright daisy types. Many of the cultivars recommended in previous publications (3, 4) no longer exist and have been replaced by ones which commercial propagators judge to be healthier, to be more responsive to growth regulators, to have better growth habit, or to possess outstanding flower characteristics.

The objective of this research was to evaluate a selection of available commercial chrysanthemum cultivars which could be center-disbudded to produce a spray-type product in a shade house in Florida.

*General:* Four rooted chrysanthemum cuttings were planted per 6-inch diameter plastic container (A600) in a medium of Florida sedge peat, coarse white builders' sand, coarse vermiculite, and perlite (5:3:3:1, v/v). Medium amendments in lbs/yd<sup>3</sup> of soil were 12.0 Osmocote Chrysanthemum Mix 12-8.3-7.4 (NPK), 1.5 6-5-2.6 dry fertilizer, 15.0 dolomite, 10.0 granular calcium carbonate, 4.0 hydrated lime, 6.0 superphosphate, and 1.0 Micro-Max (a minor element mixture). Plants were grown in a shade house covered with black polypropylene (25% light exclusion) under ambient temperature and humidity. Incandescent lights, which provided a minimum of 10 ft-candles at plant level, were illuminated from 2200 to 0200 hours daily from time of planting until 5 days following pinching. Pots were set on 6-inch high raised beds which were covered with 1.5 mil white on black polyethylene mulch, with the white side up. Pots were spaced on 15-inch centers, with 3 rows of pots down each 2.7 foot wide bed. Plants were watered manually as needed. Each pot was soil drenched at planting with 8 oz solution containing Banrot (0.5 lb/100 gal) plus 20-16.6-8.7 liquid fertilizer (1.0 lb/100 gal). Plants were protected from insects, mites, and diseases by a weekly preventative spray program. The experimental design was a randomized complete block and each cultivar contained 4 replications of 3 pots each. Significant differences among cultivar means for each of the parameters measured were determined by Duncan's multiple range test. Data recorded included date of marketability (1/3 flowers open), plant height above the pot rim, plant diameter, inflorescence diameter, number of laterals, and number of floral buds per lateral. Flower potential was calculated as the product of the latter two parameters. Plants were also subjectively evaluated for their aesthetic value on a scale of 1 to 5, where 1 = poor and 5 = excellent.

*Spring 1988.* Forty-two chrysanthemum cultivars (Table 1) were planted on 23 Feb. and were soft-pinched (terminal pruned) on 7 Mar. Lights were discontinued on 12 Mar. Foliar applications of 2500 ppm daminozide (B-Nine, SADH) were applied on 19 and 26 Mar., with a volume of 0.85 oz (1.5 quarts/100 ft<sup>2</sup>) per pot. Chemical was applied using a pressurized sprayer at 40 psi. Data on plant characteristics were recorded starting 4 May when the earliest maturing cultivars had at least 1/3 of the flowers open.

*Spring 1989.* Thirty-nine chrysanthemum cultivars (Table 2), which included the highest rated cultivars from 1988 as well as newly introduced cultivars from industry, were planted on 17 Feb. and soft-pinched on 3 Mar. Lights were turned off on 8 Mar. Foliar applications of 2500 ppm daminozide were applied on 16 and 23 Mar., with a volume of 0.85 oz per pot (1.5 quarts/100 ft<sup>2</sup>). Plant measurements were initiated on 5 May.

### Results and Discussion

*Spring 1988.* The season started with cool, wet days (65-75°F), which were ideal for plant establishment but appeared to delay plant growth. Warmer, dryer weather prevailed after time of pinching and the environmental conditions were ideal for chrysanthemum growth. Descriptions

Table 1. Plant and flower characteristics of center-budded chrysanthemum cultivars grown in 6 inch containers (Spring, 1988).

Cultivar	Flower Type	Flower Color	Flower Diameter (in.)	Days to Marketability <sup>z</sup>	Plant Height (in.)	Plant Diameter (in.)	Number Laterals	No. Flw. Buds per Lateral	Flower Potential	Overall Rating <sup>y</sup>
Akira	Daisy	Light Rose	3.0 cd <sup>x</sup>	59.7 pg	11.3 j-o	13.5 n-r	22.0 h-o	7.5 d-h	165 i-n	2.0 no
Antonio	Daisy	White	2.6 f-j	75.2 c	12.3 d-i	15.2 b-e	25.0 e-j	5.8 h-k	145 l-q	2.6 lmn
Applause	Decorative	Butter Yellow	2.0 p	59.6 pg	10.9 nop	13.8 l-r	25.5 e-i	7.8 d-g	199 e-h	4.9 a
Brandywine	Decorative	Medium Rose	2.9 d	67.9 g	12.4 c-i	14.2 h-n	24.5 e-k	5.8 h-k	142 m-q	4.9 a
Brightlight	Daisy	Dark Yellow	2.4 g-l	64.9 hij	12.8 b-f	13.9 j-q	25.2 e-j	4.8 k	121 p-s	4.8 ab
Bronze Arola	Decorative	Medium Orange	2.1 m-p	65.3 hi	11.6 h-o	14.0 j-p	32.2 abc	6.8 e-j	219 d-g	4.7 abc
Candlelight	Daisy	Medium Orange	2.4 h-m	82.5 a	13.0 b-e	14.8 c-h	31.8 abc	5.0 jk	159 j-o	2.7 lm
Carnival	Daisy	Light Yellow	3.3 b	63.8 jkl	12.8 b-f	13.3 p-s	18.2 n-q	7.5 d-g	136 m-s	4.2 b-g
Chic	Daisy	Dark Rose	2.1 nop	58.9 qr	12.1 e-j	13.9 k-r	24.3 e-k	7.2 d-i	175 h-l	4.5 a-e
Golden Geos	Decorative	Light Yellow	3.3 b	69.1 fg	12.8 c-f	15.3 bcd	21.0 k-p	6.5 f-k	136 m-s	3.9 e-i
Circus	Daisy	Medium Rose	2.3 i-n	62.7 lm	11.7 g-n	13.2 q-t	23.5 f-m	6.5 f-k	153 k-p	4.4 a-f
Dark Cirus	Daisy	Dark Rose	2.2 i-n	66.1 h	11.5 h-o	13.2 r-u	17.8 opq	6.5 g-k	107 s	3.4 ijk
Dark Parasol	Daisy	Medium Rose	2.8 l-o	65.8 h	14.5 a	14.8 c-i	17.8 opq	6.5 f-k	116 qrs	4.1 c-h
Echo	Daisy	White	2.1 op	61.9 mn	15.5 b	15.4 bc	32.5 ab	9.8 abc	318 a	4.8 ab
Envy	Decorative	White	3.2 bc	61.9 nm	10.9 m-p	15.0 c-h	17.3 pqr	6.0 g-k	104 s	3.1 jkl
Excel	Decorative	Medium Lavender	2.1 op	63.2 klm	11.1 k-o	12.8 stu	24.0 e-l	7.5 e-h	180 h-k	3.7 g-j
Firelight	Daisy	Light Orange	2.5 f-k	56.9 s	10.3 pq	12.8 stu	22.5 hn	6.5 f-k	146 l-q	2.1 mn
Free Spirit	Decorative	Cream	3.5 a	76.9 b	11.9 f-m	14.6 d-j	27.5 def	7.0 e-i	192 f-i	4.1 c-h
Geos	Decorative	White	3.2 b	73.8 d	13.0 b-e	16.6 a	22.8 h-m	5.8 h-k	132 o-s	3.8 f-i
Gold Champ	Decorative	Medium yellow	2.6 e-h	68.4 fg	9.9 q	14.5 e-l	25.5 e-i	8.5 cde	217 d-g	4.4 a-f
Golden Antonio	Daisy	Light Yellow	2.6 e-h	75.5 c	12.0 f-k	13.7 m-r	19.8 l-q	6.3 f-k	125 p-s	2.5 lmn
Hostess	Decorative	Medium Rose	2.5 f-k	68.2 g	11.9 f-l	14.5 e-l	20.5 kpq	6.5 f-k	133 n-s	4.1 e/h
Joy	Daisy	White	2.4 h-m	55.2 t	12.4 d-i	15.1 c-f	26.3 d-h	8.5 cde	224 def	4.8 ab
Karma	Daisy	Cream	2.2 l-o	57.4 s	11.3 j-o	14.1 i-o	30.3 bcd	9.0 bcd	273 b	4.9 a
Lamplight	Daisy	Pale Yellow	2.6 f-j	71.7 e	11.0 l/p	13.4 o-r	13.5 r	8.5 cde	115 qrs	2.6 lmn
Lucido	Daisy	Dark Red	2.4 g-l	69.6 f	13.4 bc	15.9 b	26.3 d-h	10.8 a	284 b	4.0 d-i
Neoga	Daisy	Pale Rose	2.9 de	68.2 g	11.5 h-o	15.0 c-h	27.5 def	6.8 e-j	187 g-j	4.3 a-g
Pekoe	Daisy	Light Orange	2.3 k-o	54.1 t	12.0 e-k	12.6 tu	22.5 h-n	10.9 abc	225 de	1.4 o
Pink Arola	Decorative	Dark Rose	2.6 f-j	64.8 hij	12.2 e-j	14.6 d-j	30.5 bcd	5.5 ijk	168 h-m	4.7 abc
Puritan	Decorative	White	3.2 bc	71.0 e	12.5 c-h	15.0 c-f	28.3 cde	7.8 d-g	221 def	4.1 c-h
Rave	Daisy	Light Rose	2.5 f-j	57.4 s	11.5 h-o	14.4 e-l	27.3 def	7.8 d-g	213 d-g	4.5 a-e
Rejoice	Daisy	Lemon Yellow	2.6 f-j	60.4 op	11.8 g-m	14.9 c-h	22.3 h-n	6.3 f-k	140 m-r	4.5 a-e
Salmon Charm	Decorative	Light Salmon	2.7 ef	65.9 h	12.7 c-g	15.3 bcd	25.5 e-i	6.5 f-k	166 i-m	4.1 c-h
Schnitzer's Twilight	Daisy	Medium Bronze	2.5 f-k	58.8 qr	12.2 e-j	12.5 u	16.5 qr	6.5 f-k	107 s	2.6 lmn
Siren	Daisy	Dark Orange	2.3 j-m	57.7 rs	10.9 nop	14.2 g-n	22.8 h-m	8.0 def	182 h-k	2.8 kl
Skylight	Daisy	Medium Rose	2.6 f-i	68.1 g	12.8 b-f	14.6 g-k	21.8 i-o	5.0 jk	109 s	3.5 hij
Solo	Daisy	Cream	2.0 p	58.0 rs	10.7 opq	14.1 j-o	26.3 e-h	10.3 ab	271 bc	4.4 a-f
Songster	Quill	Lemon Yellow	2.6 f-k	61.2 no	12.4 d-i	15.4 bc	35.3 a	6.8 f-j	240 cd	4.3 a-g
Steplight	Daisy	Dark Red	2.4 g-k	64.7 hij	12.6 c-g	15.8 b	21.0 k-p	5.8 h-k	122 p-s	4.1 c-h
Sunlight	Daisy	Medium Yellow	2.6 e-h	65.9 h	12.4 d-i	14.1 i-o	19.3 m-q	6.8 e-j	131 o-s	4.6 a-d
Tara	Daisy	Cream	2.2 l-o	64.1 ijk	12.6 c-g	27.0 d-g	8.0 def	216 d-g	4.5 a-e	
Ultralight	Daisy	Medium Lavender	2.6 e-h	60.5 op	13.3 bcd	14.4 f-m	22.5 h-n	5.0 jk	112 rs	4.0 d-i

<sup>z</sup>Marketability was determined when approximately 1/3 of flowers were open.<sup>y</sup>1 = poor; 5 = excellent.<sup>x</sup>Mean separation within columns by Duncan's multiple range test, 5% level.

of the flowers, by color and type, are recorded in Table 1. Color-mix of the 42 cultivars contained 10 white/cream, 10 yellow, 7 orange/salmon/bronze, 11 rose, 2 lavender, and 2 red. The high light intensity and the normal hot and dry weather during late April and May faded the floret color of several of the cultivars, such as 'Firelight,' 'Pekoe,' 'Schnitzer's Twilight,' and 'Skylight.' Several of the white cultivars, such as 'Solo' and 'Tara' exhibited very clear white florets when just opening but had a tendency to pink when the florets were mature. In contrast, 'Joy' retained

its snowy white luster, even when all flowers were open. This pinking characteristic was also evident with some of the yellow cultivars, such as 'Rejoice.' Thirteen of the cultivars had a decorative flower type and 28 had a standard daisy type. Florets of 'Echo' were spoon shaped while those of 'Songster' had very frilly spider-type florets.

Days to marketability ranged from 54.1 to 82.5, represented by 'Pekoe' and 'Candlelight,' respectively (Table 1). One of the cultivars would be classed in the 7-week response group, 15 were in the 8-week group, 17 were in

Table 2. Plant and flower characteristics of center-budded chrysanthemum cultivars grown in 6 inch containers (Spring, 1989).

Cultivar	Flower Type	Flower Color	Flower Diameter (in.)	Days to Marketability <sup>2</sup>	Plant Height (in.)	Plant Diameter (in.)	Number Laterals	No. Flw. Buds per Lateral	Flower Potential	Overall Rating <sup>3</sup>
Applause	Cushion	Butter Yellow	1.8 u <sup>x</sup>	64.1 lmn	11.3 rs	14.8 lm	35.4 cd	8.4 b-e	297 bc	4.8 a
Brandywine	Decorative	Medium Rose	2.8 efg	70.6 bc	13.3 hij	15.4 h-m	26.8 i-l	6.1 h-m	164 m-q	4.4 a-e
Brightlight	Daisy	Dark Yellow	2.6 h-k	65.3 i-l	13.5 ghi	15.3 h-m	26.2 j-m	6.6 f-l	173 k-q	3.8 e-h
Bronze Arola	Decorative	Medium Orange	2.4 k-p	68.7 de	11.3 rs	15.1 j-m	35.0 cd	5.7 j-m	200 h-m	4.6 abc
Carnival	Daisy	Light Yellow	3.0 cde	64.9 jkl	15.2 c	14.5 m	21.8 nop	7.8 c-g	170 l-q	3.6 gh
Chic	Daisy	Dark Rose	1.8 u	61.3 pq	12.7 k-n	14.9 lm	28.4 gk	7.4 d-i	210 h-l	4.5 a-d
Cirbronzee	Daisy	Medium Orange	2.0 t	65.0 jkl	12.3 mno	14.8 lm	29.2 f-k	5.0 m	146 pqr	4.1 b-g
Circus	Daisy	Medium Rose	2.2 st	68.8 de	13.1 hij	15.2 i-m	26.1 klm	6.5 g-m	170 l-q	4.4 a-e
Claro	Decorative	Cream	2.9 cde	62.6 nop	11.3 rs	16.1 f-i	20.0 opq	6.6 f-l	132 qr	3.4 hi
Coral Charm	Decorative	Light Salmon	2.4 k-q	68.8 de	13.2 hij	18.4 b	29.2 f-k	7.3 d-i	213 g-k	3.7 fgh
Dare	Daisy	White	3.5 a	61.5 pq	18.4 a	18.4 b	30.3 e-h	7.0 e-l	212 g-k	2.5 j
Dark Bronze Charm	Decorative	Medium Orange	2.5 j-o	66.7 ghi	13.1 hij	17.4 cd	26.4 jkl	8.1 b-f	214 g-k	2.4 j
Dark Parasol	Daisy	Medium Rose	2.9 cde	63.9 lmn	14.1 efg	15.3 h-m	17.8 q	6.6 f-l	118 r	4.4 a-e
Echo	Daisy	White	2.1 t	66.6 ghi	14.6 cde	17.4 cd	39.8 b	9.0 abc	358 a	4.5 a-d
Excel	Decorative	Medium Lavender	2.0 t	63.9 lmn	11.8 o-r	14.5 m	28.8 g-k	9.5 ab	270 cde	3.8 e-h
Fontana	Quill	Dark Yellow	3.3 b	74.8 a	12.8 j-m	17.7 bcd	30.8 efg	5.5 lm	169 l-q	4.1 b-g
Free Spirit	Decorative	Cream	3.1 c	74.2 a	12.1 m-p	15.7 g-l	18.9 pq	7.3 d-i	138 qr	3.8 e-h
Gold Champ	Decorative	Medium Yellow	2.8 fgh	68.7 de	10.9 st	15.5 h-l	30.4 e-h	7.9 c-g	240 e-h	4.7 ab
Hostess	Decorative	Medium Rose	2.4 k-q	69.4 cd	12.6 j-n	16.2 e-h	20.0 opq	7.9 c-g	158 n-r	4.3 a-f
India	Daisy	Medium Yellow	2.6 i-m	58.1 st	12.3 l-o	15.0 klm	23.4 mn	6.4 g-m	150 o-r	4.7 ab
Joy	Daisy	White	2.6 i-m	57.8 t	12.0 n-r	14.8 lm	20.3 opq	8.3 b-e	168 m-q	4.4 a-e
Karma	Daisy	White	2.0 t	58/9 rst	11.4 qrs	15.2 i-m	37.2 c	6.0 h-m	223 ghi	4.9 a
Kory	Decorative	Medium Yellow	2.4 k-q	67.7 d-g	11.5 p-s	15.8 g-k	24.0 lmn	7.2 d-j	173 k-q	4.7 ab
Lucido	Daisy	Dark Red	2.4 k-q	71.5 b	13.4 hij	16.8 def	21.9 no	9.9 a	217 g-j	4.6 abc
Neoga	Daisy	Pale Rose	3.0 cd	69.0 d	13.2 hij	17.4 cd	27.5 h-k	8.4 b-e	231 e-i	2.8 ij
Pico	Daisy	Medium Yellow	3.0 cd	68.4 def	12.0 m-r	16.0 f-j	29.7 f-i	7.3 d-i	217 g-j	4.5 a-d
Pink Arola	Decorative	Dark Rose	2.5 k-p	65.8 h-k	12.7 j-m	16.0 f-j	32.9 de	5.8 i-m	191 i-o	4.6 abc
Pomona	Decorative	Medium Rose	2.5 k-p	64.3 klm	12.2 mno	16.2 e-h	29.1 g-k	7.8 c-g	227 f-i	3.6 gh
Puritan	Decorative	Whiate	3.1 c	73.6 a	13.2 hij	17.5 bcd	35.8 cd	7.5 c-h	268 c-f	3.9 d-h
Rave	Daisy	Light Rose	2.6 i-m	60.3 qr	11.5 p-s	16.5 efg	29.7 f-i	6.5 g-m	193 i-n	3.4 hi
Rejoice	Daisy	Medium Yellow	2.3 qrs	61.8 op	13.0 i-l	16.1 e-h	27.7 h-k	6.9 e-l	191 i-o	4.3 a-f
Salmon Charm	Decorative	Medium Salmon	2.5 k-p	67.3 e-h	13.4 hij	18.1 bc	29.2 f-k	8.1 b-f	236 e-h	3.8 e-h
Solo	Daisy	Cream	1.8 u	59.4 rs	10.4 t	16.1 e-h	28.7 g-h	10.0 a	287 b-d	4.8 a
Songster	Quill	Lemon Yellow	2.7 ghi	71.6 b	14.8 cd	20.0 a	44.3 a	7.1 d-k	314 b	4.0 c-h
Stoplight	Daisy	Medium Red	2.3 pqr	64.3 klm	14.3 def	16.8 def	22.2 no	7.1 d-k	158 n-r	3.5 h
Sunlight	Daisy	Medium Yellow	2.6 h-m	71.0 b	12.4 k-o	15.8 g-k	29.1 g-k	6.2 h-m	180 j-p	4.1 b-g
Tara	Daisy	Cream	2.4 k-q	67.1 fgh	13.7 f-i	17.0 de	33.2 de	7.1 d-j	239 e-jh	4.6 abc
Ultralight	Daisy	Medium Lavender	2.4 k-q	66.4 g-j	16.3 b	16.8 def	26.1 klm	5.6 klm	146 pqr	2.8 ij
Yellow Tan	Daisy	Dark Yellow	2.3 rs	63.2 mno	13.8 fgh	15.9 g-k	29.8 f-i	8.5 bcd	253 d-g	4.6 abc

<sup>2</sup>Marketability was determined when approximately 1/3 of flowers were open.

<sup>3</sup>1 = poor; 5 = excellent.

\*Mean separation within columns by Duncan's multiple range test, 5% level.

the 9-week group, 7 were in the 10-week group, and 2 were 11-week types. Flower development of 'Candlelight' and 'Free Spirit' was delayed by the warm days. 'Carnival' produced many vegetative shoots which were interspaced among the flowers, which produced an unappealing plant. An 8- or 9-week cultivar would be more desirable for maximum utilization of bench space.

Plant height, which was influenced by the 2 daminozide applications following the terminal pinch, ranged from 9.9 to 14.5 inches, represented by 'Gold Champ' and 'Dark Parasol,' respectively. Ideal height of the plants was determined to be from 11 to 13 inches above the pot rim. Thirty-two of the cultivars were within this range. Several of the cultivars, such as 'Applause,' 'Envy,' and 'Solo' were

slightly shorter than desired, indicating that one daminozide application would be sufficient for these cultivars.

Number of laterals which developed following the pinch and number of floral buds per lateral determined the flower potential of each plant. 'Lamplight' produced the fewest laterals (13.5/pot) while 'Songster' produced the most (35.3/pot). 'Brightlight' exhibited only 4.8 floral buds per lateral while 'Lucido' had 10.8. When the flower potential per pot was calculated, 'Echo' produced the highest number (318) while 'Envy' had the least (104). Although 'Dark Circus' was selected by the commercial propagators as an improvement over 'Circus,' its only better quality was a darker floret color. 'Dark Circus' produced fewer laterals

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. 'Cirbronzé' 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 'Cirbronzé;' pink/rose—'Brandywine,' 'Pink Arola,' 'Chic,' and 'Circus;' red—'Lucido;' and lavender—'Ultralight.'

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## PRODUCTION OF FOLIAGE BEGONIAS FOR THE INTERIOSCAPE MARKET

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**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

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