Original Research Article   https://doi.org/10.20546/ijcmas.2021.1003.016

Effect of Holding Solution for Improving Vase Life of Gerbera (*Gerbera jamesonii* Bolus ex. Hook) cv. Rucha

Rohan Tomar*, Mamta Bohra, Mohit Chaudhary and Varun Chauhan

Department of Floriculture and Landscaping, College of Horticulture, VCSG, Uttarakhand University of Horticulture and Forestry, Bharsar, Pauri Garhwal, India

*Corresponding author

A B S T R A C T

The present experiment on effect of holding solution for improving vase life of gerbera was carried out during December, 2019 at Floriculture and Landscaping Laboratory, College of Horticulture, VCSG, Uttarakhand University of Horticulture and Forestry, Bharsar, Pauri Garhwal, Uttarakhand. The experiment consists of seven treatments which were replicated three times in Completely Randomized Design. The results of investigation revealed that the holded treatment applied with 4% Sucrose + 300 ppm 8- HQC (T_4) recorded maximum holding solution uptake (29.47 ml), vase life (17.49 days), per cent increase in flower diameter (19.22 cm), minimum per cent decrease weight of cut stem (5.59) and stem bending (26.85) was recorded with treatment T_4 consists of 4% Sucrose + 300 ppm 8- HQC respectively. Which have contributed to increased vase life of cut gerbera flower.

Introduction

Gerbera (*Gerbera jamesonii* Bolus ex. Hook.) is ranked among the top ten commercial cut flowers in the world flower market. It is an important commercial cut flower. The daisy like dazzling and magnificent flower is used for vase decoration, flower arrangement purpose and in making dry flowers crafts. The flowers have hollow stem therefore it is highly prone to water stress. Beside this stem/scape bending is a major physiological disorder of this crop which causes reduction in vase life of flower. Balestra *et al.,* (2005) reported that blockage of xylem due to

bacterial plugging is the main reason of stem break and bending. The postharvest longevity of cut flowers can often be improved by the use of different preservative solution (Prashanth, 2006). A preservative solution contains three components i.e. sucrose that provide carbohydrate to the flower, biocide which helps in killing the population of microbes and an acidifier which lower down the pH of vase solution which helps in improving vase life of flower. Therefore, the techniques of prolonging the vase life of flower will be great assets to the grower and uses. Hence the present study the priority was given to find out the economical chemical

different holding solutions are used for vase life prolongation of gerbera including sucrose, germicides viz. 8-HQC, $Al_2(SO_4)_3$ and Citric acid.

Materials and Methods

The present investigation entitled "Effect of pulsing and holding solution for improving vase life of gerbera (*Gerbera jamesonii* Bolus ex. Hook) cv. Rucha" was carried out under Floriculture laboratory, College of Horticulture, VCSG Uttarakhand University of Horticulture and Forestry, Bharsar, Pauri Garhwal in 2019. The flowers were harvested at stage when two outer rows of disc florets are perpendicular to the stock and kept in bucket containing cold water to remove field heat. The preservative solution was freshly prepared by using distilled water and then flowers were placed in vase solution test tube. Containing T_1 Control (distilled water); T_2 (4 % Sucrose + 100 ppm 8HQC); T_3 (4 % Sucrose + 200 ppm 8HQC); T_4 (4 % Sucrose + 300 ppm 8HQC); T_5 (4 % Sucrose + 100 ppm Citric acid); T_6 (4 % Sucrose + 200 ppm Citric acid); T_7 (4 % Sucrose + 300 ppm Citric acid); T_8 (4 % Sucrose + 100 ppm $AI_2(SO_4)_3$); T_9 (4 % Sucrose + 200 ppm $AI_2(SO_4)_3$); T_{10} (4 % Sucrose + 300 ppm $AI_2(SO_4)_3$) and each treatment replicated three times. The flowers were continuously held in the holding solution and the postharvest physiological characteristics of the flower were studied throughout the vase life period. Experiment was carried out in a Completely Randomized Design.

Data collected

Amount of holding solution uptake (ml/stem)

Amount of holding solution uptake was calculated by using the following formula:

Amount of holding solution uptake (ml) = Initial volume of solution − Final volume of the solution.

Per cent decrease in weight of the cut stem

Decrease in weight of stems was worked out by recording initial and final weight of cut stems recorded at the time of putting cut stems in holding solutions and termination of vase life.

$$Per\ cent\ decrease\ in\ weight\ of\ the\ cut\ stem = \frac{W_1 - W_2}{W_1} \times 100$$

W_1- weight of cut stems at the time of putting them in holding solutions

W_2- weight of cut stems at the time of vase life termination

Vase life (days)

Vase life was measured in days at the time of keeping the flowers in vase until the flowers show any of the following symptoms: stem bending or neck bending or 50 % petal discolouration or wilting.

Percent increase in flower diameter

The equatorial diameter of flowers at two places was recorded and average of two values was calculated.

Increase in flower diameter of cut stem was worked out by recording the original and maximum flowers diameter attained by the stems.

$$Per\ cent\ increase\ in\ flower\ diameter = \frac{W_2 - W_1}{W_1} \times 100$$

W_1- Initial flower diameter of cut stems
W_2- Maximum flower diameter attained by cut stems

Per cent stem bending (%)

It was measured by using formula:

$$Per\ cent\ stem\ bending = \frac{Number\ of\ cut\ stem\ showing\ bend\ neck}{Total\ number\ of\ cut\ stems\ used} \times 100$$

Results and Discussion

Effect of holding solution on vase life of gerbera cv. Rucha

The maximum amount of holding solution uptake (29.47 ± 0.43 ml) was noticed in treatment T_4 and found statistically at par with T_3 (28.80 ± 0.31 ml). Maximum absorption of holding solution uptake may be due to use of 8-HQC in vase solution acts as pH regulator; it reduces they microbial growth in vase solution and enhances the solution uptake on the other hand sucrose helps in maintaining water balance and turgidity. Similar results have been reported by Kumar and Gupta (2014) in gladiolus, Vaidamitra (2017), Kantharaj *et al.,* (2018), Helaly (2019) and Chandrakant (2012) in gerbera crop (Table 1).

Table.1 Effect of holding treatments on initial cut stem weight (g), initial flower diameter (cm), amount of holding solution uptake (ml) and per cent decrease weight of cut stem of gerbera cv. Rucha

Treatments code	Treatments	Amount of holding solution uptake (ml) ± S.E(m)	Percent decrease weight of cut stem ± S.E(m)	Vase life (days) ± S.E(m)	Percent increase in flower diameter ± S.E(m)	Percent stem bending and angular transformation value ± S.E(m)
T_1	Control (distilled water)	20.07 ± 0.09	9.58 ± 0.56	13.04 ± 0.22	14.47 ± 0.32	38.26 ± 0.81 (38.19 ± 0.47)
T_2	4% Sucrose + 100 ppm 8-HQC	27.60* ± 0.27	6.54* ± 0.25	15.75* ± 0.14	17.26* ± 0.12	30.92* ± 0.58 (33.77 ± 0.36)
T_3	4% Sucrose + 200 ppm 8-HQC	28.80* ± 0.31	6.01* ± 0.17	16.55* ± 0.15	17.74* ± 0.18	28.63* ± 0.31 (32.33 ± 0.20)
T_4	4% Sucrose + 300 ppm 8-HQC	29.47* ± 0.43	5.59* ± 0.40	17.49* ± 0.38	19.22* ± 0.11	26.85* ± 0.96 (31.19 ± 0.62)
T_5	4% Sucrose + 100 ppm citric acid	27.08* ± 0.32	6.91* ± 0.16	15.20* ± 0.22	16.16* ± 0.07	33.55* ± 0.72 (35.38 ± 0.44)
T_6	4% Sucrose + 200 ppm citric acid	27.48* ± 0.33	6.59* ± 0.25	15.60* ± 0.21	16.07* ± 0.24	31.33* ± 0.88 (34.02 ± 0.54)
T_7	4% Sucrose + 300 ppm citric acid	26.81* ± 0.13	6.67* ± 0.67	15.08* ± 0.30	15.85* ± 0.32	33.82* ± 0.73 (35.54 ± 0.44)
T_8	4% Sucrose + 100 ppm $Al_2(SO_4)_3$	25.52* ± 0.28	7.60* ± 0.58	14.50* ± 0.43	15.80* ± 0.27	34.00* ± 0.71 (35.65 ± 0.43)
T_9	4% Sucrose + 200 ppm $Al_2(SO_4)_3$	26.11* ± 0.77	7.36* ± 0.87	14.86* ± 0.24	15.87*± 0.26	34.74* ± 0.90 (36.09 ± 0.54)
T_{10}	4% Sucrose + 300 ppm $Al_2(SO_4)_3$	25.10* ± 0.58	7.75* ± 0.39	14.00* ± 0.38	15.74* ± 0.47	36.21 ± 0.91 (36.98 ± 0.54)
S.E (d)		0.57	0.69	0.40	0.37	1.09 (0.67)
C.D$_{(0.005)}$		1.19	1.45	0.85	0.79	2.30 (1.40)

*Significant at 5% level of significance as compared to control

The minimum percent decrease in weight of cut stems (5.59 ± 0.40 %) was observed from the flowers holded with T_4 and found statistically at par with T_2 (6.54 ± 0.25 %), T_3 (6.01 ± 0.17 %), T_5 (6.91 ± 0.16 %), T_6 (6.59 ± 0.25 %) and T_7 (6.67 ± 0.67 %). The percent decrease weight in cut stem under these treatments might be due to sucrose provide food for cut flower and antimicrobial activity of 8-HQC that act as biocide in the holding solution reduce the microbial population in vase solution that causes increase uptake of solution and reduction in percent decrease in weight of cut stem. The findings is in line with those reported by Patel *et al.,* (2008) and Khan *et al.,* (2015) in gerbera and Kumar and Gupta (2014) in gladiolus.

The maximum vase life (17.50 ± 0.38 days) was recorded from the flowers holded with T_4 followed by T_3 (16.55 ± 0.15 days). Halevy and Mayank (1979) reported that sucrose antagonizes the effect of abscissic acid which promote senescence. 8-HQC might have decreased microbial growth and prevented vascular blockage, thereby helped in increasing vase life. The above results are also corroborated with the findings of Bhat *et al.,* (1999) in chrysanthemum, Singh *et al.,* (2005) in gladiolus, Chandrakant (2012) and Kantharaj *et al.,* (2018) in gerbera.

The maximum percent increase in flower diameter (19.22 ± 0.11 %) was recorded in T_4 followed by T_3 (17.74 ± 0.18 %). Increase in flower diameter might be due to the maximum solution uptake and reduce vascular blockage of xylem tissue by 8-HQC and utilization of sucrose of energy by cut flower stem. Similar results were also found by Chandrakant (2012) and Vaidamitra (2017) in gerbera.

The minimum stem bending [26.85 ± 0.96 (31.19 ± 0.62) %] was observed in the cut

stems when holded with T_4 and found statistically at par with T_3 (28.63 ± 0.31%). Minimum stem bending may be due to the presence of antimicrobial activity of 8-HQC (Marousky, 1971). The results are in close conformity Prashanth *et al.,* (2007) in gerbera.

In conclusion the results of present investigation revealed that gerbera cv. Rucha holded with 4% Sucrose + 300 ppm 8-HQC was found significantly effective in improving vase life of flower and could satisfactorily be recommended for enhancing vase life of gerbera.

References

Balestra, G.M., Agostini, R., Bellincontro, A., Mencarelli, F. and Varvaro, L. 2005. Bacterial populations related to gerbera (*Gerbera jamesonii* L.) stem break. *Phytopathologia Mediterranea.* 44: 291–299.

Bhat, A., Tripathi, S.N. and Sehgal, O.P. 1999. Effect of pulsing and storage treatments on vase life of chrysanthemum cut flowers. *Advances Horticulture and Forestry*. 6: 125-131.

Chandrakant, J.A. 2012. Post harvest study on gerbera (*Gerbera jamesonii*) cv. Stanza. Thesis, Ph.D. Department of Horticulture, Navsari Agriculture University, Navsari.

Halevy, A.H. and Mayak, S. 1981. Senescence and post harvest physiology of cut flowers. *Horticultural Reviews.* 1: 204-236.

Helaly, A. A. E. 2019. Improving gerbera cut flowers by using pulsing and holding solutions under cold storage periods treatments. *Journal of Plant Production.* 10(3): 241- 246.

Kantharaj, Y., Hemlanaik, B., Prashanth, S.J., Sreenivas, K.N., Seetharamu, G.K., Sangama and Sivashankar, K.S. 2018. Standardization of different chemicals

on the vase life of cut gerbera (*Gerbera jamesonii*) cv. Julia. *International Journal of Pure and Applied Bioscience*. 6(1): 849- 855.

Khan, P., Mehraj, H., Taufique, T., Shiam, I.H. and Jamal Uddin, A.F.M. 2015. Chemical preservatives for increasing shelf life of gerbera. *Journal of Bioscience and Agriculture Research.* 5: 30-36.

Kumar, S. and Gupta, A.K. 2014. Postharvest life of *Gladiolus grandiflorus* L. cv. Jessica as influenced by pre-harvest application of gibberellic acid and kinetin. *Journal of Postharvest Technology*. 2 (3): 169-176.

Marousky, F.J. 1971. Inhibition of vascular blockage and increased moisture retention in cut rose induced by modifying pH, 8-Hydroxyquinoline citrate and Sucrose. *Journal of the American Society for Horticultural Science*. 96: 38-41.

Patel, J.G., Valia, R.Z., Patel, Z.N., Tandel, Y.N. and Vahora, A.M. 2008. Extension of vase life of gerbera (*Gerbera jamesonii*) cv. Bora Bora through different chemicals. Abstract in National Symposium on Recent Advances in Floriculture, N.A.U., Navsari.

Prashanth, P. 2006. Studies on the role of physiological and biochemical components with floral preservatives on the vase life of cut gerbera (*Gerbera jamesonii)* cv. Yanara. Thesis, Ph.D. Acharya N G Ranga Agricultural University, College of Agriculture, Rajendranagar, Hyderabad.

Prashanth, P., Chandrasekhar, R. and Chandrasekhar, R.K. 2007. Enhanching vase life of cut gerbera (*Gerbera jamesonii* Bolus ex. Hook) by addition of floral preservatives. *Journal of Asian Horticulture*. 3(3):183-186.

Singh, A., Kumar, J. and Kumar, P. 2005. Influence of 8- Hydroxy quinoline (8-HQ) and sucrose pulsing on membrane stability and post-harvest quality of gladiolus cut spikes. *Journal of Ornamental Horiculture*. 8(4): 243-248.

Vaidamitra, S.V. 2017. Studies on post harvest handling of gerbera (*Gerbera jamesonii* Bolus ex. Hook). Thesis, M.Sc. Dr. Y. S. Parmar University of Horticulture and Forestry, Solan.