

## Special Research Report # 454: Reducing Scape Bending in the Gerbera Daisy

David G. Clark, Terril A. Nell, Ria T. Leonard, and Thomas A. Colquhoun

Institute of Plant Innovation, Department of Environmental Horticulture  
University of Florida, Gainesville, FL 32611

### BACKGROUND

Cut flowers must consistently have high quality and a long vase life to cultivate and maintain consumer purchases. Bending of the scape is a major postharvest problem of cut *Gerbera* and can render the flowers unmarketable. Various genetic, physiological, and postharvest handling practices were evaluated to determine factors that may reduce or overcome this problem.

### MATERIAL & METHODS

Several varieties of cut *Gerbera jamesonii* were obtained from commercial growers in the USA and Colombia and were commercially transported dry in floral boxes. Within 4 to 7 days after harvest, the flowers arrived in the University of Florida Postharvest Laboratory. Depending on the study, flowers were held either dry in boxes or re-cut and hydrated in a commercial hydration solution upon arrival for 2 to 7 days at temperatures maintained at 35, 42, 50, or 70 °F. Flowers were held in closed-door florist display coolers, with 5  $\mu\text{mol m}^{-2}\text{s}^{-1}$  (24 hr/day) of light from florescent bulbs and 65-70% relative humidity.

After storage, flower stems (scapes) were cut to 35 cm and placed in a vase containing commercial flower food and held at 70 °F, 10  $\mu\text{mol m}^{-2}\text{s}^{-1}$  (12 hr/day) and 50% relative humidity to simulate consumer conditions. Scape bending was evaluated when removed from storage and over time in postharvest conditions. Scape bending was rated based on the following scale: 1=no bending; 2=slight (<30° angle); 3=fair (>30 to <60° angle); 4=severe (>60° angle). Vase life was determined from the time flowers were placed into simulated consumer conditions to when the flowers either wilted, discolored (25% or greater of the surface area) or the scape collapsed.

A total of 14 cut *Gerbera* varieties were screened for their susceptibility to scape bending, flower quality, and vase life. Several postharvest handling practices were evaluated to determine their effects on scape bending. Physiological examination of the xylem and vascular bundles of the stem was conducted between susceptible and non-susceptible varieties. Scape samples were obtained 1.5 inches below the flower and cut using a microtome. Sections were cut to 30 microns, stained, and examined under a high power microscope (10x to 40x). Xylem tubes and vascular bundles were counted and measured. Stem diameters were also measured.

## RESULTS

### A. Genetic Influence and Storage Conditions on Scape Bending

A range in vase life and susceptibility to scape bending varied among the cut *Gerbera* varieties tested (Table 1). Vase life ranged from 5.5 days for 'Teresa' to 13.3 days for 'Mistike' after being wet stored at 42 °F for 4-days. All varieties had severe scape bending after wet storage at 35 °F, partial bending at 42 °F and generally no scape bending when stored at 50 °F or greater for 4 or more days. Half of the varieties recovered from scape bending within 24 to 48 hours in postharvest conditions, while the others did not. The most susceptible varieties to scape bending include: 'Guarda', 'Fiction', 'Pink Elegance', 'Primrose', 'Sonata', 'Teresa' and 'Testarrosa'. Scape bending significantly decreased when storage time was reduced to 2 days.

Table 1. Scape bending characteristics and vase life of 14 cut *Gerbera* varieties.

Variety	Flower color	Vase life <sup>1</sup> (days)	Recovery from stem bending after storage at 35 °F for 4 days
Guarda	Red	8.0	No
Fiction	Pink	10.0	No
Foske	Orange	13.2	Yes
Malibu	Dark Red	13.0	Yes
Meriva	Yellow	8.5	Yes
Mistike	Orange	13.3	Yes
Pink Elegance	Pink	7.0	No
Primrose	Light Pink	7.4	No
Solero	Orange	9.5	Yes
Sonata	Red	8.5	No
Sunset	Orange	9.0	Yes
Teresa	White	5.5	No
Testarrosa	Red	8.0	No
Loriana	Dark Pink	11.5	Yes

<sup>1</sup>Vase life presented is based on storage for 2 days at 42 °F.

### B. Physical Support of Cut *Gerbera* Flowers after Transport on Scape Bending

After dry transport, freshly cut *Gerbera* scapes can be weak and unable to support the flower head. The scape bends despite the long, plastic tubes often placed on each stem during dry transport. In contrast, by physically supporting *Gerbera* stems in an upright position during hydration, showed that scape bending was eliminated, even when stored at 35 °F (Figure 1).



**Fig. 1. Scape bending of 'Testarrosa' was eliminated when stems were supported during hydration (left) compared to no support (right).**

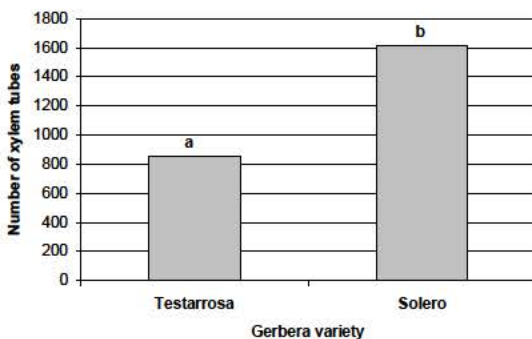


**Fig 2. Example of a physical support system using chicken wire placed over a procona during hydration of Gerbera.**

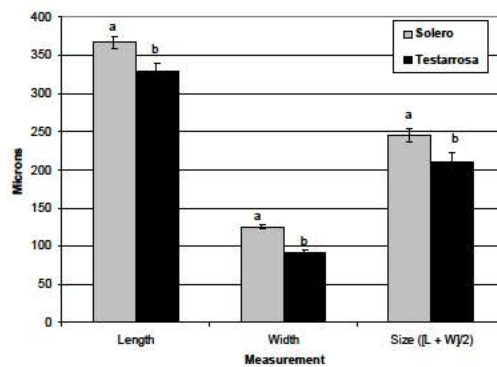
Placing a piece of chicken wire over the top of a bucket or procona and placing each stem in the slot is a simple, inexpensive and an extremely effective technique to overcome scape bending (Figure 2). The stem should hang freely in the container and should not touch the bottom of the container. The stems should also be adequately submerged in the hydration solution. The scape will straighten within 24-48 hours.

### C. Physiological Examination of *Gerbera* Scapes

Anatomical studies were conducted on the vascular system of two varieties that differ widely in scape bending susceptibility. Cut flowers are able to take up water in the stem by tube-like structures called xylem, which are contained in the vascular bundle in the stem. The number of xylem tubes and vascular bundles were examined on the susceptible variety 'Testarrosa' and the non-susceptible variety 'Solero'. 'Solero' had 47.2% more xylem tubes than 'Testarrosa' (Figure 3). 'Solero' vascular bundles were also larger in length, width, and size compared to 'Testarrosa' (Figure 4). No relationship was found between scape diameter and scape bending.



**Fig. 3. The number of xylem tubes in cross sections of Gerbera scapes of two Gerbera varieties.**



**Fig. 4. The length, width and size of vascular bundles of two Gerbera varieties.**

To further examine the composition of the xylem vessels, stems sections were stained with phloroglucinol, which is taken up easily by lignin, a complex compound found in the xylem that plays a crucial part in conducting water in plant stems. Results showed that ‘Solero’ had a greater uptake of the phloroglucinol stain. This indicates a higher amount of lignin in the scape, when compared to ‘Testarrosa’ (Figure 5). The quantity of lignin and/or the amount and size of xylem vessels may explain part of the difference in scape bending susceptibility among varieties.

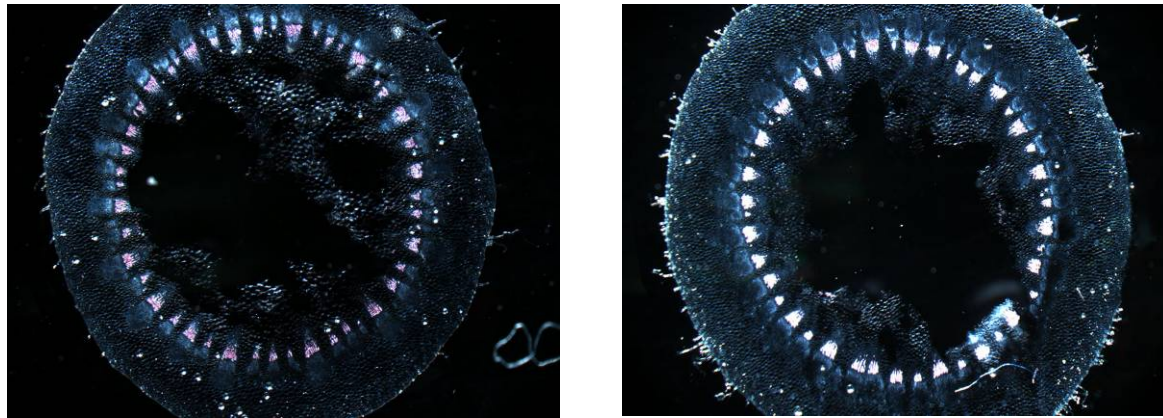


Fig. 5. ‘Testarrosa’ (left) had less lignin content and smaller sized vascular bundles compared to ‘Solero’ (right). Stems were viewed through 4.0x objective lens with a phloroglucinol stain.

#### D. Specialized Hydration Solutions on Scape Bending, Bacterial Control, and Vase life

‘Testarrosa’ stems were held in boxes dry or hydrated using specialized commercial *Gerbera* hydration solutions or plain water for 2 days at 42 °F. The solutions were tested for bacteria contamination after hydration. Stems were re-cut after hydration and placed in a commercial flower food for evaluation.

The specialized hydration solutions were effective in reducing scape bending, eliminating bacteria in the solution, and maximizing vase life compared to hydrating in water (Table 2). Hydrating stems in tap water significantly increased scape bending and reduced vase life by 50%. Holding flowers dry prior to consumer conditions significantly increased scape bending.

Table 2. Specialized hydration solution effects on bacteria growth, scape bending and vase life of the *Gerbera* variety ‘Testarrosa’.

Hydration treatment	No. bacteria per ml (colony forming units/ml)	Vase life (days) <sup>1</sup>	Scape bending rate <sup>2</sup>
Chrysal Professional Gerbera Tablets	0	7.8 a	2.4 b

Floralife Rose and Gerbera Pre-Treatment PRG	0	7.9 a	2.3 a
Tap water	950,000	4.0 b	3.3 a
Boxed (no hydration)	-	8.7 a	3.5 a

<sup>1</sup> Different letters within columns are significantly different at  $P > 0.05$ .

<sup>2</sup> Bending rate: 1=no bending; 2=slight; 3=fair; 4=severe.

## CONCLUSIONS

*Gerbera* scape bending can be eliminated or greatly reduced by variety selection, proper temperature control during storage conditions, supporting stems during hydration and wet storage, and proper postharvest handling techniques. Since *Gerbera* is a relatively short-lived flower, storage should be avoided, if at all possible. Flowers should be unpacked immediately upon arrival, stems cut, placed in a commercial hydration solution where stems are physically supported upright, and held at 42 °F for no longer than 2-days.

The tests showed a high level of variation in susceptibility to scape bending and vase life among the *Gerbera* varieties tested. Therefore, varieties that are less susceptible to scape bending should be considered. The amount and size of the xylem vessels and the corresponding lignin content appears to play a role in the susceptibility of a variety to scape bending.

### **Summary of Practices to Eliminate Scape Bending in Cut *Gerbera***

- Choose varieties that are less susceptible to scape bending or that easily recover.
- Avoid storing cut *Gerbera*.
- Unpack immediately, cut stems and place in a freshly made hydration solution. A specialized solution formulated especially for *Gerbera* is recommended.
- Provide physical support to stems while hydrating to overcome scape bending. They should not touch the bottom of the container.
- Hold or display physically supported stems in a commercial hydration solution at 42 °F for no more than 2-days.
- Always use a commercial hydration solution as these solutions eliminate/reduce bacteria, improve vase life, and reduce scape bending compared to hydrating in water.
- Never store in boxes!
- Always provide flower food packets to customers.

## INDUSTRY IMPACT

This research has identified major factors that are responsible for scape bending in cut *Gerbera* flowers. It has provided practical solutions to eliminate and/or reduce this major industry problem. Growers and retailers should choose *Gerbera* varieties that



are least susceptible to scape bending (Table 1) and provide conditions that will eliminate this problem. This information allows the industry to provide a higher quality, longer-lasting flower to consumers, cultivate repeat customers, and increase sales.

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For additional information contact Dr. David G. Clark [geranium@ufl.edu](mailto:geranium@ufl.edu)

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**American Floral Endowment**

Phone: 703.838.5211

[www.endowment.org](http://www.endowment.org)

[afe@endowment.org](mailto:afe@endowment.org)