Evaluation of Trachelium Cultivars as Cut Flowers

RongNa Liang[1] and Brent K. Harbaugh[2]

HortTechnology April-June 2001

Summary. *Trachelium caeruleum* has been grown in the United States as a cut flower for about a decade. Only two cultivars, 'White Umbrella' and 'Purple Umbrella', were readily available for commercial use before 1997, but nine new cultivars became available in the last few years. Comparative performance trials have been lacking for these cultivars in the United States. This trial evaluated 11 cultivars of Trachelium for cut flower production performance (vegetative and flowering characteristics) and postharvest longevity. The evaluation was in the spring of 1999 at Bradenton, Florida (27.4 N, 82.5 W; AHS Heat Zone 10; USDA Cold Hardiness Zone 9b). Plant height for all cultivars except 'White Umbrella' was above 30 inches (76 cm), a height required for acceptance as a high quality cut flower. Vase life was a short as 7 days for 'Summer Lake' to as long as 11 days for 'White Umbrella'. 'Lake Powell' (white color group), 'Summer Blue Wonder' (blue color group), and 'Lake Superior' (purple color group had the highest overall rankings.

Trachelium has been grown in the United States as a cut flower for about a decade but is a relatively unknown or untried crop for many cut flower growers (Evensen and Beattie, 1987). In Europe, Trachelium has been grown commercially since the early 1980s (Armitage, 1988). In 1998, it was ranked twentieth in both value and volume of cut flowers in the Dutch auction. 'White Umbrella' and 'Purple Umbrella' were the only cultivars readily available to growers in the United States until 1995 (Armitage, 1995). However, many cultivars have been released in the last few years affording growers a chose of not only new cultivars with white or blue flowers, but also cultivars with novel red, pink, or dark purple flowers.

To our knowledge, there has not been a replicated cut flower trial for Trachelium by the public sector in the United States. We evaluated 11 cultivars of Trachelium for vegetative and flowering characteristics when produced in ground beds as cut flowers. Postharvest performance (vase life) also was evaluated.

Materials and methods

Seeds of 11 trachelium cultivars were sown 11 Nov. 1998 and germinated at 72 to 75º (22 to 24º C) in a growth room with a photosynthetic photon flux (PPF) of 30 $\mu mol \cdot m^{-2} \cdot s^{-1}$ for 12 h from cool-white fluorescent lamps. Germination trays were moved to a glass greenhouse 12 d after sowing. The minimum night temperature was maintained at 60º F (15.5º C) and daily high temperatures were 80 to 88º F (27 to 31º C). Seedlings were fertilized twice a week with a 15N-7P-14.1K (15-16-17 Peat-Lite Special; Scotts Co., Marysville, Ohio) solution containing 250 ppm ($mg \cdot L^{-1}$) N.

Seedlings were transplanted 21 Dec. 1998 into 200-cell plug trays with 1-inch (2.54 cm) cells and grown in the same greenhouse until 29 Jan.1999. Seedlings were fertilized once per week with a 15N-2P-12.4K water soluble fertilizer (15-5-15 Ca-Mg Excel; Scotts Co., Marysville, Ohio) solution containing 500 ppm N.

On 29 Jan., plugs were transplanted into ground beds within an open sided, fiberglass-covered, sawtooth greenhouse. Temperatures during the remainder of the experiment ranged from a low of 42º F (5.6º C) to a high of 98º F (36.7º C). Midday PPF ranged from 760 to 920 $\mu mol \cdot m^{-2} \cdot s^{-1}$. Beginning 15 Feb., day length was extended 4 h from twilight with a PPF at plant height of at least 2 $\mu mol \cdot m^{-2} \cdot s^{-1}$.

Ground beds were fumigated 3 weeks before planting with a mixture of 67% methyl bromide and 33% chloropicrin at 350 lb/acre ($392 kg \cdot ha^{-1}$). Plants were fertilized twice per week with a 15N-7P-14.1K (15-16-17 Peat-Lite Special; Scotts Co., Marysville, Ohio) solution containing 500 ppm N. Plants were irrigated via two microirrigation tubes spaced 12 inches (30.5 cm) apart on the bed.

The beds were 3 ft. wide (91 cm) and 6 inches high (15.2 cm) covered with white-on-black polyethylene film. Two layers of 6 × 8 inch (15.2 × 20.3 cm) support wires were placed on the beds with 6 rows across the bed. Two seedlings were planted per 6 × 8 inch rectangle. There were 24 plants per cultivar per plot, and three plots of each cultivar. Twelve stems were cut from the interior of each plot for evaluation of vegetative and flowering characteristics.

Evaluation of vegetative and flowering characteristics.

Flower stems were cut when 70% to 75% of the flowers in the terminal inflorescence were open. Stems were cut 2 inches (5.1 cm) above the beds. Data on harvested stems included the number of days from sowing to harvest, total cut stem height (base of a stem to the inflorescence tip), cut stem weight, the stem base diameter, and inflorescence diameter.

The experimental design was a randomized complete block with three blocks, and 12 plants represented the experimental unit. Statistical analyses were performed on data using analysis of variance, and mean separated where appropriate using Fisher's protected $LSD_{0.05}$ (PROC ANOVA, SAS Inst., Cary, N.C.).

Evaluation of postharvest longevity.

After production data were taken, stems were recut to 24 inches (61 cm) and place in clear glass vases with water to determine their postharvest longevity (vase life). The

interior environment was maintained at 72 to 75º F (22 to 24º C) and a photosynthetic photon flux of 30 µmol·m^{-2}·s^{-1} for 12 h from cool-white fluorescent lamps. The number of days that foliage and flower quality were judged acceptable for a cut flower was recorded. Unacceptable characteristics were either wilted or necrotic foliage, wilted inflorescences, or aborted or wilted flowers within an inflorescence rendering the appearance of the entire inflorescence as undesirable. A randomized block design was used with three replications and four stems as an experimental unit. Statistical analysis was performed as above.

Selection of best cultivars.
Cultivars were ranked for each of the attributes and the total rank sum of all attributes (TRS) was used to select the best cultivars. That is, cultivars were given a rant from 1 (least desirable) to 11 (most desirable) for each attribute. For all attributes except days to harvest, the highest values were considered the most desirable. For two-way ties at a given rank, rank n and n + 1 were replaced by rank n + ½ which was assigned twice, and the next rank was n + 2. Three and four-way ties were handled similarly.

Results and discussion
Evaluations of vegetative and flowering characteristics.
Plants height ranged from 71.5 cm (28.2 inches) for 'White Umbrella' to 95.3 cm (37.5 inches) for 'Lake Superior' (Table 1). Stem length is an important factor in the pricing of cut flowers. To bring the highest prices, cut stems generally have to be =76 cm (30 inches). All of the cultivars except 'White Umbrella' were tall enough to be considered a top quality cut flower.

'Summer Blue Wonder' had the thickest and heaviest stem at 9 mm (0.35 inch) and 64.7 g (2.3 oz), respectively. 'White Umbrella' had the thinnest and lightest stems at 7.7 mm (0.3 inch) and 28 g (1.0 oz), respectively. Stem diameter and weight, as gauges of stem strength, area also important factors determining cut stem quality. Tall trachelium stems with a small stem diameter or weight will not support the inflorescences causing stems to break after cutting. It is interesting to note that the three tallest cultivars ('Lake

Superior', 'Lake Powell', and 'Summer Blue Wonder') also had the larger stems diameters and weights making these cultivars highly desirable as cut flowers.

'Summer Blue Wonder' had the largest inflorescence diameter at 16.0 cm (6.3 inches) and 'Summer Lake' the smallest at 10.7 cm (4.2 inches). While we did not count individual flowers in each inflorescence, all cultivars except 'White Umbrella' had an abundance of tightly clustered flowers giving an excellent floral display. Individual flowers within an inflorescence of 'White Umbrella' were sparse resulting in a decreased floral display even though the inflorescence diameter was relatively large.

Evaluation of postharvest longevity.
Eight of the eleven cultivars had a vase life of 8 to 9 d. 'Summer Lake' had the shortest vase life of 7 d and 'White Umbrella' the longest at 11 d. While these differences in vase life appeared relatively small, they none the less are of practical importance. Since trachelium is used as a filler in flower arrangements, their early decline could quickly and significantly reduce the value of the entire arrangement.

Selection of the best cultivars.
Trachelium cultivars can be separated into three basic flower color classes; white, blue, and shades of purple. The three cultivars with the highest TRS were 'Lake Powell' (white), 'Summer Blue Wonder' (violet blue), and 'Lake Superior' (dark purple). Interestingly, all three color classes were represented in the top three cultivars.

We recognize that growers may eliminate a cultivar based on a single negative attribute, or that growers might choose a cultivar because one attribute was more important for their marketing strategy regardless of the relative TRS. However, the TRS method incorporates many factors that are often hidden or overlooked by growers and we believe represents a reasonable method for ranking overall performance. While this evaluation was at a single location and for a single year, the results indicate that breeding effort have resulted in significantly improved cultivars compared to the older cultivars, 'Purple Umbrella' and 'White Umbrella'.

Literature cited

Armitage, A.M. 1988. Effects of photoperiod, light source and growth regulators on the growth and flowering of *Trachelium caeruleum*. J. Hort. Sci. 63:667-674.

Armitage, A.M. 1995. Trachelium caeruleum, p. 136-138. In: Specialty cut flowers. Varsity Press/Timber Press, Portland, Oregon.

Evensen, K. B. and D. J. Beattie. 1987. Trachelium caeruleum: The umbrella flower. Pa. Flower Growers Bul. 380.

Table 1. Production and postharvest performance of eleven cultivars of trachelium grown at Bradenton, FL. Seeds were planted 11 Nov. 1998 and plugs transplanted to ground beds 21 Dec. 1998.

Cultivar	Flower color	Stem length (cm)[z]	Stem diam (mm)[y]	Stem wt (g)[x]	Inflorescence diam (cm)	Days to harvest (days)	Vase life (days)	Total rank sum[w]
					White cultivars			
Lake Powell	White	92	8.7	62	15.4	169	8	42.5
White Umbrella	White	72	7.7	28	13.6	160	11	33.0
					Blue cultivars			
Summer Blue Wonder	Violet blue	90	9.0	65	16.0	163	9	56.0
Meri Blue	Violet blue	81	8.7	52	11.8	162	9	39.0
Purple Umbrella	Violet blue	88	8.1	46	13.3	163	10	38.0
Lake Success	Violet blue	82	8.6	42	12.3	162	9	34.5
Blue Wonder	Violet blue	86	8.4	46	11.7	164	9	31.5
Summer Lake Superior	Dark violet	86	8.2	47	10.7	165	7	20.5
					Purple cultivars			
Lake Superior	Dark purple	95	8.8	60	12.3	166	8	42.0
Lake Avalon	Purple	88	8.4	52	13.00	166	8	33.0
Lake Sunset	Red purple	84	8.5	51	11.8	166	8	26.0
$LSD_{0.05}$		12	0.5	17	2.5	5	0.6	