

## 'Florida Silver' – A Semi-dwarf Heat-tolerant Lisianthus

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'Florida Blue' was released in 1995 as a blue flowering, semi-dwarf, and heat-tolerant cultivar of lisianthus [*Eustoma grandiflorum* (Raf.) Shinnery; Gentianaceae Juss.] developed at the Univ. of Florida's Gulf Coast Research and Education Center, Bradenton (Harbaugh et al., 1996). It was the first semi-dwarf cultivar whose seedlings could be grown at 28 to 31°C without rosetting. Seedlings of most commercial cultivars of lisianthus form rosettes when grown at or above 25 to 28°C (Harbaugh et al., 1992; Ohkawa et al., 1991). Rosetted plants have a basal cluster of leaves, very short internodes typical of biennials, and do not bolt or flower for 3 to 6 months unless exposed to  $\leq 15$  to 18°C for 3 to 4 weeks (Ohkawa et al., 1994; Pergola, 1992). Semi-rosetted plants develop when seedling are grown at a constant 22 to 25°C or at  $< 22^\circ\text{C}$  nights with  $> 28^\circ\text{C}$  days. Although semi-rosetted plants have one or more side shoots that may elongate and flower, they flower unpredictably and are of poor quality as cut flowers or potted plants. Thus, commercial production of lisianthus for late spring or summer sales is limited by high temperatures in many areas of the United States and other countries. Also, rosetting of plugs caused by the interaction of high temperature and short days makes fall plug production to produce flowering plants for early spring sales difficult (Harbaugh, 1995).

'Florida Pink' and 'Florida Light Blue' were released in 1998 (Harbaugh and Scott, 1999) as F<sub>1</sub> semi-dwarf, heat-tolerant, low rosette-forming lisianthus similar to 'Florida Blue'. These cultivars were released to provide different flower color selections in the Florida cultivar-group. 'Florida Silver' plants also are semi-dwarf and heat-tolerant. They have vegetative and flower characteristics that are similar to 'Florida Blue' and provide a white flower selection to the Florida cultivar-group.

### Origin

'Florida Silver' is an F<sub>1</sub> hybrid resulting from crossing inbred lines UF99-16 and UF99-49 (Fig. 1). UF99-16 was chosen for its large white flowers with a vivid violet-blue center, heat tolerance, and lower branching. UF99-49 was chosen for its floriferousness, white flowers with a violet-blue center, heat tolerance, and compact growth habit.

UF99-16 was the F<sub>6</sub> selection of a cross between UF94-505 and UF94-34. A white flowering plant was selected in the F<sub>2</sub> and improved over four generations. UF94-404 was the F<sub>3</sub> selection of a cross between UF92-17 and 'Blue Lisa', and it was chosen for its dwarf habit, heat tolerance, and white flowers with a blue eyespot. UF92-17 was the F<sub>5</sub> selection of 'Double Light Blue' and UF7-53. 'Double Light Blue' -1 was chosen for its strong stems, basal branching, and large flowers. UF7-53 resulted from selfing of 'Blue Poppy' -2, which was selected for its short, lower branching habit and ability to flower in the summer (35°C day). 'Blue Lisa' was chosen for its early flowering and dwarf characteristics. UF94-34 (the F<sub>4</sub> of a cross between UF8-21 and 'Mermaid Blue') was chosen for its lower branching, heat tolerance, and floriferousness. UF8-21 was selected after three generations of self-pollination of 'Blue Poppy' -1. 'Mermaid Blue' was chosen for its lower branching, dwarf characteristics.

UF99-49 was the F<sub>6</sub> selection of a cross between UF94-404 and UF94-46. A plant with tulip-shaded white flowers was selected in the F<sub>2</sub> and improved over four generations in the F<sub>2</sub> and improved over four generations. UF94-46 was the F<sub>4</sub> selection of a cross between UF9-150

and 'Blue Lisa'. UF9-105 was selected after three generations of self-pollination of 'Blue Poppy'-1 and was selected for its ability to flower at high temperatures.

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  $28^{\circ}\text{C}$  for 4 weeks for initial selections in early generations, and 3) exposure of 17-d-old seedlings to  $31^{\circ}\text{C}$  for 4 weeks for selection of final parents used in  $F_1$  hybrids.

### **Flower color description**

Flower color was determined under natural light using the Royal Horticultural Society Colour Chart (Royal Horticulture Society, 1966). A number plus a letter are used for each color chip (e.g., 65B). Petals of lisianthus typically are one color over most of the surface, but exhibit a distinct basal eyespot (i.e., base of petals surrounding the ovary) of a different color.

'Florida Silver' flower petals are a white (155C) on the adaxial and abaxial petal surface. Under certain light conditions, the petals have a blue overtone, thus the name silver rather than white. The eyespot is a violet-blue (83B). To our knowledge, this is the only dwarf or semi-dwarf cultivar that has a violet-blue eyespot. Other commercial cultivars have a green center.

### **Characteristics and use**

Cultivars used in our research belonged to four cultivar-groups. Cultivars in the Lisa and Mermaid cultivar-groups, are dwarf, while cultivars in the Tiara and Florida cultivar-groups are semi-dwarf. 'Florida Blue', 'Florida Light Blue', and 'Florida Pink' were the only cultivars that were known to have heat-tolerance and low rosette formation. Seeds of all cultivars were planted on 13 Dec. 1995, at Bradenton. Seventeen-day-old seedlings were grown either at a constant  $31^{\circ}\text{C}$  for 5 weeks or in a glasshouse (control) with a high of  $33$  to  $35^{\circ}\text{C}$  day and  $13$  to  $15^{\circ}\text{C}$  night. Seedlings exposed to  $31^{\circ}\text{C}$  were rated as rosetted if they had not bolted after growth for an additional 4 weeks in the control greenhouse. Nonrosetted plants from the control greenhouse were evaluated for plant height, number of lower branches (lateral stems forming on the central stem below the first flower bud), 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 Florida cultivar-group cultivars as compared with other dwarf and semi-dwarf commercial lines was their heat-tolerance (Table 1). None of the heat stressed or control seedlings of the Florida cultivars rosetted. However, 100% of all the other cultivar seedlings exposed to  $31^{\circ}\text{C}$  rosetted. In the control greenhouse, 38% ('Lisa White'), 7% ('Mermaid White'), 8% ('Lizzy White'), and 9% ('Tiara White') of the commercial cultivars rosetted.

In addition to heat tolerance, we considered that 'Florida Silver' plants exhibited sufficient similarities in flower form and display, branching habit, and in the number of days from sowing to flowering in comparison with 'Florida Blue', that they could be included in a Florida cultivar-group. A white-flowering cultivar provides the full range of basic flower colors (blue, pink, and white) expected in a cultivar-group.

Florida cultivars are intended to be used as bedding plants or for flowering potted plants. Treatment with growth retardants is necessary for production of Florida cultivars in  $\leq 11.5$ -cm-diameter pots (Harbaugh et al., 1998). One to three plugs per 7.6- to 11.5-cm-diameter pot is recommended for optimal marketing display.

Table 1. Percentage of rosetted plants<sup>z</sup> and growth and flowering characteristics<sup>y</sup> of nine cultivars of lisianthus grown in 11.5-cm square pots (0.65-L) with capillary mat irrigation at Bradenton, FL.

Cultivar	Rosetted (%)		Plant <sup>x</sup>		Lower branches <sup>w</sup> (no.)	Flowers and buds (no.)	Petal length (cm)	Days to flower (no.)
	31°C	Control	Ht (cm)	Width (cm)				
Florida Blue	0 b <sup>y</sup>	0 c	35 b	20 a	10 bc	70 ab	6.3 ab	137 a
Florida Pink	0 b	0 c	28 de	17 b	8 cd	52 c	5.8 c-e	135 ab
Florida Light Blue	0 b	0 c	30 cd	20 a	10 bc	77 a	6.0 b-d	135 ab
Florida Silver	0 b	0 c	32 bc	19 a	11 b	66 b	6.4 a	135 ab
Lisa White	100 a	38 a	26 ef	12 d	6 e	40 d	6.1 bc	136 ab
Mermaid White	100 a	7 b	25 f	14 cd	9 b-d	39 d	5.9 c-e	136 ab
Lizzy White	100 a	8 b	25 ef	15 c	7 de	42 d	5.7 de	134 ab
Tiara White	100 a	9 b	41 a	21 a	16 a	55 c	5.6 e	133 b

<sup>z</sup> Seventeen-day-old seedlings were grown in a greenhouse at 33 to 35°C day and 13 to 15°C night (control), or exposed to 31°C for 5 weeks in a growth chamber and evaluated after 4 weeks for percentage of rosetted plants. Values are means of four replications with eight plants as the experimental unit arranged in a randomized block design.

<sup>y</sup> Vegetative and flowering characteristics were for non-rosetted control plants. Values are means of five replications of single-plant experimental units arranged in a completely randomized design.

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

<sup>w</sup> Lateral stems originating on the central flowering stem (bolted stem) but below the first flower bud.

<sup>v</sup> Mean separation within columns by Duncan's multiple range test,  $P \leq 0.05$ .

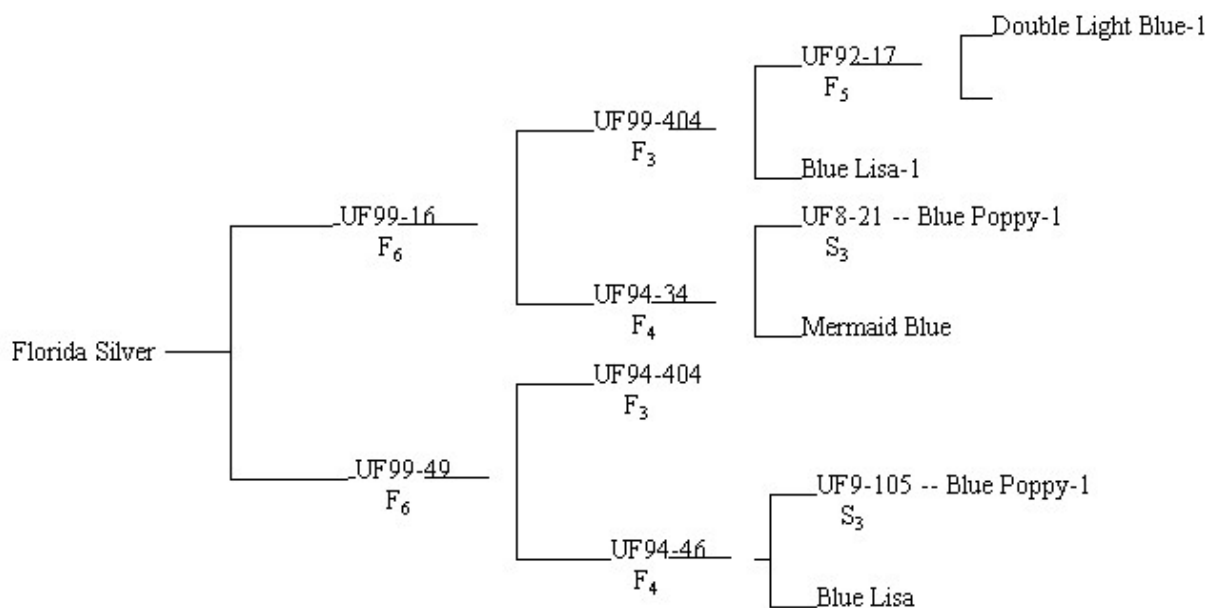


Fig. 1. Pedigree of 'Florida Silver' lisianthus.

### Availability

Seed of Florida cultivar-group will be offered for sale through PanAmerican Seed Co., West Chicago, IL. Scientists interested in seed for research purposes should contact Dr. Harbaugh.

## Literature Cited

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