

GROWERTALKS

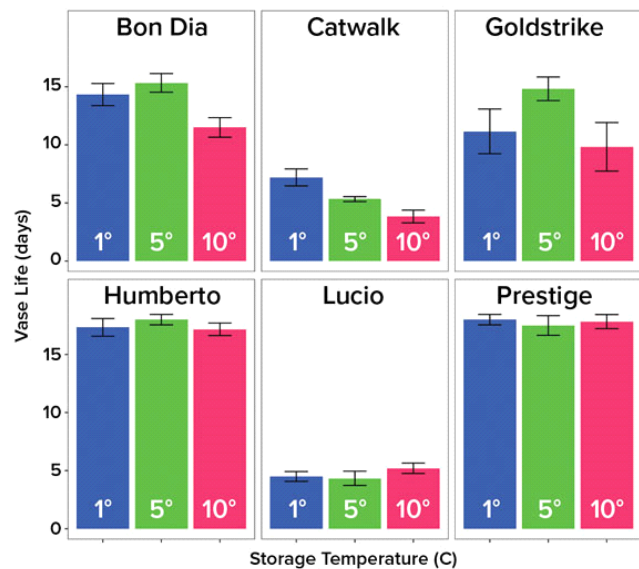
Features

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No Such Thing as Too Chill

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Cut flowers, while highly valuable, are highly perishable. Most of the traditional cut flowers used in the United States are grown and imported from other countries, requiring transportation and storage for extended periods of time to get from production origins and reach the end consumer. To maintain demand, cut flowers must be well-preserved during their postharvest life. Postharvest refers to all steps after harvest, including shipping, storage, time on the shelf and utilization by the end consumer. It's critical to understand the storage conditions that will optimize and preserve quality; however, with the range of plant structures, origins, stage of maturity and genetics, among other crop characteristics, there's no "one-size-fits-all" solution for handling floral commodities.



*Figure 1. Vase life (average number of days) of six *Gerbera jamesonii* cultivars following storage at 33, 41 or 50F (1, 5 or 10C) for eight days.*

Storing horticultural crops at cool temperatures is a critical technology to prolong postharvest life, as detrimental processes such as carbohydrate use, ethylene production and water loss through transpiration are all reduced at lower temperatures. However, if temperatures are too cold, the tissue of some plants can be damaged by chilling injury. Chilling injury is a specific physiological response to cold, but non-freezing, temperatures. Below the temperature threshold for chilling injury induction, plant cell membranes are impaired, leading to physiologic dysfunction and symptom development, such as water-soaking, lesions, petal discoloration and abnormal development.

Crops susceptible to chilling injury are often from tropical or subtropical origins because they aren't adapted to low temperatures. Some flowers known to suffer from chilling injury include bird of paradise, anthurium and Dendrobium orchids. The widely accepted critical threshold for damage is below 50 to 59F (10 to 15C), however, the critical threshold varies by species. The severity of damage depends on the duration of exposure and how far temperatures are below the critical threshold, and injury is often not seen until return to warmer temperatures. Although there are no universal chilling injury symptoms across sensitive species, ultimately, chilling injury reduces quality. Therefore, it's imperative susceptible crops are handled at the optimal temperature to prevent significant economic and product

losses.

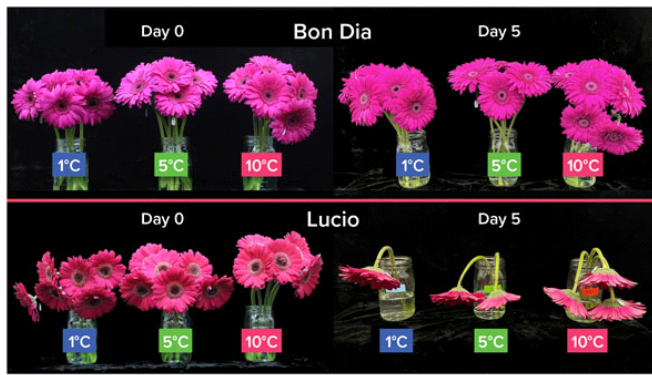


Figure 2. Gerbera cultivars Bon Dia (top) and Lucio (bottom). From left to right: Vases in each panel show flowers that were stored at 33, 41 or 50F (1, 5 or 10C) for eight days. The pictures on the left are from Day 0, which represents the first day of vase evaluation after storage, and the pictures on the right are the same flowers on Day 5 in the vase.

Gerbera jamesonii is a member of the *Asteraceae* family and originates from the eastern, subtropical regions of South Africa. They're perennial plants with

rosette leaves and a flat, broad flower on a long, thin, leafless stem. Gerberas are very popular and commonly used as a potted plant or cut flower. Hundreds of varieties are available in an extremely diverse range of colors in two groups of flower sizes: large flowering varieties, known as gerberas, and those with smaller flowers, known as gerbera minis or “germinis.”

There are conflicting reports among postharvest professionals, with some suggesting a suspicion that *Gerbera jamesonii* as a tropical flower might be susceptible to chilling injury, while others deny it. Although there's been much postharvest work done related to gerbera, it's often centered around the stem bending phenomenon and sensitivity to microbial levels in vase water.

The purpose of this study was to evaluate how postharvest cold storage affects vase life, stem bending and aesthetic qualities of modern *Gerbera jamesonii* cultivars. (For clarity, the term “stem” will be used to refer to the complete gerbera inflorescence, including the flower head and scape. Scape will refer to the green, leafless stalk below the flower head.)

The study

In May 2023, cut *Gerbera jamesonii* stems (cultivars Bon Dia, Catwalk, Goldstrike, Humberto, Lucio and Prestige) were supplied by a commercial grower in California and treated according to their standard practices. Flowers were packed and shipped dry, laid horizontally in cardboard boxes with flower heads supported through a tray insert. Flowers were in transit for two days before arrival in Ithaca, New York. Upon arrival, scapes were cut to 13 in. (34 cm) and held for four hours at room temperature in a commercial hydration solution (FloraLife Express Clear 100).

Following hydration, flowers were stored in a commercial storage solution (FloraLife Express Universal 300) and additionally treated with a commercial chlorine solution specifically for gerbera (FloraLife PRG 100). Water only covered the lower few centimeters of the scape. Stems were hung through wire bucket covers that supported flower heads and allowed scapes to straighten, as the stems didn't reach the bottom of the bucket. Flowers were stored in the dark in coolers set at 33, 41 or 50F (1, 5 or 10C) and 70% relative humidity for eight days.

After storage, scapes were recut to 12 in. (32 cm) and placed in vases containing 500 mL of a standardized vase solution prepared with NaHCO_3 (125 mg/L), $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ (99 mg/L) and $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ (1.2 mg/L) in distilled water. The vase solution was additionally treated with the commercial chlorine tablets. Postharvest evaluation was conducted in a growth chamber at 68F (20C) and 65% relative humidity. At one- to two-day intervals, flowers were assessed for vase life and possible signs of chilling injury development.

Results

Storage at 33F (1C) resulted in similar or improved vase life for all cultivars when compared to flowers stored at warmer temperatures (41 or 50F/5 or 10C). Within cultivars Humberto, Lucio and Prestige, there were no significant differences in vase life due to storage temperature. With Bon Dia and Goldstrike, flowers stored at 50F (10C) had the shortest vase life of 11.5 and 9.8 days, respectively. The vase life of Catwalk was significantly different between 33F (1C; 7.2 days) and 50F (10C; 3.8 days). Lucio stems were very susceptible to bending and all lasted at most five days. Flower quality was not impacted by cold storage, as flowers stored at 33F (1C) appeared without defect (no necrosis or browning) throughout vase life at 68F (20C). Although stem bending has been considered a symptom of chilling injury in gerbera, within each of the six cultivars evaluated, the onset and pace of stem bending occurred concurrently, regardless of storage temperature, suggesting the issue has other structural or genetic causes.

The results obtained from this study provide evidence against the susceptibility of *Gerbera jamesonii* to chilling injury. Storing gerbera at low temperatures is an important postharvest treatment to extend or maintain vase life; however, performance varies tremendously by cultivar. This work indicates that not all gerbera cultivars are created equal; there are wide disparities among cultivars for characteristics such as vase life and resistance to stem bending.

Breeders and growers must evaluate cultivars for optimal postharvest performance, as developing strong cultivars with long vase lives, tolerance to cold storage and resistance to bending is ideal for maintaining the market demand for cut gerbera. **GT**



Figure 3. Gerbera cultivar Prestige pictured on Day 16 in the vase. These flowers were stored at 33F (1C) for eight days and didn't show any symptoms of chilling injury development on the petals.

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