

Lisianthus 'UF Savanna' -- Eight Colors of Heat-Tolerant Single-Flowering Cultivars Released by the University of Florida's Lisianthus Breeding Program.¹

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In 1985, we began a lisianthus [*Eustoma grandiflorum* (Raf.) Shinnery; Gentianaceae Juss.] breeding program at the University of Florida's Gulf Coast Research and Education Center in Bradenton, Florida. The emphasis was on development of pot or bedding plant types with heat tolerance and basal branching. Cultivars differ significantly in their sensitivity to high temperatures (Fukuda et al., 1994; Harbaugh et al., 1992; Li et al., 2002). Seedlings of most commercial lisianthus cultivars form rosettes (formation of a basal cluster of leaves with no flowering stems) when grown at or above 25 to 28°C (Harbaugh et al., 1992; Harbaugh, 1995; Ohkawa et al., 1991; Ohkawa et al., 1994; Pergola, 1992). 'Maurine Blue' (Harbaugh and Scott, 1996) and 'Florida Blue' (Harbaugh et al., 1996) were the first heat-tolerant lisianthus whose seedlings could be grown at 28-31°C (82-88°F) without rosetting.

'Maurine Blue' was intended to be used as a flowering potted plant when grown with the use of growth retardants or as a bouquet cut flower without growth retardants. Additional colors have been added over the years that also were heat tolerant with

vegetative and flower characteristics similar to 'Maurine Blue'. The Maurine cultivar group now includes pink, pink-lilac, white, light blue, lilac (Harbaugh and Scott, 1998), blue/white (Harbaugh and Scott, 2003), and pink/white (Harbaugh and Scott, 2005 a) bi-colored flowers. When grown without growth retardants, these cultivars have a height suitable for the bouquet-cut flower market.

'Florida Blue' was semi-dwarf and intended to be used as a bedding plant. Additional colors added to form the Florida cultivar group included light blue, pink (Harbaugh and Scott, 1999), silver (Harbaugh and Scott, 2001), blue/white and pink/white (Harbaugh and Scott, 2005 b) bi-colored flower colors.

The UF Savanna cultivar group is heat tolerant and intermediate in height between the Florida cultivar group and the Maurine cultivar group. The UF Savanna cultivar group is represented with eight colors including blue, pink, white, silver, blue rim, pink rim, blue frost, and pink frost (Fig. 1). To our knowledge, 'Savanna Blue Frost' and 'Savanna Pink

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Frost' flower colors are not available in other commercial pot type lisianthus.

Selection Procedures

Growing conditions used to select seedlings for resistance to heat-induced rosetting during development of heat-tolerant parents included: (1) production during summer months under greenhouse conditions at day temperatures $\geq 35^{\circ}\text{C}$, (2) exposure of 2- to 4-week-old seedlings to 28°C for 4 weeks in a growth chamber for initial selections in early generations, and (3) exposure of 17-day-old seedlings to 31°C in a growth chamber for 5 weeks for selection of final parents used in F_1 hybrids. The photosynthetic photon flux in growth chambers was $150\text{--}190 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ from cool-white fluorescent bulbs.

Heat tolerance vegetative and flower characteristics of the UF Savanna cultivar-group were compared to seven commercial bedding or pot type cultivars. Seeds of all cultivars were planted on 19 January 2005, at Bradenton, Fla. Seventeen-day-old seedlings were grown either in a glasshouse (control) with a high of 30 to 33°C day and 13 to 15°C night or at a constant 31°C for 5 weeks in a growth chamber (heat-stressed). Seedlings exposed to 31°C were rated as rosetted if they had not bolted after growth for an additional 4 weeks in the control greenhouse. Non-rosetted plants from the control greenhouse were evaluated for plant height, plant width, number of branches (lateral stems forming on the central stem from the basal leaves to the first flower), total number of flowers and buds per plant after three flowers were open, petal length, and the number of days from sowing to flowering.

The most important and distinguishing attribute of all the UF Savanna cultivar-group cultivars as compared with other commercial lines was their heat tolerance (Table 1). 'Florida Blue' was an exception but it was released from our program as a semi-dwarf and heat-tolerant line and is now commercialized (Harbaugh *et al.*, 1996). None of the heat-stressed Savanna cultivar group rosetted while 47% 'Forever Blue', 30% 'Lisa Blue', 100% 'Lizzy Blue', 40% 'Mermaid Blue', 86% 'Sapphire Blue', and 67% 'Tiramisu Purple' seedlings rosetted.

In addition to heat tolerance, we considered that the UF Savanna cultivars exhibited sufficient similarities in flower form and display, branching habit, and in the number of days from sowing to flowering to be included in the UF Savanna cultivar-group. Notable differences were that days to flower ranged from 111 to 116 days for all UF Savanna cultivars except 'UF Savanna Pink', which flowered earliest at 108 days; that 'UF Savanna Blue Frost' were very floriferous (75 flowers and buds); and that 'UF Savanna Blue', 'UF Savanna Silver' and 'UF Savanna White' had very large petals (7.2, 6.7 and 6.6 cm, respectively).

Characteristics and Use

UF Savanna cultivars are intended to be used as flowering potted plants in containers $\geq 15\text{-cm}$ -diameter pots. Plant height for Maurine cultivars averaged 75 to 102 cm (Harbaugh and Scott, 1998) and Florida cultivars 28 to 35 cm (Harbaugh and Scott, 2001). Thus the UF Savanna cultivars averaging 38 to 48 cm, were intermediate in height. They have a spray-type flower display that is desirable if lisianthus are to be used as a pot plants making height control easier. Treatment with growth retardants is necessary for production of UF Savanna cultivars in $\leq 15\text{-cm}$ -diameter pots (Harbaugh *et al.*, 1998). Three to four plugs per 15-cm-diameter pot are recommended for optimal marketing display (Fig. 1).

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'UF SAVANNA' Series

Lisianthus



Blue



Pink Rim



Pink Frost



Pink



Blue Rim



White



Silver



Blue Frost

Table 1. Percentage rosetted plants^z and growth and flowering characteristics^y of twelve lisianthus cultivars grown in 11.5-square-cm pots (0.65-L) at Bradenton, Florida.

Cultivar	Plant ^x			Flowers and buds (no.)	Petal length (cm)	Days to flower (no.)	
	Rosetted (%)	ht (cm)	width (cm)				Branches ^w (no.)
Florida Blue	0	36	21	9	63	6.3	115
Forever Blue	47	32	25	14	62	5.1	109
Lisa Blue	30	23	15	7	33	5.0	108
Lizzy Blue	100	28	17	7	49	5.9	116
Mermaid Blue	40	24	18	10	59	5.6	112
Sapphire Blue	86	25	23	11	49	5.6	107
Tiramisu Purple	67	37	23	14	70	4.9	111
UF Savanna Blue	0	40	24	10	75	7.2	113
UF Savanna Blue Frost	0	45	22	12	75	6.3	114
UF Savanna Blue Rim	0	40	18	9	47	6.1	113
UF Savanna Pink	0	38	20	8	60	6.0	108
UF Savanna Pink Frost	0	47	22	8	69	6.3	113
UF Savanna Pink Rim	0	43	18	7	59	6.1	116
UF Savanna Silver	0	41	22	10	65	6.7	114
UF Savanna White	0	48	19	9	58	6.6	111
LSD ($P = 0.05$)	25	4.6	3.0	2.2	11.6	0.4	1.7

^z Seventeen-day-old seedling were exposed to 31°C for 5 weeks in a growth chamber and then grown in a greenhouse for 4 weeks. Percentages of rosetted plants are means of three replications with eight plants as the experimental unit arranged in a randomized block design.

^y Vegetative and flowering characteristics were for plants grown in a greenhouse at 33 to 35°C day and 13 to 15°C night. values are means of five replications of single-plant experimental units arranged in a completely randomized design.

^x Plant height = distance from the pot rim to the tip of the highest bud measured after three flowers had opened.

^w Lateral stems forming on the central stem from the basal leaves to the first flower.