

ed 'Citation III,' 'Manhattan III,' 'Omega III,' 'Premier II,' 'Sunrise Primo Elite,' 'GH94,' 'LRF-B7E,' 'LRF-C7,' 'MB43,' '2M3-95,' and '2ET-95' perennial ryegrass.

Literature Cited

Anderson, S. F. and A. E. Dudeck. 1994. Overseed trials on fairway and putting green bermudagrasses. *Proc. Fla. State Hort. Soc.* 107:416-420.

Proc. Fla. State Hort. Soc. 109:309-310. 1996.

EFFECTS OF PRODUCTION SHADE LEVELS ON LEAF/STEM SIZE AND VASE LIFE OF THREE HERBACEOUS PERENNIALS

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Abstract. Three herbaceous perennial plants—*Aspidistra elatior* Bl. 'Milky Way', *Ophiopogon jaburan* (Kunth) Lodd. 'Vittatus', *Ruscus hypophyllum* L.—were grown in the full sun (0% shade) and under panels of shade fabric designed to provide 30%, 50% or 80% shade. Mulched plots were watered based on their individual soil moisture tensions. After a year of establishment, leaves of 'Milky Way' and 'Vittatus' and stems of ruscus were harvested for vase life evaluations. At each harvest, leaf/stem lengths and weights were determined prior to storage at 4°C [40°F] for two weeks. The response of leaf/stem lengths and weights to shade level was quadratic for all three crops and peaked in the 50-80% shade range, depending on crop. Vase life averaged across three harvests was 52, 33 and 121 days for 'Milky Way', 'Vittatus' and ruscus, respectively. Vase life increased linearly with increasing shade for 'Milky Way' and ruscus but was the same at all light levels for 'Vittatus'.

The foliage of many herbaceous perennials grown in Florida are suitable for use as florists' greens; however, the effects of production light levels on leaf size and subsequent vase life have been studied for only a few (Stamps, 1995; Stamps and Boone, 1992). Florists typically pay more for larger leaves/stems of any given cut foliage. Three landscape perennials that are being used commercially as cut foliages are *Aspidistra elatior* 'Milky Way', *Ophiopogon jaburan* 'Vittatus' (often sold as Aztec grass) and *Ruscus hypophyllum* (Israeli/Holland ruscus). All

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Anderson, S. F. and A. E. Dudeck. 1995. An Evaluation of cool-season turfgrasses for overseeding fairway and putting green bermudagrass. *Soil Crop Sci. Soc. Florida Proc.* 54:5-12.

Anderson, S. F., A. E. Dudeck, and L. E. Trenholm. 1995. Overseed trials in Fairway and putting green bermudagrass. *Proc. Fla. State Hort. Soc.* 108:407-414.

Maguire, J. D. 1962 Speed of germination - aid in selection and evaluation for seedling emergence and vigor. *Crop Sci.* 2:176-177.

Penman, H. L. 1948. Natural evaporation from open water, bare soil, and grass. *Proc. Royal Soc. Series A* 193:120-145.

Turgeon, A. J. 1991. Turfgrass management. 3rd ed. Prentice Hall, Englewood Cliffs, NJ.

three were formerly classified as members of the Liliaceae family and are clump forming, evergreen and can be used as line items in floral arrangements. In addition, 'Milky Way' is used as a background material and ruscus is used as filler material.

This experiment was conducted to evaluate the effects of shade levels ranging from 0% to 80% on leaf size and vase life of the three herbaceous perennials mentioned above.

Materials and Methods

This research was conducted at the Central Florida Research and Education Center in Apopka, FL. Plants were obtained a month prior to planting and held under an intermediate (50%) shade level. The 'Milky Way' and ruscus were in 15-cm [6"] pots and the 'Vittatus' in 5.7-cm [2¼"] rose pots. The perennials were planted on 7 May 1993 in rototilled Tavares-Millhopper fine sand soil. Soil pH and organic matter content were 6.2 and 2.6%, respectively. Four plants of each type were planted in a 0.6-m × 0.6-m [2' × 2'] square area in each plot, one plant per 0.09 m² [1 ft²] in this randomized complete block design experiment with three replications. Shade treatments (30%, 50% and 80%) were provided using 2.4-m × 3.7-m [8' × 12'] wooden frames covered with shade fabric mounted 1.2 m [4'] above the soil surface on wooden posts. Full sun plots had no posts or frames. Plots were watered daily for one week after planting, mulched with oak and pine leaves, and hand weeded as needed.

Fertilization in each plot consisted of 444 g [1 lb] of 12 to 14-month release duration 15N-2.6P-12.4K [15N-6P₂O₅-15K₂O] controlled release fertilizer coated with minor elements (Customblen, Scotts, Milpitas, CA 95035) applied per 3 m² [32 ft²] once a year. This application rate was equivalent to 224 kg N/ha per yr [200 lb N/acre per yr]. Irrigation water was applied overhead individually to each plot using a single spray head sprinkler (8F-FLT, L. R. Nelson, Peoria, IL 61615) mounted on a 0.6-m [2-ft] riser in the center of each plot. Each plot was equipped with a 15-cm [6"] tensiometer (model R, Irrrometer, Riverside, CA 92516). Irrigation was initiated when the soil moisture tension reached -12 kPa [-12 cbar]. Basing the irrigation of each individual plot on tensiometer readings was intended to remove bias due to differences in water availability that might occur because of variable evapo-

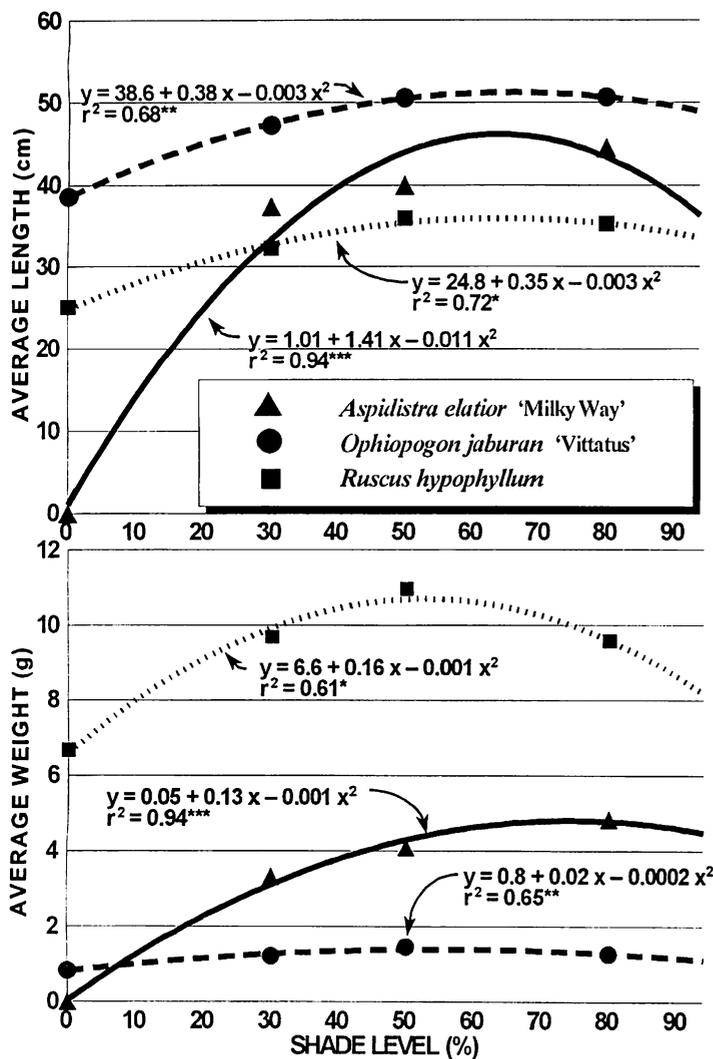


Fig. 1. Effects of production shade levels on leaf ('Milky Way', 'Vittatus') and stem (ruscus) lengths and weights. Means are based on three harvests. *, **, *** indicate significance at $P = 0.05, 0.01$ and 0.001 , respectively.

transpiration rates in plots with different shade levels and/or amounts of mulch or plant material.

'Milky Way' and 'Vittatus' leaves and ruscus stems were harvested from each plant in the mornings on 10 June, 8 July and 16 Sept., 1994. These are the months when postharvest longevity of cut foliages is generally shortest (Mathur et al., 1982; Poole et al., 1984). 'Milky Way' leaves and ruscus stems were harvested with clippers and 'Vittatus' leaves were harvested by grasping them close to the base and pulling upward. Leaf/stem lengths and fresh weights were then taken and the samples moistened and placed in polyethylene bags. Bags were placed in waxed fiberboard boxes and stored for two weeks at 4C [40°F]. After storage, petioles/stems were recut 1 cm [0.4 inch] above the base and inserted into florists' foam (Smithers-Oasis, Kent, OH) sitting in trays filled with deionized water. Postharvest evaluations were conducted in rooms maintained at $23 \pm 2C$ [$74 \pm 4°F$] and $45 \pm 15\%$ RH, with 12 hours of light/day at $17 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ [107 ft-candles] provided by cool white fluorescent lamps. Vase life was terminated when leaves began to show chlorosis (yellowing) or signs of desiccation (graying, curling).

Leaf/stem lengths and vase lives were averaged for all samples taken from a given plot at each harvest prior to statis-

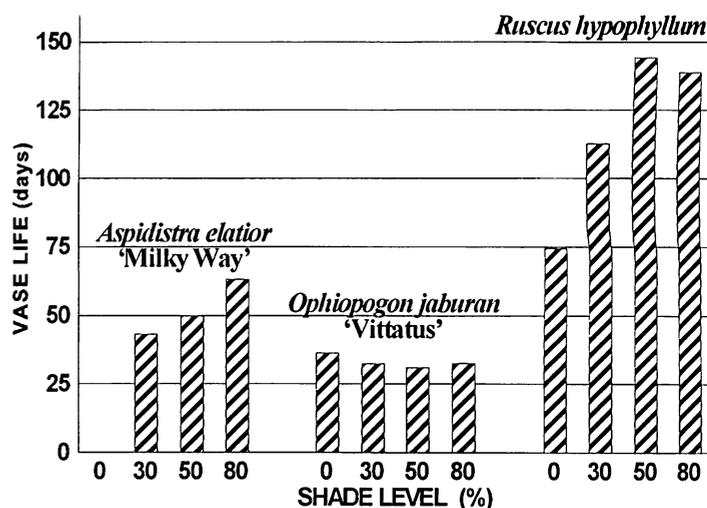


Fig. 2. Effects of production shade levels on vase life of three herbaceous perennials. *Aspidistra elatior* 'Milky Way' did not survive in full sun.

tical analysis making the experimental unit four leaves/stems. Data were subjected to regression analyses (SAS, SAS Institute, Cary, NC).

Results and Discussion

Since the effects of shade level were similar at each harvest, the overall means are used below.

Leaf/stem growth. The response of leaf and stem lengths and weights to shade level were quadratic for all three crops (Fig. 1). 'Milky Way', known as a low light plant, barely survived the full sun treatment and both leaf lengths and weights were highest at 80% shade. Previous research has indicated that overall plant growth for 'Milky Way' in central Florida is greater at 80% shade than higher light levels (Stamps et al., 1994). Stem lengths for ruscus appeared to plateau at between 50% and 80% shade; however, stem weights declined going from 50% to 80% shade. Both leaf lengths and weights for 'Vittatus' were similar at 50% and 80% shade.

Vase life. Vase lives of all three crops were excellent, averaging 52, 33 and 121 days across all three harvests for 'Milky Way', 'Vittatus' and ruscus, respectively. Vase life of 'Vittatus', whose leaf weight was least affected by shade level, was the same under all shade levels (Fig. 2). Vase life for 'Milky Way' and ruscus increased linearly with increasing shade level but was more than adequate at the lower shade levels. However, in full sun and 30% shade ruscus stems and 'Milky Way' leaves ('Milky Way' barely survived in full sun) were of poor quality for florists' use due to their pale green color compared to those produced under higher shade.

All three perennials proved durable as cut foliage and produced their largest leaves/stems under 50-80% shade.

Literature Cited

- Mathur, D. D., R. H. Stamps, and C. A. Conover. 1982. Postharvest wilt and yellowing of leatherleaf fern. Proc. Fla. State Hort. Soc. 95:142-143.
- Poole, R. T., C. A. Conover, and R. H. Stamps. 1984. Vase life of leatherleaf fern harvested at various times of the year and at various frond ages. Proc. Fla. State Hort. Soc. 97:266-269.
- Stamps, R. H. 1995. Effects of shade level and fertilizer rate on yield and vase life of *Aspidistra elatior* 'Variegata' leaves. J. Environ. Hort. 13:137-139.
- Stamps, R. H. and C. C. Boone. 1992. Effects of growing medium, shade level and fertilizer rate on cladode color, yield and vase life of *Ruscus hypophyllum*. J. Environ. Hort. 10:150-152.