

A REFEREED PAPER

VASE LIFE COMPARISON OF ORNAMENTAL ASPARAGUS SPECIES AND CULTIVARS

ROBERT H. STAMPS*, DIANE K. ROCK
AND ANNETTE L. CHANDLER
University of Florida, IFAS
Environmental Horticulture Department
Mid-Florida Research and Education Center
2725 S. Binion Road
Apopka, 32703-8504

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Abstract. The cut foliage industry in Florida started in the 1890s when producers started growing *Asparagus setaceus* (plumosa "fern"). Since then, a number of additional species and cultivars of ornamental *Asparagus* have been tried for use as florists' greens. Ten species and cultivars were grown in containers in a shadehouse with 70% light exclusion. Over a seven-year period, stems were periodically harvested for vase life evaluations. After harvest, stems were submerged in water, packed in plastic bags and stored for 2 weeks in corrugated fiberboard boxes held at 4°C (40°F). After storage, stems were held under simulated home/office conditions in glass containers filled with deionized water. Average overall vase life durations ranged from 24.4 days for *A. densiflorus* 'Myers' to 6.2 days for *A. pseudoscaber*, and generally broke out into a number of somewhat discrete groupings: *A. densiflorus* 'Myers' > *A. africanus*, *A. setaceus* > *A. falcatus*, *A. virgatus*, *A. retrofractus* > *A. densiflorus* 'Sprengeri', *A. officinalis* subsp. *prostrata*, *A. crispus* and *A. pseudoscaber*. The primary symptoms at vase life terminations were chlorosis (yellowing) and cladophyll drop (abscission).

*Corresponding author; e-mail: rhs@ifas.ufl.edu

The cut foliage industry in Florida started in the 1890s when growers started producing *Asparagus setaceus* (plumosa "fern") for shipment to northern markets (Manning, 1984). Over the years, additional *Asparagus* species and cultivars have been introduced for use as florists' greens (Hunter, 2000; Scace, 2001; Stamps, 1988; Strong, 1996). However, relative vase lives of these plants, produced and evaluated under the same conditions, have not been studied. In addition, the nomenclature used in several references is dated or incorrect, which can lead to confusion when comparing various ornamental *Asparagus*.

The purpose of this study was to repeatedly harvest and evaluate a number of *Asparagus* species and cultivars in order to ascertain the relative variability and duration of their vase lives.

Materials and Methods

Ten species, subspecies and cultivars of *Asparagus* were evaluated in this study (Table 1, Fig. 1). Please note that the taxonomy of these plants is still in a state of flux, and that some of the names listed are somewhat provisional. Plants were grown in Apopka, Fla., in a shadehouse covered with black polypropylene shade fabric providing 70% light exclusion. During winter, temperatures were maintained above 7°C (45°F) by lining the shadehouse with polyethylene film and heating it using kerosene-fueled space heaters. Substrate used in the plastic pots was a Sphagnum peat:vermiculite:perlite (60%:20%:20% by volume) soilless growing medium (Vergro Container Mix A, Verlite, Tampa, Fla.). Pots were fertilized with a 15N-4P-10K controlled-release fertilizer containing additional macro- and micronutrients (Osmocote Plus 15-9-12 with minors, Scotts, Marysville, Ohio) at an annual nitrogen application rate of 3,192 kg·ha⁻¹·yr⁻¹ [2,850 lb/acre/yr]. Multiple pots, usually five to 12, of each *Asparagus* being evaluated were maintained. Irrigation was provided as needed using overhead sprinklers.

Table 1. Ornamental *Asparagus* evaluated for vase life.

Scientific names (Bailey et. al., 1976; Huxley, 1992)		Common name(s)	
Name and authority	Synonyms	Floral industry	Other
<i>A. africanus</i> Lam.	<i>A. cooperi</i> Bak.	—	climbing asparagus
<i>A. crispus</i> Lam.		basket asparagus	thornless sprengeri
<i>A. densiflorus</i> (Kunth) Jessop. 'Myers'	<i>Asparagus meyerii</i> Hort.	foxtail, foxtail "fern"	meyeri
<i>A. densiflorus</i> 'Sprengeri'	<i>A. sprengeri</i> Reg.	sprengeri, sprengeri "fern"	emerald "fern", asparagus "fern"
<i>A. falcatus</i> L.		bamboo "fern"	sickle thorn
<i>A. officinalis</i> L. subsp. <i>prostrata</i>		—	prostrate edible asparagus
<i>A. pseudoscaber</i> (Asch. & Gräbn.) Grecescu.	<i>A. officinalis</i> var. <i>pseudoscaber</i> Asch. & Gräbn.	Lace Veil, Lace Veil asparagus	
<i>A. retrofractus</i> L.	<i>A. macowanii</i> Bak.	ming "fern"	pom pom asparagus "fern"
<i>A. setaceus</i> (Kunth) Jessop.	<i>A. plumosus</i> Bak.	plumosus, plumosa "fern", wedding "fern"	asparagus "fern", lace fern
<i>A. virgatus</i> Bak.		tree "fern"	broom "fern"

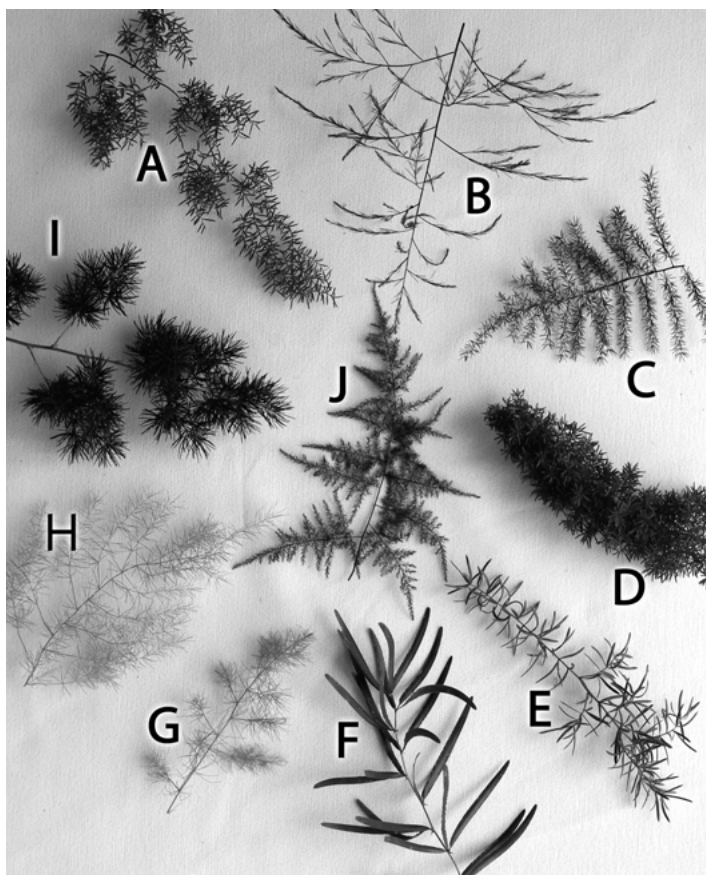


Fig. 1. Ornamental Asparagus evaluated for vase life. *A. crispus* (A), *A. virgatus* (B), *A. africanus* (C), *A. densiflorus* 'Myers' (D), *A. densiflorus* 'Sprengeri' (E), *A. falcatus* (F), *A. officinalis* subsp. *prostrata* (G), *A. pseudoscaber* (H), *A. retrofractus* (I) and *A. setaceus* (J).

Recently matured stems were harvested by pulling by hand (*A. densiflorus* 'Myers' and 'Sprengeri', *A. officinalis* subsp. *prostrata*) or cutting using clippers and bunched into five- or ten-stem groups. Stem lengths generally ranged from 60 to 76 cm (24 to 30 inches). Bunches were submerged in deionized water for 3 min and immediately placed into 30 cm × 76 cm (12" × 30") plastic bags. Bags were sealed and placed in waxed fiberboard boxes and stored in a cooler at 4°C (40°F) (Nowak and Rudnicki, 1990) for two weeks. After 14 d in stor-

age, stem bases were re-cut using hand clippers to remove about 2.5 cm (1 inch). Cladophylls at base of the stems were stripped off by hand. Stems were then placed in 900-mL glass jars, filled with deionized water, located in an acclimatization room. Only the stems of one species or cultivar were placed in a jar.

Conditions in the rooms simulated home/office conditions with light levels of 17 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ (107 ft-candles) provided for 12 h per day using cool white fluorescent lamps, temperatures of $23 \pm 2^\circ\text{C}$ ($74 \pm 4^\circ\text{F}$) and relative humidities of $45 \pm 15\%$. Vase life of stems were terminated when they began to exhibit chlorosis (yellowing), necrosis (brown or black tissue), desiccation (graying, curling, wilting) or cladophyll drop (abscission) affecting about 5% or more of the cladophylls or cladophyll surface area.

Statistical analyses were done using analysis of variance and means separations were made using Duncan's new multiple range test at $P \leq 0.05$ (SAS Institute, Cary, N.C.). The experimental units were individual stems.

Results and Discussion

Average vase lives for individual harvests ranged from 2 d for *A. officinalis* subsp. *prostrata* in June of 2001 to 32.2 d for *A. densiflorus* 'Myers' in June of 2003 (Table 2). Overall vase lives averaged across all harvests ranged from 6.2 d for *A. pseudoscaber* to 24.4 d for *A. densiflorus* 'Myers'. Both *A. officinalis* subsp. *prostrata* and *A. pseudoscaber*, along with *A. crispus* and *A. densiflorus* 'Sprengeri', frequently had the shortest vase lives across all harvests. The relatively short vase life of *A. densiflorus* 'Sprengeri' has been reported previously (Broschat and Donselman, 1987). However, it should be noted that for boutonniere, bridal and corsage work the observed vase lives would be adequate.

A. densiflorus 'Myers' was at the other end of the vase life scale, averaging 24.4 d overall. In four out of eight trials, its vase life was significantly greater than that of the other Asparagus and in seven out of eight it was in the top grouping. *A. africanus* and *A. setaceus* were generally in the top or second from the top groupings throughout these trials with average vase lives of over two weeks; both are suitable for a number of uses from arrangements to garlands. This relatively long vase life after two weeks in storage and its delicate texture are two reasons why *A. setaceus* is still popular more

Table 2. Vase life, in days, of Asparagus species and cultivars after storage for 2 weeks at 4°C.

	Harvest month and year								Overall
	7/96	10/97	6/98	7/99	1/01	6/01	8/02	5/03	
<i>A. africanus</i>	19.7 b ^a	5.6 cd	18.7 b	16.0 a	7.0 bc	13.2 b	4.6 de	—	14.8 b
<i>A. crispus</i>	4.5 d	—	9.7 de	4.8 b	5.0 cd	2.0 d	10.6 bc	10.4 bc	7.0 e
<i>A. densiflorus</i> 'Myers'	25.8 a	20.0 a	32.0 a	19.0 a	11.8 a	19.6 a	13.0 b	32.2 a	24.4 a
<i>A. densiflorus</i> 'Sprengeri'	—	3.6 d	13.4 c	7.8 b	3.8 d	5.8 cd	6.8 cde	4.0 d	7.6 e
<i>A. falcatus</i>	16.3 b	8.8 bc	9.5 de	18.0 a	7.2 bc	7.6 c	8.6 bcd	10.2 bc	11.7 c
<i>A. officinalis</i> subsp. <i>prostrata</i>	3.8 d	4.0 d	11.6 cd	8.4 b	—	2.0 d	2.6 e	6.3 cd	7.2 e
<i>A. pseudoscaber</i>	5.0 d	6.4 bcd	6.5 e	8.0 b	—	4.6 cd	—	—	6.2 e
<i>A. retrofractus</i>	—	7.4 bcd	—	9.4 b	8.4 b	8.0 c	8.4 bcd	7.6 bcd	8.4 de
<i>A. setaceus</i>	—	9.2 bc	12.9 cd	19.2 a	11.6 a	18.8 a	21.5 a	—	15.9 b
<i>A. virgatus</i>	11.6 c	10.1 b	10.1 cd	7.8 b	8.8 b	7.6 c	8.4 bcd	11.7 b	10.2 cd

^aMeans in a column followed by the same letter are not significantly different at $P \leq 0.05$ (Duncan's new multiple range test).

Table 3. Vase life termination symptoms displayed by stems of ornamental *Asparagus*, in percentages.^z

Scientific name	Stems displaying symptoms (%)			
	Chlorosis	Cladophyll drop	Necrosis	Dessication
<i>A. africanus</i>	84.1	72.7	0.0	0.0
<i>A. crispus</i>	97.6	23.8	0.0	2.4
<i>A. densiflorus</i> 'Myers'	86.3	15.7	3.9	11.8
<i>A. densiflorus</i> 'Sprengeri'	89.7	51.3	10.3	0.0
<i>A. falcatus</i>	90.4	17.3	17.3	0.0
<i>A. officinalis</i> subsp. <i>prostrata</i>	94.4	5.6	9.3	1.9
<i>A. pseudoscaber</i>	95.1	2.4	0.0	12.2
<i>A. retrofractus</i>	90.3	16.1	9.7	0.0
<i>A. setaceus</i>	78.1	22.6	18.8	3.1
<i>A. virgatus</i>	98.0	14.3	2.0	0.0

^zPercentages are the average of five to eight evaluations, depending on plant (see Table 2). Total percentages may exceed 100% since multiple symptoms may have been observed on individual stems.

than 100 years after it was introduced as a cut foliage crop in Florida. Texture of *A. africanus* and *A. setaceus* are similar but *A. africanus* has bluer cladodes. Results for *A. setaceus* are consistent with previous work (Barendse, 1979; Dolci et al., 1989).

The remaining *Asparagus*, with average overall vase lives greater than one week but less than two, were intermediate between the better and worst performing plants. Of these *Asparagus*, vase lives found in our trials were consistent with those reported earlier for *A. falcatus* (Dolci et al., 1989) and *A. virgatus* (Barendse, 1979; Stamps and Rock, 2000) but shorter than previously reported for *A. retrofractus* (Barendse, 1979; Broschat and Donselman, 1987).

Chlorosis was by far the most common reason vase lives were terminated (Table 3). Depending on *Asparagus* type, from 78% to 98% of stems exhibited this symptom. The other significant characteristic ending vase lives was cladophyll drop. Both of these symptoms are typical for ornamental *Asparagus* (Barendse, 1979; Dolci et al., 1989; Lee et al., 2003) and are likely related to the known ethylene sensitivity of these crops (Nowak, 1985; Dolci et al., 1989; Lee et al., 2003).

In conclusion, ornamental *Asparagus* have a range of vase life potentials that should be taken into consideration when used by florists. Additional research on the effects of pre- and/or postharvest treatments to extend vase life should be conducted so that these products will perform better as cut foliage.

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