



## Effects of different preservatives on the vase life of chrysanthemum cut flowers

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### ABSTRACT

This research determined how different preservatives affected Chrysanthemum cut flowers' visual quality and vase life (*Chrysanthemum morifolium* L.). The study's findings will benefit farmers, particularly chrysanthemum growers, producers, and dealers, by enabling them to enhance and prolong the Chrysanthemum cut flowers' visual appeal and vase life. The study took place over a period of 23 days. There were four treatments: t0- tap water, t1- three (3) tablespoons of sugar with two (2) tablespoons of vinegar per liter of distilled water, t2- fifty percent coconut water per liter of distilled water, and t3- 200 mg ascorbic acid per 100ml of distilled water. The Complete Randomized Design (CRD) was utilized to arrange these treatments, and four replications were carried out. As a statistical tool for the study, the Analysis of Variance (ANOVA) and Tukey's Significant Difference at a 5% significance level were used to compare means. The highest visual quality was obtained from Chrysanthemum cut flowers treated with three tablespoons of sugar with two tablespoons of vinegar in the first, second, and third week, respectively, compared to all other treatments. Also, it got the highest mean for vase life. It was found that the application of three tablespoons of sugar with two tablespoons of vinegar per liter of distilled water is significantly different and can maintain and extend the visual quality or freshness of Chrysanthemum cut flowers as well as the vase life of those flowers. As a result, three tablespoons of sugar with two tablespoons of vinegar is suggested as an alternative to other preservatives for cut flowers. Additional research studies of using sugar with vinegar on other kinds of cut flowers is recommended to validate the results.

### ARTICLE INFO

Received : Feb. 1, 2023

Revised : Dec. 5, 2023

Accepted : Dec. 30, 2023

### KEYWORDS

*Ascorbic acid,  
Chrysanthemum cut flower,  
Coconut water, Sugar,  
Vinegar*

### Suggested Citation (APA Style 7<sup>th</sup> Edition):

Padernal, J.M., Reyes, R., Ardeña, R., Gemida, J., & Ameler, J. (2023). Effects of different preservatives on the vase life of chrysanthemum cut flowers. *International Research Journal of Science, Technology, Education, and Management*. 3(4), 153-157. <https://doi.org/10.5281/zenodo.10516439>

## **INTRODUCTION**

Approximately 30 types of herbaceous annuals and perennials, aromatic woody, and semi-woody Chrysanthemum, also known as "mums," which is the common name for the plant known scientifically as *Chrysanthemum morifolium* L. (Peyvandi et al., 2010). After the rose, chrysanthemums are considered the world's most crucial cut flower (Kafi & Ghahsareh, 2009). Chrysanthemums are cultivated all over the Philippines, however, because of the shorter vase life, which affects marketability, the industry still has difficulty meeting demand around holidays like Valentine's Day, school graduations, May Flower Festivals, All Saints Day, and the Christmas season (Mashhadian et al., 2012).

Cut flowers are valuable horticultural goods; the production, marketing, and sales of flowers bring in significant revenue. It is also traded globally with countries specializing in cultivating specific flower varieties due to favorable climate and expertise. In many countries, cut flowers have cultural and social value. They symbolize love, celebration, remembering, or sympathy in festivals and religious rituals. In order to achieve positive market outcomes, it is crucial and practicable to maintain the cut flower's high quality while extending the vase's life. A high-quality product will typically command a higher selling price and assist the business in drawing in and keeping customers (Redman et al., 2022). Rapid wilting or early degradation of flowers increases waste at every stage of the supply chain, from producers to retailers to end users. Techniques for preserving flowers can reduce this waste by increasing their lifespans.

The increase in water intake in cut flowers and the prolonging of vase life are both influenced by ascorbic acid (Abdulrahman et al., 2012). According to some writers, ascorbic acid was crucial for several biological processes as an antioxidant on the chloroplast cell membrane, an electron transporter, and an enzyme cofactor (Gallie, 2013). Coconut water, also known as liquid endosperm, is another way to prolong a freshly cut flower's vase life. It is thought to contain auxins, cytokinins, gibberellins, and sugar alcohols like myoinositol. Its auxin component was discovered to delay fruit ripening and leaf and floral senescence (Nair et al., 2000). Sugar was discovered to be commonly used for extending the cut flower's vase life. Adding sugar, such as sucrose, to vase water helps extend the cut flower's vase life since it plays a crucial role as a substance for respiration in plants (Halevy & Mayak, 1979). It was stated clearly that the treatment given to chrysanthemum cut flower affects how long they last in vases (Paull & Chantrachit, 2001). Because of this, the researchers studied how different preservatives affected the vase life of Chrysanthemum cut flowers. Efforts will be made to maintain and have longer vase life and quality, and advancing preservation methods.

## **OBJECTIVES OF THE STUDY**

Generally, the study aimed to determine the effect of different preservatives on the Chrysanthemum cut flower's vase life. Specifically, with an emphasis on the average vase life and visual quality rating per treatment, the study aims to determine how different preservatives affect the vase life of chrysanthemum cut flowers. Additionally, the study aims to compare treatments to determine which ones might extend the vase life of Chrysanthemum cut flowers.

## **MATERIALS AND METHODS**

Four (4) treatments, four (4) replications, and sixteen (16) experimental units made up the Completely Randomized Design (CRD) used for this study. There were five (5) samples in each experimental unit. Therefore, 80 chrysanthemum cut flowers were used.

### **Experimental set-up**

The study used CRD since it was carried out in a room or indoor space. The space was sanitized and cleaned before the study was undertaken. Chrysanthemum cut flowers were purchased at Roquero's Flower Shop in

Murcia, Negros Occidental. When the outer petals were fully expanded in the morning, the flowers were cut and collected. Cut flowers were put in the buckets of water to lessen the strain on the flowers during transit. Cut flowers were placed in the preparation area, cut to a height of 30 cm, and given the prescribed treatments. All treatments were prepared into a vase, where  $t_0$  (Control) contains tap water, three tablespoons of sugar with two tablespoons of vinegar per liter of distilled water was applied to  $t_1$ , 50% coconut water per liter of water was applied to  $t_2$ , and 200mg ascorbic acid per 100 ml of distilled water was applied to  $t_3$ . The basal form of the cut flowers was cut into uniform lengths. The test materials were inserted into individual bottles containing the treatment.

### Data gathering procedure

The cut flower's vase life was estimated from the day the flowers had been transferred to the designated treatments, and it was determined that the vase life had ended when the flowers no longer had any ornamental or display value in the designated vase or treatment. From the start of the study until it ended. The Visual Quality Rating (VQR) was obtained every day. According to the rating scales used, one (1) denoted that the object was unfit for decoration, three (3) that it had severe defects, five (5) that it was fair or moderate, seven (7) that it was good or only slightly defected, and nine (9) that it was excellent or defect-free (Magbanua et al., 2009).

## RESULTS AND DISCUSSION

### Average vase life

The means of the vase life for chrysanthemum cut flowers treated with different preservatives are displayed in table 1 below. This parameter is essential when evaluating chrysanthemum cut flower.

Table 1. Means of the vase life on the effect of different preservatives on the vase life of chrysanthemum cut flowers

Treatments	Vase life (days)
Tap water (Control)	7.55 <sub>d</sub>
3 tbsp. of sugar with 2 tbsp. of vinegar per liter of distilled water	19.80 <sub>a</sub>
50% of coconut water per liter of distilled water	13.40 <sub>b</sub>
200mg ascorbic acid per 100ml of distilled water	10.90 <sub>c</sub>
CV%	6.98

*Means of the same letter showed no significant difference.*

The Chrysanthemum cut flower's vase life presented in the above table shows that treatment applied with three tablespoons of sugar with two tablespoons of vinegar per liter of distilled water got the highest mean of 19.80 followed by 50% of coconut water per liter of distilled water with a mean of 13.40 and then the application of ascorbic acid with a mean of 10.90. Tap water, on the other hand, had the lowest mean of 7.55. Data reveals that the application of three tablespoons of sugar with two tablespoons of vinegar per liter of distilled water is significantly higher than other treatments. Therefore, three tablespoons of sugar with two tablespoons of vinegar per liter of distilled water can prolong the Chrysanthemum cut flower's vase life. Thus, this supports the study of Halevy and Mayak (1979), who state that sugar plays a vital role in plants as a substance for respiration; adding sucrose to vase water effectively improves the cut flower's vase life. The 6.98% coefficient of variation (CV) signifies that the dataset is more stable or consistent and has lower relative variability.

### Average visual quality rate

The table 2 below shows the means of the visual quality rate on the chrysanthemum cut flowers treated with different preservatives. This parameter is essential to evaluate the chrysanthemum cut flowers.

Table 2. Means of the visual quality rate on the effect of different preservatives on the vase life of chrysanthemum cut flowers

Treatments	Visual quality rate
Tap water (Control)	6.24 <sub>c</sub>
3 tbsp. of sugar with 2 tbsp. of vinegar per liter of distilled water	8.12 <sub>a</sub>
50% of coconut water per liter of distilled water	7.87 <sub>ab</sub>
200mg ascorbic acid per 100ml of distilled water	7.40 <sub>b</sub>
CV%	4.40

*Means of the same letter showed no significant difference.*

In average visual quality rate, table 2 shows that the application of three tablespoons of sugar with two tablespoons of vinegar per liter of distilled water got the highest mean of 8.12, followed by the application of 50% coconut water per liter of distilled water with the mean of 7.87 and then 200 mg ascorbic acid per 100 ml of distilled water with a mean of 7.40 respectively. In contrast, the tap water as control got the lowest mean of 6.24. Results revealed that applying three tablespoons of sugar with two tablespoons of vinegar per liter of distilled water significantly differs from other treatments. This means that three tablespoons of sugar with two tablespoons of vinegar per liter of distilled water can preserve the visual quality of the Chrysanthemum cut flower longer. Thus, this supports the study of Trish Baber (2010), who states that by dissolving three tablespoons of sugar and two tablespoons of vinegar per liter of distilled water, we can keep our cut flowers fresh longer. Also, sugar feeds the cut flowers, while vinegar inhibits bacterial growth and creates a favorable pH balance. The 4.40% coefficient of variation (CV) signifies that the dataset is more stable or consistent and has lower relative variability.

### CONCLUSION AND RECOMMENDATION

Based on the result of the study, three tablespoons of sugar with two tablespoons of vinegar per liter of distilled water performs better than the other treatments (tap water, 50% of coconut water per liter of distilled water, and 200mg ascorbic acid per 100ml of distilled water) in terms of Chrysanthemum cut flower's visual quality rating and vase life. It is concluded that three tablespoons of sugar with two tablespoons of vinegar can extend the freshness of the vase life of Chrysanthemum cut flowers. This increase in shelf life decreases losses from unsold inventory by giving farmers, producers, and dealers more time to sell their flowers before deterioration. Also, this strategy helps producers and sellers minimize losses from unsold or wasted flowers, which promotes more economical and environmentally friendly practices. Dealers and retailers can provide customers with products that look and feel fresher for longer when they use cut flowers that have been adequately preserved, therefore boosting customer satisfaction.

It is recommended to use three tablespoons of sugar with two tablespoons of vinegar per liter of distilled water in the vase of Chrysanthemum cut flowers since it performs better than the other treatments; thus, it prolongs the vase life and quality of Chrysanthemum cut flowers. Chrysanthemum growers can meet quality demands imposed by flower industry norms, retailers, and wholesalers by using this preservation method under ideal conditions. Following these recommendations guarantees increased costs and access to beyond markets. Further study of using sugar with vinegar on other kinds of cut flowers is recommended to validate the results. Observation of the experts to the visual quality rate of this study is recommended.

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