

# ‘Summer Rose’—A Fancy-leaved Caladium for Containers and Landscapes

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Cultivated caladiums (*Caladium ×hortulanum* Birdsey; Araceae Juss.) are known for their bright colorful leaves and ease in growing. Species such as *C. bicolor* and *C. picturatum* have contributed to the breeding and development of the modern cultivars (Wilfret, 1993). Caladiums are used widely in containers, hanging baskets, and landscapes (Wilfret, 1993). Commercial caladium plants are grown from tubers. Over 95% of the caladium tubers used in the world are produced in Central Florida (Bell et al., 1998).

The predominant leaf colors exhibited in caladium are white, red, and pink. According to a 1998 survey, pink fancy-leaved cultivars represented 28% of the tuber producing industry (Bell et al., 1998). ‘Rosebud’ is ranked fifth for acreage grown (7% of total acreage) among the pink fancy-leaved cultivars. This cultivar is well liked for its unique pattern of bright pink color. However, tuber production in ‘Rosebud’ has been rather costly, due to a disorder called “grassy tuber”. This disease results in diminutive plants with many small leaves and reduction of tuber size and yield (Polston et al., 1991). Tuber producers have to manage this disorder by rouging symptomatic plants manually. For many tuber producers, costs of rouging and reduced yields make production of ‘Rosebud’ unattractive economically and a replacement cultivar would be welcome.

We believe that ‘Summer Rose’ (Fig.1) would make a good replacement for tuber producers desiring a new cultivar to replace ‘Rosebud’. ‘Summer Rose’ is similar in color and container-performance to ‘Rosebud’, except that de-eyed tubers sprout several days earlier and petioles are red-purple at the leaf attachment and gradually darken to brown at the petiole base. Tuber production and field performance of ‘Summer Rose’ were better than ‘Rosebud’, adding another benefit to both tuber producers and landscapers.

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treated with hot water to control nematodes (Rhodes, 1964).

## Description

Descriptions of color for plant parts are based on comparison with the Horticultural Society (RHS) Colour Chart (Royal Horticultural Society, 1986). Plants used for describing color were grown in 15-cm containers in a 50% shaded greenhouse from jumbo (6 to 9 cm diameter) de-eyed tubers.

Jumbo tubers of ‘Summer Rose’ are multi-segmented, usually bearing three to four dominant buds. Tuber surfaces are brown (RHS 200 B-C) with the cortical area very light yellow (RHS 4D center to 8D edge). Leaves are peltate, sagittate-cordate, with palmate-pinnate venation. The center veins are red-purple (RHS 61A). The upper surface has a dark green (RHS 137A) irregular margin, 3 to 9 mm wide, bordering the entire leaf, except for the basal leaf sinus where it is grayed-purple (RHS 185A). Interveneal areas in the center of the leaf are red-purple (RHS 60D), but this is bordered by a green-white (RHS 157D) speckling on a green background (RHS 147A). The undersurface is predominantly grayed-purple (RHS 186B) with very little of the upper leaf color pattern showing through. The margin is green (RHS 138A). Petioles are 3 to 4 mm thick and are red-purple at the leaf attachment and gradually darken to brown (RHS 2000A) at the petiole base.

## Origin

‘Summer Rose’ was derived from a cross between ‘Aaron’ and a seedling S-25 (Fig. 2) and it was evaluated in 2001 as GC607. S-25 was from a cross of ‘Fire Chief’ × ‘Torchy’. ‘Aaron’ is a white, fancy (heart-shaped) leaf cultivar selected for its large leaves and tubers. ‘Fire Chief’ and ‘Torchy’ were selected for their vivid red veins and interveneal areas. S-25 was selected for its vigor and bright color. Ancestry of ‘Aaron’, ‘Fire Chief’ and ‘Torchy’ are unknown. Tubers were propagated in fumigated Eau Gallie fine sandy soils at the Gulf Coast Research and Education Center (GCREC) at Bradenton, Fla, and were



Fig. 1. Plant (7 weeks old) of caladium ‘Summer Rose’ forced in a 10-cm container using one No.1 tuber (>3.8 and <6.4 cm). Dominant eyes were excised from tubers before planting. The plant was grown in a glasshouse with 50% light exclusion.

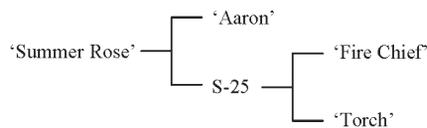


Fig. 2. Pedigree of 'Summer Rose'

'Summer Rose' plants grown from 2.5 cm tuber propagules for about 4 months in full sun in ground beds had an average height of 52 cm (Table 1). Their leaves averaged 31 cm long and 21 cm wide, larger than 'Rosebud', which had leaves 23 cm long and 16 cm wide (Table 1). The largest leaf on plants grown in a 50% shaded greenhouse produced from an intact number one tuber in a 12.7-cm pot averaged 25 cm long and 19 cm wide 7 weeks after planting (Table 2). This size was very similar to other pink cultivars tested.

### Performance

'Summer Rose' was evaluated for tuber production and plant performance at the GCREC–Bradenton, Fla., during 2003 and at the GCREC–Dover, Fla., in 2004. The soil in Bradenton was an EauGallie fine sand with 1% organic matter and a pH of 6.2 and the soil in Dover was a Seffner fine sand with 1% organic matter and a pH of 6.5. Plants were grown in a plastic-mulched raised-bed system maintaining a constant water table with seepage irrigation (Geraldson et. al, 1965) or irrigated with a drip system. The beds were 91 cm wide and 20 cm high with 2.5 cm caladium seed pieces planted 15 cm apart in three rows (Bradenton) or 30 cm apart in two rows (Dover). Osmocote 18N–2.6P–10K 8 to 9 month controlled release fertilizer (Scotts Co., Marysville, Ohio) was applied to the bed

surface when shoot tips were emerging from the soil with N at 336 kg·ha<sup>-1</sup>.

Plots were organized in a randomized complete block design consisting of three replications. For tuber production, each plot was 1.2 m<sup>2</sup> and contained 30 propagules. Analysis of variance was conducted to compare the performance of 'Summer Rose' to commercially important pink and white fancy-leaved cultivars. For plant performance, three plants were measured in the center of each plot and plant height, leaf number, and leaf size were measured mid-summer. Since year did not significantly influence plant performance, the data were averaged over the 2 years.

'Candidum' was grown on 150 acres in a 1998 survey and was the top caladium cultivar ranked based on production acreage (Bell et al., 1998). It was in the top three cultivars for tuber weight and production value of tubers

Table 1. Performance of caladium cultivars grown from 2.54-cm tuber propagules in ground beds under full sun.

Cultivar	Plant ht <sup>z</sup> (cm)	Leaves <sup>z</sup> (no.)	Leaf <sup>z</sup>		Overall plant performance <sup>y</sup>		
			Length (cm)	Width (cm)	Early	Middle	Late
Candidum	46	13	28	18	3.3	3.7	3.5
Carolyn Whorton	48	16	33	22	3.0	4.6	4.5
Rosebud	42	20	23	16	2.5	3.2	2.0
Summer Rose	52	17	31	21	4.5	4.5	4.5
LSD ( $\alpha = 0.05$ )	8.2	5.3	2.2	1.6	1.0	0.7	0.1

<sup>z</sup>Values presented are means of three replications with three plants measured per plot per year, averaged over 2 years (2003 and 2004). The plots were organized in the field in a randomized complete block design. Measurements were made 4 months after planting. The PROC GLM procedure (SAS Inst., 2005) was used to calculate the least significant difference (LSD) at  $P = 0.05$ .

<sup>y</sup>Overall plant performance was rated 22 July (early), 31 Aug. (middle), and 16 Nov. (late), 2004, on a scale of 1 to 5, with 1 being very poor (stunted plants with few leaves and severe sun burns), and 5 being very good (full plants with many bright colorful leaves and little sun burn).

Table 2. Plant performance for caladium cultivars grown from No. 1 tubers planted 24 June, 2002, in 10-cm containers in a 50% shaded glasshouse, Bradenton, Fla. Values represent the means of five plants produced from intact or de-eyed No. 1 (3.8 to 6.4 cm in diameter) tubers planted individually per container.<sup>z</sup>

Cultivar	Days to sprout <sup>y</sup>		Plant ht (cm)		Leaves (no.)		Leaf length (cm)		Leaf width (cm)	
	Intact	De-eyed	Intact	De-eyed	Intact	De-eyed	Intact	De-eyed	Intact	De-eyed
Calypso	14	13	39	40	11	19	25	20	18	14
Carolyn Whorton	20	18	43	41	10	14	27	21	18	14
Rosebud	20	23	38	32	12	19	24	17	13	13
Summer Rose	18	17	36	39	9	22	25	21	19	16
LSD ( $\alpha = 0.05$ )	4.5	4.4	NS	4.5	NS	4.5	NS	NS	NS	NS

<sup>z</sup>Plants were arranged on the bench in the greenhouse in a randomized complete block design. Measurements were made 7 weeks after tubers were planted. The PROC GLM were used to calculate the least significant difference (LSD) at  $P = 0.05$ .

<sup>y</sup>Number of days from planting to the first unfurled leaf.

Table 3. Tuber weights, production index, and tuber grade distribution of caladium cultivars harvested in 2003 and 2004. Values presented are means of three replications with 30 propagules per 1.2-m<sup>2</sup> plot per year.<sup>z</sup>

Cultivar	Tuber			Tuber distribution <sup>y</sup> (%)				
	Wt (g)	Production <sup>x</sup> index	Marketable (No.)	Super mammoth	Mammoth	Jumbo	No. 1	No. 2
2003								
Candidum	2784	98	33	1	12	30	43	14
Carolyn Whorton	2879	101	39	0	9	28	40	24
Rosebud	2632	109	45	0	4	24	45	27
Summer Rose	3519	126	40	0	8	47	40	5
LSD ( $\alpha = 0.05$ )	306	25	13	2	13	19	26	17
2004								
Candidum	2860	96	35	2	6	27	54	12
Carolyn Whorton	4268	132	53	0	9	20	45	26
Rosebud	2553	102	49	0	2	18	47	33
Summer Rose	4597	132	40	0	15	42	32	12
LSD ( $\alpha = 0.05$ )	531	15	9	2	9	16	21	14

<sup>z</sup>Field plots were organized in a randomized complete block design with three replications. Tuber weights and grades were determined 3 weeks after harvesting in December 2003 and January 2004, respectively. Data on tuber weights, grades, and production indices were analyzed using the PROC GLM procedure (SAS Inst., 2005) for their least significant differences (LSD) at  $P = 0.05$ .

<sup>y</sup>Tubers graded by maximum diameter; No. 2 (2.5 to 3.8 cm), No. 1 (3.8 to 6.4 cm), Jumbo (6.4 to 8.9 cm), Mammoth (8.9 to 11.4 cm), and Super Mammoth (>11.4 cm).

<sup>x</sup>The production index is an indicator of economic value of the crop harvested and is calculated as: N (No.2s) + 2N (No. 1s) + 4N (Jumbos) + 6N (Mammoth) + 8N (Super Mammoth); where N = number of tubers in each grade.

in a comparison of 78 cultivars on sandy soil (Wilfret, 1983). Tuber producers consider it very profitable to grow because it yields so well. 'Summer Rose' tuber production was excellent with tuber weights nearly 1.3 and 1.6 times higher than 'Candidum' in 2003 and 2004, respectively (Table 3). Also, its production index (an economic indicator of crop value) was greater than 'Candidum' in both years (1.3 or 1.4 times greater). Similarly, 'Summer Rose' had higher yields than 'Rosebud' as seen in tuber weight (1.3 and 1.8 times higher) and production index (1.2 and 1.3 time higher) measurements. Although the same number (30) of seed pieces were planted per plot, more than 30 tubers were harvested. This occurs because each seed piece could develop more than one tuber, and tubers could break apart during harvest. If tubers are marketable, these factors can increase profitability. Although 'Summer Rose' did not have the greatest number of marketable tubers, it had 40 tubers per plot and had similar or more tubers than other cultivars tested. There were also a greater percentage of tubers in the mammoth and jumbo grades compared to 'Rosebud' and 'Carolyn Whorton', and these grades have a high market value.

Landscape performance of cultivars grown under full-sun conditions was evaluated in 2003 and 2004 on the same plots used for evaluating tuber production. Plant height, number of leaves, and foliar characteristics were recorded about 4 months after planting (Table 1). 'Summer Rose' was taller with larger leaves than 'Rosebud' but similar in height and leaf size to 'Candidum' and 'Carolyn Whorton'. It had excellent performance ratings all through the growing season.

'Summer Rose' tubers were forced in 10-cm containers and its growth compared to three pink-fancy commercial cultivars. No. 1 tubers were planted in a peat/vermiculite mix (Vergro Container Mix A; Verlite Co., Tampa, Fla.) on 24 June 2002. The study was conducted in a glasshouse with 50% light exclusion during the summer in Bradenton, Fla. Average daily temperatures ranged from a low of 21 °C night to 29 °C day during the experiment. Plant height, number of leaves, and foliar characteristics were recorded 7 weeks after planting.

Plant performance of 'Summer Rose' in containers was similar to the other cultivars tested. Noticeable differences included fewer days to sprout for 'Summer Rose' than 'Rosebud' for de-eyed tubers, and greater plant height for de-eyed 'Summer Rose'. Since 'Rosebud' is known as an excellent pot plant, these results indicate 'Summer Rose' also has potential for use as a potted/container plant.

In summary, 'Summer Rose' is intended for use in containers and the landscape. It should perform well in partial shade or full sun conditions. Although extensive research and evaluations of this cultivar have been performed on small acreages, tuber producers are encouraged to plant only limited quantities of 'Summer Rose' until they have gained experience in producing this cultivar. Standard postharvest treatment of tubers is recommended (Harbaugh and Tjia, 1985) and preplant hot-water treatment of tubers is encouraged to prolong their life.

#### Availability

A patent will be applied for 'Summer Rose' by the Florida Agricultural Experiment

Station and production of this cultivar is to be with a licensing agreement with the Florida Foundation Seed Producers, Inc., P.O. Box 309, Greenwood, FL 32443. Information on tuber availability and propagation agreements can be obtained from the Florida Foundation Seed Producers, Inc.

#### Literature Cited

- Bell, M.L., G.J. Wilfret, and D.A. DeVoll. 1998. Survey of caladium tuber producers for acreage of cultivars grown. Proc. Fla. State Hort. Soc. 111:32-34.
- Geraldson, C.M., A.J. Overman, and J.P. Jones. 1965. Combination of high analysis fertilizers, plastic mulch and fumigation for tomato production on old agricultural land. Proc. Soil and Crop Sci. Soc. Fla. 25:18-24.
- Harbaugh, B.K. and B.O. Tjia. 1985. Commercial forcing of caladiums. IFAS Univ. Fla. Agr. Ext. Serv. Circ. 621.
- Polston, J.E., M.R. Evans, and J.H. Tsai. 1991. Investigation of the etiology of grassy tuber of caladium. Proc. Fla. State Hort. Soc. 104:334-336.
- Rhodes, H.L. 1964. Effect of hot water treatment of seed tubers and soil fumigation for control of root knot on yield of caladiums. Plant Dis. Rpt. 8:568-571.
- Royal Horticultural Society. 1986. RHS colour chart. Royal Hort. Soc., London.
- SAS Institute. 2005. The SAS system for Windows. Release 9.00. SAS Inst., Cary, N.C.
- Wilfret, G.J. 1983. Tuber production of caladium cultivars grown in a sandy soil. Proc. Fla. State Hort. Soc. 96:245-248.
- Wilfret, G.J. 1993. Caladium, p. 239-247. In: A. de Hertogh and M. le Nard (eds.). The physiology of flower bulbs. Elsevier, New York.