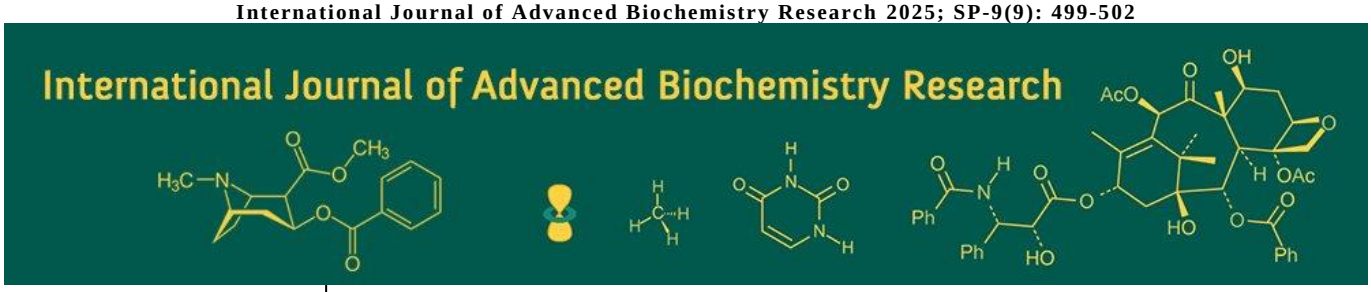


**ISSN Print:** 2617-4693
**ISSN Online:** 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; SP-9(9): 499-502
www.biochemjournal.com
Received: 07-07-2025
Accepted: 10-08-2025

**Deepika B Painkra**
Research Scholar, Pt. KLS College of Horticulture and Research Station, MGUVV, Durg, Chhattisgarh, India

**Dr. Shishir P Sharma**
Assistant Professor (Fruit Science) Sant Kabir College of Agriculture and Research Station, Indira Gandhi Krishi Vishwavidyalaya, Raipur Chhattisgarh, India

**Dr. Pooja Gupta**
Assistant Professor, (Floriculture and Landscape Architecture) IGKV, Raipur, Chhattisgarh, India

**Dr. Santosh K Sahu**
Assistant Professor (Agronomy) Rani Avanti Bai Lodhi College of Agriculture and Reserch Station, IGKV, Raipur, Chhattisgarh, India

**Dr. Dikeshwar Nishad**
Assistant Professor (Agriculture Statistics and Social Science) Pt. S. K.S. CARS, IGKV, Raipur, Chhattisgarh, India

**Corresponding Author:**
**Deepika B Painkra**
Research Scholar, Pt. KLS College of Horticulture and Research Station, MGUVV, Durg, Chhattisgarh, India

# Effect of different vase solution on post-harvest life of Rose flower (*Rosa hybrida* L.)

**Deepika B Painkra, Shishir P Sharma, Pooja Gupta, Santosh K Sahu and Dikeshwar Nishad**

**DOI:** https://www.doi.org/10.33545/26174693.2025.v9.i9Sg.5549

**Abstract**
The present study entitled (Effect of different vase solution on post-harvest life of Rose flower (*Rosa hybrida* L.)) was conducted at the Laboratory of Floriculture and Landscape Architecture, Pt. KLS College of Horticulture, and the Research Station in Rajnandgaon (C.G.) during the *Rabi* season of the year 2022-23. The experiment was designed using a Completely Randomized Design (CRD) with three replications, comprising eleven treatment combinations of citric acid and sucrose preservatives. The treatments were as follows: $T_0$-Distilled Water (Control), $T_1$-100 ppm Citric Acid, $T_2$-100 ppm Citric Acid + 8% Sucrose, $T_3$-150 ppm Citric Acid, $T_4$-150 ppm Citric Acid + 8% Sucrose, $T_5$-200 ppm Citric Acid, $T_6$-200 ppm Citric Acid + 8% Sucrose, $T_7$-250 ppm Citric Acid, $T_8$-250 ppm Citric Acid + 8% Sucrose, $T_9$-300 ppm Citric Acid, $T_{10}$-300 ppm Citric Acid + 8% Sucrose. the study reveal that pre-treating rose flowers with a solution of 100 ppm citric acid combined with 8% sucrose ($T_2$) is highly effective in extending their post-harvest life. This was followed by ($T_1$) 100 ppm citric acid, while the minimum vase life was recorded in the control treatment ($T_0$). This treatment significantly improved flowering parameters, including the number of fully opened flowers, flower opening percentage, days until the first flower wilting, and overall vase life compared to other treatments. Therefore, this solution is recommended for commercial handling of rose flowers.

**Keywords:** Rose, citric acid, sucrose

## Introduction
Rose (*Rosa hybrida* L.) is one of the nature's most beautiful creations and is collectively admired as the (Queen of Flowers). It belongs to family Rosaceae and genus Rosa, which contains 200 species and with more than 20,000 cultivars (Ritz *et al*., 2005) [20]. Rose is at the top in the cut flower industry and exemplify a wonderful commercial cultivar all over the world (Fanourakisa *et al*., 2013) [7]. From medicinal and nutritional perspective roses are of great importance. Rose fruit (hips) are rich source of vitamin 'C' and Antioxidants. Flowers are considered as the best medium to precise inflammation feeling of heart, love warmth and scene of celebration. Flowers are also connected with joy, beauty, grace, perception, purity, passion, strength, heaven, rebirth, devotion etc. On such a special day the mandate and price of rose spike go very high. Rose has a great demand for some international festivals such as New Year Day, Valentine's Day and Christmas day etc. Roses also commonly used in social events like marries, birthday and are frequently substituted among loves ovens. Cut flowers specifically rose have shorter vase life. Just underneath the bloomy head both flowers and their axis bent down (Doorn, 1997) [21]. It is well recognized that blockage of xylem vessels is the main reason of rose vase life discount (Meetern *et al*., 2000) [18]. In Chhattisgarh rose flower grown in 1.182 hectare. With the production of 0.826 MT loose flower and 36.354 MT for cut flower purpose. (Anonymous, 2022b) [1]. Mahasamund, Korba, Bilaspur, Raipur, Baster and Durg District are cultivated of this crop in Chhattisgarh. The primary aim of vase life is to supply fresh cut flowers to the distant markets for the commodities. To find out the effect of optimum concentration of sucrose and citric acid for enhances and prolongs vase life. To find out the concentration for extending vase life, quality and post-harvest behaviour of flowers.

## Materials and Methods

The present study entitled (Effect of different vase solution on post-harvest life of Rose flower (*Rosa hybrida* L.)) was conducted at the Laboratory of Floriculture and Landscape Architecture, Pt. KLS College of Horticulture, and the Research Station in Rajnandgaon (C.G.) during the *Rabi* season of the year 2022-23. The experiment was designed using a Completely Randomized Design (CRD) with three replications, comprising eleven treatment combinations of citric acid and sucrose preservatives. The treatments were as follows: $T_0$-Distilled Water (Control), $T_1$-100 ppm Citric Acid, $T_2$-100 ppm Citric Acid + 8% Sucrose, $T_3$-150 ppm Citric Acid, $T_4$-150 ppm Citric Acid + 8% Sucrose, $T_5$-200 ppm Citric Acid, $T_6$-200 ppm Citric Acid + 8% Sucrose, $T_7$-250 ppm Citric Acid, $T_8$-250 ppm Citric Acid + 8% Sucrose, $T_9$-300 ppm Citric Acid, $T_{10}$-300 ppm Citric Acid + 8% Sucrose.

## Results and Discussion

### 1. Growth parameters

### 1.1 Increase in water uptake

The effect of vase solution on vase life of cut Rose was significant. Maximum increase in water uptake at 3,6,9, 12 days during vase period. Maximum water uptake was recorded (5.71 ml, 15.55 ml, 21.11 ml, 25.67 ml) in $T_2$ Citric acid 100 ppm + 8% Sucrose. The water uptake was significantly superior followed by ($T_1$) Citric acid 100 ppm which was at par with each other in respect of water uptake. Citric acid to vase solution caused low latex flow from the cut stem surface and delay in the closure of xylem (Imsabai *et al*., 2013) [13]. Sucrose in the vase solution influence water uptake, Transpiration loss of water, maintained better water relations there by improved fresh weight of the flower (Bhattacharjee, 1998) [3].

### 1.2 Increase in flower diameter (cm)

The effect of vase solution of vase life of cut Rose was significant flower diameter at 1,3,6,9, 12 days during vase period. Maximum flower diameter was recorded (4.73cm, 7.10cm, 8.87 cm, 9.52 cm, 7.00 cm) in ($T_2$) Citric acid 100 ppm + 8% Sucrose. The flower diameter was significantly superior followed by ($T_1$) Citric acid 100 ppm which was at par with each other in respect of flower diameter.

Citric acid was reported as the source of carbon and energy for cells and used in the respiratory cycle and some other biochemical pathway Da Silva, 2003 [4]; Darandeh and Hadavi, 2012 [5]. Similarly, Citric acid significantly transported iron in plants (Hell and Stephan, 2003, Darandeh and Hadavi, 2012) [11 5]. Sucrose requires for the development of flower bud to open flower (Pun skeletons for bud opening (Mayak *et al*., 1973) [17]

**Table 1:** Effect of different vase solution on increase in water uptake of Rose flower

| Treatment | Citric acid and sucrose concentration | Increase in water uptake | | | |
|---|---|---|---|---|---|
| | | 3 days | 6 days | 9 days | 12 days |
| $T_0$ | Distilled water | 0.00 | 3.89 | 0.00 | 0.00 |
| $T_1$ | Citric acid 100 ppm | 5.45 | 14.44 | 19.78 | 24.33 |
| $T_2$ | Citric acid 100 ppm + 8% sucrose | 5.71 | 15.03 | 21.26 | 25.67 |
| $T_3$ | Citric acid 150 ppm | 3.35 | 13.33 | 17.77 | 23.00 |
| $T_4$ | Citric acid 150 ppm + 8% sucrose | 5.00 | 14.44 | 17.78 | 23.33 |
| $T_5$ | Citric acid 200 ppm | 2.22 | 11.11 | 17.22 | 0.00 |
| $T_6$ | Citric acid 200 ppm + 8% sucrose | 3.33 | 12.21 | 17.56 | 0.00 |
| $T_7$ | Citric acid 250 ppm | 1.67 | 10.56 | 16.57 | 0.00 |
| $T_8$ | Citric acid 250 ppm + 8% sucrose | 1.67 | 11.11 | 16.68 | 0.00 |
| $T_9$ | Citric acid 300 ppm | 1.67 | 8.90 | 0.00 | 0.00 |
| $T_{10}$ | Citric acid 300 ppm + 8%sucrose | 1.67 | 10.00 | 0.00 | 0.00 |
| | SEm± | 0.018 | 0.09 | 0.28 | 0.25 |
| | CD at 5% | 0.053 | 0.28 | 0.84 | 0.73 |
| | C.V. | 1.074 | 1.44 | 3.73 | 4.87 |

**Table 2:** Effect of different vase solution on increase in diameter of rose flower

| Treatment | Citric acid and sucrose concentration | Increase in diameter | | | | |
|---|---|---|---|---|---|---|
| | | 1 days | 3 days | 6 days | 9 days | 12 days |
| $T_0$ | Distilled water | 2.69 | 3.37 | 4.84 | 0.00 | 0.00 |
| $T_1$ | Citric acid 100 ppm | 4.05 | 5.82 | 7.81 | 7.53 | 6.17 |
| $T_2$ | Citric acid 100 ppm + 8% sucrose | 4.73 | 7.10 | 8.87 | 9.52 | 7.00 |
| $T_3$ | Citric acid 150 ppm | 3.54 | 4.93 | 6.52 | 7.16 | 5.44 |
| $T_4$ | Citric acid 150 ppm + 8% sucrose | 4.05 | 5.43 | 7.46 | 7.52 | 5.67 |
| $T_5$ | Citric acid 200 ppm | 3.37 | 4.62 | 6.24 | 6.61 | 0.00 |
| $T_6$ | Citric acid 200 ppm + 8% sucrose | 3.44 | 4.72 | 6.52 | 6.75 | 0.00 |
| $T_7$ | Citric acid 250 ppm | 3.29 | 4.34 | 5.92 | 5.91 | 0.00 |
| $T_8$ | Citric acid 250 ppm + 8% sucrose | 3.34 | 4.60 | 6.21 | 6.31 | 0.00 |
| $T_9$ | Citric acid 300 ppm | 2.94 | 3.81 | 5.33 | 0.00 | 0.00 |
| $T_{10}$ | Citric acid 300 ppm + 8% sucrose | 2.96 | 3.93 | 5.67 | 0.00 | 0.00 |
| | SEm± | 0.05 | 0.06 | 0.06 | 0.18 | 0.03 |
| | CD at 5% | 0.15 | 0.19 | 0.16 | 0.52 | 0.11 |
| | C.V. | 2.53 | 2.31 | 1.46 | 5.80 | 3.01 |

**2. Flowering parameter**

**2.1 Days for fully opened flower**

The effect of vase solution on vase life of cut Rose was significant. Maximum days for fully opened flowers was recorded in ($T_2$) Citric acid 100 ppm + 8% sucrose (9 Days) followed by ($T_1$) Citric acid 100 ppm (8.33 days) which were at par with each other in while minimum days for fully opened flower ($T_0$) distilled water (5.00 days).Full opening of bloom and increase the flower diameter might be due to continuous absorption of water, regular supply of carbohydrates, anti-microbial activity and low pH of solution due to citric acid. Sucrose plus citric acid has also been reported as good bud-opening solution for chrysanthemum (Gupta *et al*., 2006) [8].

**2.2 Numbers of fully opened flower**

The effect of vase solution on vase life of cut Rose was significant. Maximum number of fully opened flowers was recorded in ($T_2$) Citric acid 100 ppm + 8% Sucrose (2.95) followed by ($T_1$) Citric acid 100 ppm which were at par with each other in while minimum number of fully opened flowers (0.67) were observed in ($T_0$) distilled water. Citric acid increased flower opening of opening of lisianthus, which confirmed the role of citric acid in maintaining postharvest quality and increasing colour development during flower opening (Jowkar and Saheli, 2006) [14]. Sucrose concentrations are more effective agreed with (Doi and Reid, 1995) [6] on gladiolus and liatris. It seems that carbon is a key factor to anthesis (Yamane *et al*., 1991) [22]. It is possible that sucrose applied as an osmolite in anthesis of cut flowers (Liao *et al*., 2000) [16].

**2.3 Flower opening percentage**

The effect of vase solution on vase life of cut Rose was significant. Maximum flower opening percentage was recorded in ($T_2$) Citric acid 100 ppm + 8% Sucrose (98.94%) followed by ($T_1$) Citric acid 100 ppm (79.06%) which were at par with each other in while minimum flower opening percentage (56.41%) were observed in ($T_0$) distilled water. Similar results have been recorded in gladiolus and carnation (Halevy, 1987 and Mayak *et al*., 1973) [10, 17]. When sucrose was present in the holding solution, the activities of sucrose synthase, sucrose-P-synthase and sucrose-6Pisomerise in the flower remained high for bud opening. Sucrose increases the osmatic potential and improves their ability to take up maintain turgidity (Acock and Nichols, 1974) [2] and (Halevy and Mayak, 1974) [9].

**3. Quality parameter**

**3.1 Days of 1st flower wilting**

The effect of vase solution on vase life of cut Rose was significant. The maximum days for first flower wilting was recorded in roses pulsed with ($T_2$) Citric acid 100 ppm + 8% Sucrose (14.67days) followed by ($T_1$) Citric acid 100 ppm (13.33 days). The treatment $T_2$, was superior over all other treatment days for first flower wilting. The lowest first flower wilting (5.33 days) was observed under distilled water.

Citric acid were reported as the source of carbon and energy for cells and used in the respiratory cycle and some other biochemical pathway (Da Silva, 2003; Darandeh and Hadavi, 2012) [4, 5]. Citric acid reduce bacterial population in vase solution and increase the water conductance in xylem of cut flowers (Van Doorn, 1997) [21]. Similarly, Citric acid significantly transported iron in plants (Hell and Stephan, 2003; Darandehand Hadavi, 2012) [11 5]. Sucrose supply increase flower wilting by approaching carbohydrate starvation. It is also an osmatically active molecule leading to the promotion of subsequent water relation. So, by application of these chemicals, blockage of vessels is prevented and ethylene levels retain resulting in prolonged fresh flower wilting, thus decreasing floral fading percentage. (Patel *et al*., 2016) [19]. Treatment with sucrose promoted unfolding petals, suppresses the decrease in weight of cut flowers and inhibition on the occurrence of petals senescence (Ichimura *et al*., 2003) [12]. It is reported that tuberose cut flowers retained their freshness for longer periods when higher concentrations of sucrose were used (Khondakar and Mojunmdar, 1985) [15]

**3.2 Vase life (days)**

The effect of vase solution on vase life of cut Rose was significant. The maximum vase life was recorded in roses pulsed with ($T_2$) Citric acid 100 ppm + 8% Sucrose (15days) followed by ($T_1$) Citric acid 100 ppm (14.67 days). The treatment $T_2$, was superior over all other treatment for vase life. The lowest vase life (6.22 days) was observed under distilled water.

Citric acid were reported as the source of carbon and energy for cells and used in the respiratory cycle and some other biochemical pathway (Da Silva, 2003; Darandeh and Hadavi, 2012) [4, 5]. Citric acid reduce bacterial population in vase solution and increase the water conductance in xylem of cut flowers (Van Doorn, 1997) [21]. Similarly, Citric acid significantly transported iron in plants (Hell and Stephan, 2003; Darandehand Hadavi, 2012) [11 5]. Sucrose supply increase flower vase life by approaching carbohydrate starvation. It is also an osmatically active molecule leading to the promotion of subsequent water relation. So, by application of these chemicals, blockage of vessels is prevented and ethylene levels retain resulting in prolonged fresh vase life, thus decreasing floral fading percentage. (Patel *et al*., 2016) [19]. Treatment with sucrose promoted unfolding petals, suppresses the decrease in weight of cut flowers and inhibition on the occurrence of petals senescence (Ichimura *et al*., 2003) [12]. It is reported that tuberose cut flowers retained their freshness for longer periods when higher concentrations of sucrose were used (Khondakar and Mojunmdar, 1985) [15]

**Table 4:** Effect of different vase solution on number of fully flower opened, days for fully opend flower, flower opening percentage, day's of 1st flower wilting and vase life of rose flower

| Treatment | Number of fully flower opened | Days for fully opend flower | Flower opening percentage | Day's of 1st flower wilting | Vase life |
|---|---|---|---|---|---|
| $T_0$ | 0.67 | 5.00 | 56.41 | 5.33 | 13.33 |
| $T_1$ | 2.67 | 8.33 | 79.06 | 13.33 | 14.67 |
| $T_2$ | 2.95 | 9.00 | 98.91 | 14.67 | 9.89 |
| $T_3$ | 1.67 | 7.00 | 75.17 | 9.89 | 10.67 |
| $T_4$ | 1.95 | 7.67 | 78.95 | 10.67 | 8.67 |
| $T_5$ | 1.33 | 6.51 | 69.46 | 8.67 | 9.67 |
| $T_6$ | 1.66 | 6.67 | 70.86 | 9.67 | 7.33 |
| $T_7$ | 1.29 | 6.31 | 62.11 | 7.33 | 7.67 |
| $T_8$ | 1.31 | 6.67 | 66.28 | 7.67 | 6.00 |
| $T_9$ | 0.90 | 5.33 | 58.61 | 6.00 | 6.67 |
| $T_{10}$ | 1.00 | 6.00 | 62.09 | 6.67 | 0.30 |
| SE(m) | 0.04 | 0.18 | 1.29 | 0.90 | 0.36 |
| CD at 5% | 0.13 | 0.52 | 3.80 | 0.30 | 1.05 |
| C.V. | 4.66 | 4.37 | 3.15 | 5.79 | 5.75 |

## Conclusions

On the basis of present investigation, it can be concluded that the vase solution containing citric acid 100 ppm + 8% sucrose could be considered the best preservatives solution in respect of increase in flower diameter, increase in water uptake, days for fully opened flower, number of opened flowers, flower opening percentage, days for 1st flower wilting, vase life of cut rose.

## References


1. Anonymous. Area and production of horticulture crops—category-wise, All India, 2021-22 (final). 2022b.
2. Acock B, Nichols R. Effect of sucrose on water relation of senescing carnation flowers. Ann Bot. 1979;44:221-230.
3. Bhattacharjee SK. Effect of different chemicals in the holding solution on post-harvest life and quality of cut roses. Ann Plant Physiol. 1998;12(8):161-163.
4. Da Silva JAT. The cut flower: postharvest considerations. Online J Biol Sci. 2003;3:406-442.
5. Darandeh N, Hadavi E. Effect of pre-harvest foliar application of citric acid and malic acid on chlorophyll content and post-harvest vase life of *Lilium* cv. Brunello. Front Plant Sci. 2012;2:1-3.
6. Doi M, Reid MS. Sucrose improves the postharvest life of cut flowers of a hybrid *Limonium*. HortScience. 1995;30:1058-1060.
7. Fanourakis D, Pieruschka R, Savvides AJ, Macnish V, Sarlikioti V, Woltering EJ. Sources of vase life variation in cut roses. Postharvest Biol Technol. 2013;78:1-15.
8. Gupta VN, Chakrabarty D, Datta SK. Influence of holding solution on postharvest behaviour of cut flowers (*Chrysanthemum dendrathema grandiflora* Tzvelve). J Ornam Hortic. 2006;9(2):80-84.
9. Halevy AH, Mayak S. Improvement of cut flower quality and longevity by preshipment treatment. Acta Hortic. 1974;43:355-357.
10. Halevy AH. Recent advances in post-harvest physiology of carnation. Acta Hortic. 1987;216:243-254.
11. Hell R, Stephan UW. Iron uptake, trafficking and homeostasis in plants. Planta. 2003;216:541-551.
12. Ichimura K, Kawabata Y, Kishimoto M, Goto R, Yamada K. Shortage of soluble carbohydrates is largely responsible for short vase life of cut "Sonia" rose flowers. J Jpn Soc Hortic Sci. 2003;72:292-298.
13. Imsabai W, Leethiti P, van Doorn WG. Petal blackening and lack of bud opening in cut lotus (*Nelumbo nucifera*): role of adverse water relations. Postharvest Biol Technol. 2013;79:32-38.
14. Jowkar MM, Salehi H. Effect of different preservative solutions on the vase life of cut tuberose (*Polianthes tuberosa* L.) cv. Goldorosht-e-Mahallat. J Sci Technol Agric Nat Resour. 2006;10:299-309.
15. Khondakar SRK, Mojumdar BC. Studies on prolonging the vase life of tuberose cut flower. South Indian Hortic. 1985;33(2):145-147.
16. Liao LJ, Lin YH, Huang KL, Chen WS, Cheng YM. Postharvest life of cut rose flowers as affected by silver thiosulfate and sucrose. Bot Bull Acad Sin. 2000;41:299-303.
17. Mayak S, Bravdo B, Gvilli A, Halevy AH. Improvement of opening of cut gladiolus flowers by pre-treatment with high sugar concentrations. Sci Hortic. 1973;1:357-365.
18. van Meeteren U, van Gelder H, van Ieperen W. Reconsideration of the use of deionized water in postharvest experiments on cut flowers. Postharvest Biol Technol. 2000;18:169-181.
19. Patel R, Thakkar A, Mankad A. Effect of chemical preservative on water relation and vase life of *Tithonia rotundifolia* Blake cut flower. Ann Biol Res. 2016;7(1):27-30.
20. Ritz CM, Schmuths H, Wissemann V. Evolution by reticulation: European dog roses originated by multiple hybridization across the genus *Rosa*. J Hered. 2005;96:4-14.
21. van Doorn WG. Water relations of cut flowers. Hortic Rev. 1997;18:1-85.
22. Yamane K, Kawabata S, Sakiyama R. Changes in water relations, carbohydrate contents and acid invertase activity associated with perianth elongation during anthesis of cut gladiolus flowers. J Jpn Soc Hortic Sci. 1991;60:421-428.