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'Florida Blue' Semi-dwarf Lisianthus [*Eustoma grandiflorum* (Raf.) Shinn.]

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Lisianthus was introduced into the U.S. floricultural trade in the early 1980s. Although evaluated as a potential cut flower and potted plant (Halevy and Kofranek, 1984), introduced cultivars primarily were developed for use as cut flowers. They required high rates of plant growth retardant to make them suitable as potted plants (Starman, 1991; Tjia and Sheehan, 1986; Whipker et al., 1994). In the early 1990s, the dwarf cultivars Little Belle Blue, Blue Lisa, and Mermaid Blue were released to U.S. markets. These dwarf cultivars can be grown as potted plants without growth retardants.

Although breeding efforts were successful in developing shorter plants, problems with heat-induced rosetting were similar to those with taller cultivars. Dwarf cultivars also rosette when grown at 25 to 28°C (Harbaugh et al., 1992; Ohkawa et al., 1991). Rosetted plants have a basal cluster of leaves and very short internodes typical of biennials, and they do not bolt or flower for 3 to 6 months without exposure at $\leq 18^{\circ}\text{C}$ for 3 to 4 weeks to reverse heat-induced rosetting (Ohkawa et al., 1994; Pergola, 1992). Semirosetted plants develop when seedlings are grown at a constant 22 to 25°C or at $< 22^{\circ}\text{C}$ nights with $> 28^{\circ}\text{C}$ days. Semirosetted plants have one or more side shoots that may elongate and flower, but plants flower unpredictably and are of poor quality. Thus, commercial production of lisianthus for late spring or summer sales as cut flowers or as potted plants is limited by high temperatures in many areas of the United States and other countries. Fall plug production, to produce flowering plants for early spring sales, is also impossible due to rosetting of plugs caused by the interaction of high temperatures and short days (Harbaugh, 1995). 'Florida Blue' is a heat-tolerant, semi-dwarf lisianthus developed at the Univ. of Florida's Gulf Coast Research and Education Center, Bradenton. Seedlings have been produced at 28 to 31°C without rosetting.

Origin

'Florida Blue' is the F₁ hybrid resulting from the cross of inbred lines GCREC-46 and GCREC-34 (Fig. 1). GCREC-46 was an F₄ selection of a cross between GCREC-8-21 and 'Mermaid Blue'. GCREC-34 was an F₄ selection of a cross between GCREC-9-105 and 'Blue Lisa'. 'Mermaid Blue' and 'Blue Lisa' were used for their dwarf characteristics. GCREC-8-21 and GCREC-9-105 were identified after three generations of self-pollination (S₃) from 'Blue Poppy'. They were selected for their ability to flower at high temperatures (35°C day), their basal branching characteristics (i.e., lateral stems forming from the first four to five leaf pairs before bolting), and lower branching

characteristics (i.e., lateral stems forming on the central flowering stem before the first flower bud). Growing conditions used to select F₁ to F₄ GCREC-46 and GCREC-34 lines for resistance to heat-inducing rosetting were 1) exposure of 3- to 4-week-old F₁ to F₃ seedlings to 28°C for 4 weeks and 2) exposure of 17-day-old F₄ seedlings to 31°C for 5 weeks.

Description

Seventeen-day-old 'Florida Blue' seedlings exposed to constant 31°C for 5 weeks did not develop rosetted plants (Table 1). In contrast, similar treatment of 'Blue Lisa', 'Mermaid Blue', and 'Little Belle Blue' resulted in 100% semirosetted or rosetted plants. 'Florida Blue' plants grown in 11.5-cm square pots (0.65-L) with capillary mat irrigation were similar in height to 'Blue Lisa' and taller than 'Little Belle Blue' and 'Mermaid Blue'. 'Florida Blue' had 4.4 basal breaks and 3.0 lower breaks. This combination of basal and lower branching characteristics resulted in a higher flower and bud count than the dwarf cultivars examined. There were 142 days from a 20 Dec. sowing to first open flower for 'Florida Blue'. Days-to-flower for 'Florida Blue' appears similar to those for 'Little Belle Blue' and 'Mermaid Blue', but 11 days more than for 'Blue Lisa'. The range in days-to-flower in other 'Florida Blue' trials during 1995-96 was 107 days (1 Aug. sowing) to 147 days (15 Nov. sowing).

Open flowers of 'Florida Blue' are bell-shaped with a petal length of 5.1 ± 0.1 cm. When first opened, flower petals are a violet blue [Royal Horticultural Society (RHS) violet-blue group 90C; RHS, 1996] on the adaxial petal surface diffusing to a variegated 1.8 ± 0.20 -cm white band (RHS white group 155C0 at the base of the petals. As the flower matures, the petal color darkens to dark purple (RHS dark purple group 79A) and the white band fades or completely disappears. The abaxial petal surface is a lighter violet (RHS violet-blue group 90D) while opening and then darkens to purple as the flower matures (RHS violet-blue group 86B). The center of the flowers (i.e., the base of the petals surrounding the ovary) is a dark purple (RHS purple group 79A).

Characteristics and use

To our knowledge, 'Florida Blue' is the first heat-tolerant, semi-dwarf lisianthus cultivar. 'Maurine Blue', a tall heat-tolerant bedding plant or bouquet-cut flower, was released from our lisianthus breeding program in July 1995 (Harbaugh et al., 1996). 'Florida Blue' is intended to be used as a bedding plant and was designated as a semi-dwarf cultivar because production trials have shown that it normally is from 6 to 16 cm taller than commercial dwarf cultivars and 25 to 45 cm shorter than cut-flower cultivars. Growth retardants would be useful for production in pots ≤ 10 to 12 cm in diameter (0.5 to 0.7 L), especially if plants are produced with capillary mat irrigation. The height of 'Florida Blue' was 25 ± 0.2 cm following one foliar application of butanedioic acid mono (2,2-dimethylhydrazide) (daminozide) at 500 mg L^{-1} to 5- to 7-cm-tall plants grown in 11.5-cm square pots (0.65-L) provided with capillary mat irrigation.

Availability

Seeds of 'Florida Blue' will be offered for sale through PanAmerican Seed Co., West Chicago, IL. Scientists interested in seed for research purposes can contact Dr. Harbaugh.

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Table 1. Rosetting percentages of lisianthus cultivars after exposure of seedlings to greenhouse or high temperatures^z, and vegetative flowering characteristics of lisianthus cultivars sown on 20 Dec. and produced in 11.5-cm square pots (0.65-L) with capillary mat irrigation.

Cultivar	Rosetted (%) ^y		Plant ht (cm) ^x	Breaks (no.) ^x		Flowers and buds (no.) ^x	Petal length (cm) ^x	Days to flower (no.) ^x
	Control	31°C		Basal	Lower			
Florida Blue	0	0	38	4.4	3.0	61	5.1	142
Blue Lisa	8	100	32	3.0	3.4	40	4.6	131
Little Belle Blue	54	100	22	2.2	1.8	34	4.9	143
Mermaid Blue	21	100	24	6.0	1.0	47	5.0	139
LSD _{0.05}			6	1.6	2.2	14	0.5	6

^zSeedlings were grown in a greenhouse at 28 to 33°C day and 13 to 15°C night (control), or 17-day-old seedlings were exposed to 31°C for 5 weeks in a growth chamber and then flowered in the greenhouse.

^yPercentage of rosette or semirosette plants, n=24.

^xVegetative and flowering characteristics were for nonrosetted control plants. Values represent the means of five replications of single-plant experimental units arranged in a randomized complete-block design.

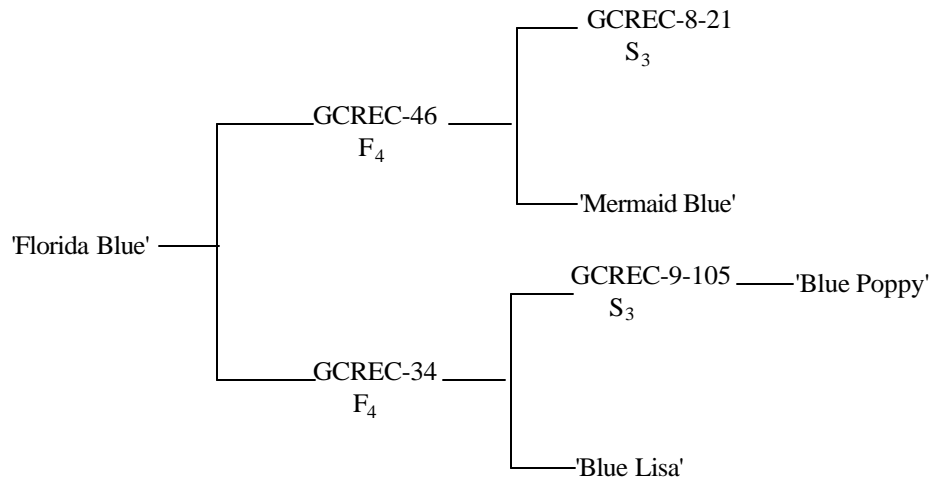


Fig. 1. Pedigree of 'Florida Blue' semi-dwarf lisianthus.