Ornamental, Garden & Landscape Section

Proc. Fla. State Hort. Soc. 125:307–311. 2012.

Fancy-leaved Caladium Varieties Recently Introduced by the UF/IFAS Caladium Breeding Program

Zhanao Deng*

University of Florida/IFAS, Department of Environmental Horticulture, Gulf Coast Research and Education Center, 14625 County Road 672, Wimauma, FL 33598

Additional index words. *Caladium ×hortulanum*, *Caladium bicolor*, ornamental aroid, landscape plant

Florida supplies more than 95% of the caladium tubers used in the United States and more than 40 foreign countries in the world. Fancy-leaved caladium varieties account for the majority of the caladium tubers Florida growers produce. Developing new fancy-leaved varieties has been a priority breeding objective for the UF/IFAS caladium breeding program. Toward this objective, six new fancy-leaved varieties have been released since 2008. 'Tapestry' (large pink-blotches), 'Strawberry Star' (white with red spots), 'Royal Flush'(red center with green margins), and 'Berry Patch' (green with purple spots) have different leaf colors or coloration patterns, and they all have shown much improved sun burn tolerance and landscape performance. They are suitable for growing in large containers and sunny or shady locations in the landscape. 'Cranberry Star' and 'Summer Pink' were selected for their novel coloration patterns (bright white leaves with green veins and numerous purple spots, or pink face, pink main veins against a white background) and produce attractive plants when forced in containers. These two varieties are selected for growing in containers and shady locations in the landscape.

Fancy-leaved caladiums are well adapted to Florida's warm climate and are commonly used in Florida to beautify outdoor and indoor landscapes. Commercially available fancy-leaved caladium plants are forced from tubers. Florida caladium growers supply more than 95% of the caladium tubers used in the United States, Canada, and ~40 countries in Europe and Asia. Recent surveys of the Florida caladium tuber production industry indicated that fancy-leaved caladium varieties accounted for 85% to 91% of the acreage planted for caladium tuber production (Bell et al., 1998; Deng et al., 2005). Sales of tubers from fancy-leaved caladiums made up 80% to 85% of the farm-gate value of Florida's caladium tuber sales (Terri Bates-Cantwell, personal communication). The 15 fancy-leaved caladium varieties most widely grown in 1998 were: 'Candidum' (11.7% of the total acreage, white), 'White Christmas' (8.7%, white), 'Freida Hemple' (7.6%, red), 'Pink Beauty' (6.5%, pink), 'Fannie Munson' (5.9%, pink), 'Carolyn Whorton' (5.9%, pink), 'Candidum Junior' (4.3%, white), 'Aaron' (3.3%, white), 'Fire Chief' (3.1%, red), 'Postman Joyner' (3.1%, red), 'Red Flash' (3.0%, red), 'Buck' (2.6%, red), 'White Queen' (2.5%, white with red veins and center), 'Rosebud' (2.0%, pink), and 'Miss Muffet' (1.8%, lemon yellow with burgundy spots) (Bell et al., 1998). These varieties accounted for approximately 72% of the total acreage planted by Florida caladium growers in 1998. A similar trend was evident in 2003 and 2008 surveys of the Florida caladium tuber production industry (Deng et al., 2005; Zhanao Deng, unpublished). Minor changes observed include the decrease of acreage for 'Buck' from 2.6% in 1998 to 0.9% in 2003 and 1.4% in 2008, the decrease of acreage for 'Fannie Munson' from 5.9% in 1998 to 4.9% in 2003 and 3.5% in 2008, and the increase of acreage for 'John Peed' from 1.0% in 1998 to 2% in 2003 and 3.0% in 2008.

The University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) established a caladium breeding program at the Gulf Coast Research and Education Center (GCREC) in Bradenton in 1976 to meet the need of new caladium varieties by the Florida caladium growers and consumers. The initial emphasis of the breeding program was on developing new varieties with bright colorful leaves, multiple leaf development, high tuber yield potential, and enhanced container and landscape performance. The breeding program released its first group of fancy-leaved varieties in 1988, including 'Florida Cardinal' (Wilfret, 1988), 'Florida Roselight' (Wilfret, 1992), and 'Florida Sunrise' (Wilfret, 1993). More fancy-leaved varieties were introduced to growers and gardeners in the 1990s ['Florida Fantasy' (Wilfret, 1991), 'Florida Elise' (Wilfret, 1991), and 'Florida Calypso' (Wilfret, 1995)] and in the early 2000s ['Florida Blizzard' (Harbaugh et al., 2002), 'Florida Moonlight' (Miranda and Harbaugh, 2003), 'Firecracker Red' (Deng and Harbaugh, 2006b), 'Garden White' (Deng and Harbaugh, 2006c), and 'Summer Rose' (Deng and Harbaugh, 2006a)]. A number of these varieties have become popular among growers (and consumers) and have significant acreages planted annually in Florida for tuber production (Deng et al., 2005; Zhanao Deng, unpublished). Same as in other horticultural trades, frequent introduction of new varieties has been important to the Florida caladium industry. Six new fancy-leaved caladium varieties were recently introduced by the UF/IFAS caladium breeding program. This article provides a brief description of the breeding and selection process and a summary of the major characteristics of these varieties.

The Breeding and Selection Process

The breeding of new fancy-leaved caladium varieties has been all through sexual hybridization among existing commercial varieties and/or breeding lines, followed by rigorous evaluation and selection in the greenhouse, field, and garden beds. Breeding parents were induced to flower by soaking tubers in gibberellic acid solutions (Harbaugh and Wilfret, 1979). Treated tubers were planted in commercial potting mix to produce parental plants,

*Corresponding author; phone: (813) 633-4134; email: zdeng@ufl.edu

and the plants were grown in the greenhouse for pollination. Artificial pollination was done by manual application of pollen from the male flower band on the spadix of pollen parents to the female flower band on the spadix of seed parents (Deng and Harbaugh, 2004). The new generation of caladiums was evaluated and screened in five stages (Deng et al., 2011b): Stage 1 – young seedlings grown in community trays or small containers in the greenhouse; Stage 2 – individual plants grown in ground beds; Stage 3 – multiple plants grown in individual field plots; Stage 4 – advanced breeding lines grown in multiple, replicated field plots (replicated field trials); and Stage 5 – advanced breeding lines forced in multiple containers (greenhouse container trials). Promising caladium lines were further evaluated in replicated garden trials and offered to Florida caladium growers for testing under commercial production conditions. Based on the data collected over multiple years on the plant, leaf, tuber yield, container and landscape performance, the best caladium lines were selected for releasing and introduction. When tubers became available, released varieties were also entered into external trials run by other universities and/or the green industry. Plant patents were applied for new caladium varieties and caladium growers produce new varieties through licensing agreements with the Florida Foundation Seed Producers, Inc. (http://ffsp.net/).

Fig. 1. 'Berry Patch' caladium.

New Fancy-leaved Caladium Varieties Introduced in the Last Five Years

'Berry Patch' (Fig. 1). Plants of this variety are vigorous, produce many leaves, and fill landscape spaces quickly. With excellent sun burn tolerance, 'Berry Patch' does well in sunny and shady locations in the landscape (Table 1). When tested in replicated trials, 'Berry Patch's performance ratings were significantly higher than those of 'Galaxy' (Deng and Harbaugh, 2009). In container forcing, 'Berry Patch' behaved much like 'Galaxy', with similar sprouting time (about 37 d), leaf size, and plant height (10–12 inches) (Deng and Harbaugh, 2009). Tuber de-eyeing is necessary for forcing 'Berry Patch' in small containers (4–5 inches) but not needed for growing in 6-inch or larger containers. 'Berry Patch' showed superior tuber yield potential in replicated field trials (Table 2).

'Cranberry Star'. This variety produces numerous bright white leaves with green veins and bright purple spots (Fig. 2). It is ideal for growing as an accent or border plant in the landscape. Plants are susceptible to sun burns; thus the variety is best suited for shady locations in the landscape (Table 1). 'Cranberry Star' produces eye-catching pot plants, even without tuber de-eyeing, as the tubers are multi-branched and produce multiple leaves simultaneously (Deng et al., 2008).

'Royal Flush'. It was initially released as UF 18-49. Plants of this variety are vigorous and tall and leaves are large and have a large red center (Fig. 3). Leaf sun tolerance is good. These characteristics make 'Royal Flush' ideal for planting in the landscape, sunny or shady, and for growing in large containers (Table 1). To force this variety in small containers (4–5 inches), tubers need to be de-eyed prior to planting. Tubers of 'Royal Flush' take 2 to 5 more days to sprout than those of 'Freida Hemple' and 'Postman Joyner'. Tuber yield potential was similar to or slightly better than that of 'Florida Cardinal', 'Freida Hemple', and 'Postman Joyner' (Table 2).

'Strawberry Star'. It was initially released as UF 85-5 (Deng and Harbaugh, 2011). It is similar to the commercial variety

Table 1. List of new fancy-leaved caladium varieties and their parents, suitability for growing in containers and requirements, sun tolerance, and uses in landscapes.

Variety name (other name)	Year released	Parents	For containers in various sizes 4–5"	6"	8"	10–15"	Sun tolerance	Landscape use Shady	Sunny	Plant ht
Berry Patch (75-14)	2008	Gingerland × Florida Moonlight	Yes/De-eye	Yes	Yes	Yes	Good	Yes	Yes	18–22"
Cranberry Star (UF-75-37)	2007	Gingerland selection × (Aaron × Candidum Junior)	Yes	Yes	Yes	Yes	Poor	Yes		12–18"
Royal Flush (UF 18-49)	2010	Breeding line UF-702 × Red Flash	Yes/De-eye	Yes	Yes	Yes	Good	Yes	Yes	15–22"
Summer Pink (UF 48-5)	2010	Red Flash × Candidum Junior	Yes/De-eye	Yes/De-eye	Yes	Yes	Poor	Yes		15–20"
Strawberry Star (UF 85-5)	2010	Summer Rose × Florida Fantasy	Yes/De-eye	Yes	Yes	Yes	Good	Yes	Yes	15–20"
Tapestry (UF-172)	2010	White Christmas × Red Flash	Yes/De-eye	Yes	Yes	Yes	Good	Yes	Yes	18–24"

Table 2. Landscape performance rating, sun tolerance rating, tuber weight, and production index of six newly introduced fancy-leaved caladium varieties and existing commercial caladium varieties that were included as checks in the replicated field trials.

Varieties	Year trialed	Performance rating[z]	Sun tolerance rating[y]	Tuber dry wt (lb)[x]	Production index[x]
Berry Patch	2005	4.7	4.8	18.1	247
	2006	3.7	4.3	19.0	240
Galaxy (check)	2005	4.1	4.4	12.8	163
	2006	2.4	4.1	26.2	240
Cranberry Star	2005	3.7	2.8	12.8	226
	2006			10.6	161
Strawberry Star	2005	4.2	4.3	12.4	171
	2006			12.1	175
Marie Moir (check)	2005	2.1	3.4	11.0	159
	2006			3.3	58
Royal Flush	2005	4.5	3.7	8.6	160
	2006	4.4	4.2	9.7	134
Freida Hemple (check)	2005	4.0	3.4	7.3	128
	2006	4.3	3.9	11.5	159
Postman Joyner (check)	2005	2.1	3.4	5.5	90
	2006	2.4	2.9	8.4	115
Summer Pink	2006	3.3	3.5	11.7	173
	2007	3.7	2.7	9.7	117
Fannie Munson (check)	2006	2.1	3.7	6.8	132
	2007	2.8	3.7	8.4	108
White Queen (check)	2006	1.1	4.1	8.2	128
	2007	3.5	4.3	10.4	166
Tapestry	2006	4.6	4.0	13.7	196
	2007	4.7	4.1	14.1	161
Carolyn Whorton (check)	2006	2.7	4.0	13.2	169
	2007	3.8	4.1	10.1	123

[z]Plant performance was rated on a scale of 1 to 5, with 1 being very poor, 3 fair and acceptable, and 5 being excellent in plant vigor, fullness, and color display.

[y]Plant sun burn tolerance was rated on a scale of 1 to 5, with 1 being very poor, 3 fair and acceptable, and 5 being excellent without showing any signs of leaf burns or resulted holes on leaf surfaces.

[x]Values are means of three replications with 30 propagules ("tuber chips") planted in a field plot. The production index is an indicator of economic value of the crop harvested and is calculated as: n (No. 2) + 2n (No. 1) + 4n (Jumbo) + 6n (Mammoth) + 8n (Super Mammoth), where n = number of tubers in each grade harvested from 30 propagules planted in a field plot. Tubers were graded by maximum diameter: No. 2 (1 to 1.5 inches), No. 1 (1.5 to 2.5 inches), Jumbo (2.5 to 3.5 inches), Mammoth (3.5 to 4.4 inches), and Super Mammoth (>4.5 inches).

Fig. 2. 'Cranberry Star' caladium.

Fig. 3. 'Royal Flush' caladium.

Fig. 4. 'Strawberry Star' caladium.

Fig. 5. 'Summer Pink' caladium.

'Marie Moir' in leaf color and coloration pattern: green veins, white face, and red spots (Fig. 4). However, 'Strawberry Star' has green petioles and 'Marie Moir' has brown petioles. Plants of 'Strawberry Star' show excellent sun burn tolerances and produce a large number of leaves in the landscape (Table 1). Its landscape performance ratings were significantly higher than those of 'Marie Moir'. Therefore, this variety is suitable for planting in sunny or shady locations in the landscape. 'Strawberry Star' produced more tubers than 'Maire Moir' (Table 2). Tubers of 'Strawberry Star' sprout 4 to 9 d earlier than those of 'Marie Moir' and produced high quality pot plants. Tuber de-eyeing seems to be optional for pot plant production, but this practice resulted in pot plants with higher quality. 'Strawberry Star' is a desirable replacement of 'Marie Moir', an old variety introduced by Richard Hoffmann more than a century ago (Hayward, 1950).

'Summer Pink'. Leaves of this variety have a bright pink face and pink veins against a white background (Fig. 5). Plants are about 3 inches taller than 'Fannie Munson' and 'White Queen' plants, but produced similar numbers of leaves with similar sizes with 'Fannie Munson' and White Queen' (Deng and Harbaugh, 2012). In full sun, leaves of 'Summer Pink' fade into light pink and had low sun burn tolerance ratings (Table 1). Thus 'Summer Pink' is more suited for partially shaded locations in the landscape. Intact tubers produced low quality plants with only few large leaves. Tuber de-eyeing significantly improved the quality of 'Summer Pink' plants grown in 4–5 inch containers. Tuber de-eyeing may be required for growing 'Summer Pink' in 6-inch containers, but should not be needed for larger containers. 'Summer Pink' produced heavier tubers with a greater production index than 'Fannie Munson' and 'White Queen' in 2006 but similar numbers and grades of tubers in 2007 (Table 2).

'Tapestry'. This variety was released as UF-172 in 2010. Plants are vigorous and can grow up to 2 ft in height. Leaves of this variety are characterized with large attractive pink blotches and red petioles (Fig. 6) and have shown good sun burn tolerance, making the variety suitable for shady and sunny locations in the landscape (Table 1). When grown in the landscape or container, 'Tapestry' performed better than 'Carolyn Whorton', 'Fannie Munson', or 'White Queen' (Deng et al., 2012). 'Tapestry' has also demonstrated high tuber yield potential in both sand and much soil (Table 2). Tubers of 'Tapestry' sprout several days earlier than 'Carolyn Whorton', 'Fannie Munson', and 'White Queen'. Tuber de-eyeing is necessary for producing 'Tapestry' plants in small-sized (4–5 inches) containers, but not for larger containers.

Fig. 6. 'Tapestry' caladium.

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.

Deng, Z. and B.K. Harbaugh, 2004. Technique for in vitro pollen germination and short-term pollen storage in caladium. HortScience 39(2):365–367.

Deng, Z. and B.K. Harbaugh, 2006a. 'Summer Rose'—A fancy-leaved caladium for containers and landscapes. HortScience 41(2):468–470.

Deng, Z. and B.K. Harbaugh, 2006b. 'Dynamite Red'—A red fancy-leaved caladium for sunny landscapes and containers. HortScience 41(2):471–473.

Deng, Z. and B.K. Harbaugh, 2006c. 'Garden White'—A large white

fancy-leaved caladium for sunny landscapes and large containers. HortScience 41(3):840–842.
Deng, Z. and B.K. Harbaugh, 2009. Caladium 75-14, a spotted fancy-leaved cultivar for containers and sunny landscapes. HortScience 44(3):854–856.
Deng, Z. and B.K. Harbaugh. 2011. 'UF 85-5'—A spotted caladium cultivar for use in containers and sunny landscapes. HortScience 46(9):1326–1329.
Deng, Z. and B.K. Harbaugh. 2012. 'Summer Pink'—A new pink fancy-leaved caladium. HortScience 47(5):1–3.
Deng, Z., B.K. Harbaugh, and N.A. Peres. 2008. 'Cranberry Star'—A fancy-leaved caladium for containers and shady landscapes. HortScience 43(1):252–254.
Deng, Z., B.K. Harbaugh, and N.A. Peres. 2011a. 'UF-172', a pink fancy-leaved caladium cultivar for large containers and landscapes. HortScience 46(1):132–134.
Deng, Z., N.A. Peres, and B.K. Harbaugh. 2011b. Improving disease resistance in caladium: Progress and prospects. Acta Hort. 886:69–76.
Deng, Z., B.K. Harbaugh, R.K. Schoellhorn, and R.C. Andrew. 2005. 2003 Survey of the Florida caladium tuber production industry. Univ. of Fla./IFAS Ext. Fact Sheet, ENH 1007. 16 July 2006. <http://edis.ifas.ufl.edu/EP258>.
Harbaugh, B.K. and G.J. Wilfret. 1979. Gibberellic acid (GA_3) stimulates flowering in *Caladium hortulanum* Birdsey. HortScience 14(1):72–73.
Harbaugh, B.K., B.D. Miranda, and G.J. Wilfret. 2002. 'Florida Blizzard'—A white fancy-leaved caladium for large pots or shady landscapes. HortScience 37:844–866.
Hayward, W. 1950. Fancy-leaved caladiums. Plant Life 6:131–142.
Miranda, B.D. and B.K. Harbaugh. 2003. 'Florida Moonlight'—A white fancy-leaved caladium for pots and shady landscape locations. HortScience 38:635–637.
Wilfret, G.J. 1988. 'Florida Cardinal' caladium. HortScience 27(12):1342–1344.
Wilfret, G.J. 1991. Florida Elise: A pink caladium for landscape and containers. Univ. Fla. Agr. Expt. Stn. Circ. S-375.
Wilfret, G.J. 1991. Florida Fantasy: A multicolored caladium for containers. Univ. Fla. Agr. Expt. Stn. Circ. S-381.
Wilfret, G.J. 1992. 'Florida Roselight' caladium. HortScience 27(9):1054–1056.
Wilfret, G.J. 1993. 'Florida Sunrise' caladium. HortScience 28(3):237–238.
Wilfret, G.J. 1995. 'Florida Calypso': A multicolored caladium for the landscape and containers. HortScience 30(4):777.