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Effect of different floral preservatives on post-harvest quality of loose flowers of *Cerbera fruticosa*

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Abstract
Cerbera fruticosa, is a compact bushy shrub with pinkish-white colour flower and flowers throughout the year. Because of the beauty the loose flowers are predominantly used for religious offerings at various shrines and temple, marriage ceremony and other rituals and even for hair adornments. The experiment was carried out at Biotechnology and Tissue Culture Centre (BTCC) Lab, Baramunda, Odisha University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha during the year 2018-2019. The study was conducted to investigate the effect of different floral preservative on shelf- life of loose flowers of *Cerbera fruticosa* in the form of laboratory experiment with 10 treatments comprising of different floral preservatives and 3 replications. From the experiment conducted, T_4 with holding solution 50 ppm of $Al_2(SO_4)_3$ significantly enhanced the gain in weight percentage (49.98%), solution uptake (295.33 ml) & shelf life (4.63 days) of the flowers, and reduced the wilting percentage (62.22%), on the fifth day of experiment.

Keywords: Floral preservatives, loose flower, cerbera, post-harvest

Introduction
Ornamental plants and flowers are associated with our civilisation since time immemorial. Flowers are the most beautiful creation of the earth. Flowers symbolize beauty, purity, peace, love affection and honesty. Flowers have been associated with Indian art and culture from the time immemorial starting with the offering of flowers during worship by the ancient Rishis (sages). In flower trade cut flowers and loose flowers plays a major role, as cut flowers are used for vase decoration, floral display, flowers arrangement and for indoor decoration. As far as loose flowers are concerned these are mainly used for worshipping God and preparation of gajara, veni, and garland.

Cerbera fruticosa, is a member of Apocynaceae family, originated from India and Malaysia. A compact, bushy shrub grows to a height of 1.75-2.5m. Flowers are funnel shaped, pinkish-white colour, with red tips and centre. Flowering occurs throughout the year. The plant is propagated by air layering. The plants are used for dual purposes such as planting in the garden or around the house for beautification and also for loose flower production. Because of the beauty the loose flowers are predominantly used for religious offerings at various shrines and temple, marriage ceremony and other rituals and even for hair adornments.

All the flowers and ornamentals are the most perishable commodities needs special care during harvesting, handling, storage and transport. The losses can be both, quantitative as well as qualitative, which result in loss in terms of monitory value. Due to perishable nature of flowers, there is huge post-harvest loss ranging from 30-50 per cent. Qualitative losses like consumer acceptability of fresh produce are much more difficult to assess than are quantitative losses. Quantitative losses occur during the entire market chain in view of lack of improper post-harvest handling (Bhattacharjee, 2006) [7] However, the longevity of loose flowers is very short, which is one of the major limiting factors for its commercial acceptance. Plants with delayed senescence would efficiently produce loose flowers with longer shelf- life with enhanced bloom displays. A few systematic studies has been done on the post-harvest handling of these flowering shrubs which are very potential crops and requiring minimum support and care. Thus, this research work was carried out with an aim to determine the effect of various floral preservatives on the shelf -life and senescence of this shrub flowers for commercial purpose.

Materials and Methods
A lab experiment was conducted in 2018-2019 at Biotechnology and Tissue Culture Centre

(BTCC), Baramunda, college of Agriculture, OUAT, Bhubaneswar, India using loose flowers of *Cerbera fruticosa* for enhancing its post-harvest quality by use of different floral preservatives. The experimental design used was Complete Randomized Design (CRD) having 10 treatments and 3 replications. In the experiment 30 flowers of *Cerbera fruticosa* were taken in a single replication. The experiment contained 10 treatments and one among the 10 treatments was treated as control having only distilled water without applying any chemicals. For single treatment, a chemical solution of 1.5 L was taken. The details information regarding treatments was as follows:

Table 1: Treatments details

Treatments	Floral preservative solutions	P^H
T_1	Distilled water (control)	5.7
T_2	Sugar (2%)	5.3
T_3	Aluminium sulphate (25ppm)	3.6
T_4	Aluminium sulphate (50ppm)	3.5
T_5	Sugar (2%) + Aluminium sulphate (25ppm)	3.3
T_6	Sugar (2%) + Aluminium sulphate (50ppm)	3.3
T_7	Soft drinks (Thumps up) @ 100ml/L	4.7
T_8	Citric acid (lemon juice) @10ml/L	2.7
T_9	Crocin tablet powder @500mg/L	5.7
T_{10}	Tetracycline powder @100mg/L	4.5

Fully bloomed fresh flowers were harvested individually without calyx end at around 6.00 A.M. Soon after harvesting, flowers were dipped in water for pre-cooling and maintaining turgidity. They were then brought into laboratory. Freshly harvested pre-cooled flowers were dipped in respective chemical solutions. Before placing in floral preservatives solution, they were measured by weighing balance for initial fresh weight. Observations were recorded during the experiment period for post-harvest parameters. Initial weight of flowers (g)at the beginning of the experiment before dipping in the chemical solutions, final weight of flower (g) at the end of the experiment when shelf life has been terminated or flowers started wilting were taken. Percentage gain/loss in weight (%) = $\frac{\text{Change in weight}}{\text{Initial weight}} \times 100$ and Wilting percentage (%) using the formula = $\frac{\text{Number of wilted flowers}}{\text{Total number of flowers}} \times 100$ were calculated. Solution uptake (ml)/amount of solution consumed (ml) = Initial volume of solution (ml)-Final volume of the solution (ml) at the termination of vase life and Shelf life (days) the time taken for the development of necrotic symptoms was recorded and the shelf life was determined as the number of days taken from placing of the loose flowers in the solution till wilting and fading of petals of these loose flowers (Lee and Suh, 1996) were noted.

Results and Discussion

Wilting percentage was found to be minimum for holding solution of 50ppm Al_2 $(SO_4)_3$, followed by aluminium sulphate (25ppm) and Tetracycline powder @100mg/L as compared to control (distilled water). Aluminium sulphate acted as ethylene inhibitor. It thus resulted in delay and suppression of the senescence effect (Hossain, 2015) [9] and tetracycline act as an antibacterial agent in solution. Simialar findings was reported by Balakrishna *et al*., (1989) [4] in tuberose, Beura (1998) [5] in gladiolus and Hossain (2015) [9] in allamanda. However, the lowest shelf life was observed for the holding solution of citric acid (lemon juice) @ 10ml/L and soft drinks (Thumps up) @ 100ml/L as compared to control.

The recorded data on shelf life was found to be maximum i.e. 4.93 days in the holding solution 50 ppm Al_2 $(SO_4)_3$, followed by 25ppm Al_2 $(SO_4)_3$ and tetracycline powder @100mg/L as compared to control (distilled water). However, the lowest shelf life was observed for the holding solution of citric acid (lemon juice) @ 10ml/L and soft drinks (Thumps up) @ 100ml/L as compared to control. Ichimura *et al*., (2006) [10] reported that $Al_2(SO_4)_3$ has been recommended for maintaining the vase life of several cut flowers and is used as an antimicrobial compound in commercial preservative solutions. The present findings are in consonance with Beura (1998) [5] in gladiolus, Hossain (2015) [9] in allamanda, Jani and Mankad (2007) [11] in Zinnia and Waithaka *et al*., (2001) [16] in tuberose.

The result revealed that T_4 with holding solution 50ppm Al_2 $(SO_4)_3$ significantly enhanced the percentage of gain in weight followed by 2% sugar along with 25ppm Al_2 $(SO_4)_3$ and 25ppm Al_2 $(SO_4)_3$ of *Cerbera fruticosa* flower as compared to control (distilled water). However, minimum percentage of gain in weight observed for the holding solution of citric acid (lemon juice) @ 10ml/L as compared to control. Cut flowers absorbed water to preserve its freshness. However, transpiration process by the flowers resulted in loss of its weight. Transpiration was inhibited by aluminium sulphate reported by Hossain (2015) [9]. The present findings are in agreement with Maryam *et al*., (2012) [14] observed that aluminium sulphate (150, 300 mgl-1) treated flowers had higher relative fresh weight than control in rose.

The result showed that solution uptake was not significantly influenced by the treatments under trial. However, maximum solution uptake (295.33 ml) was found in holding solution of 50ppm Al_2 $(SO_4)_3$ in *Cerbera fruticosa*. The present finding corroborated with Hossain (2015) [9] in allamanda, Bhattacharjee and Palanikumar (2002) [6] in rose cv. Raktaganha and Kiamohammadi and Hashemaabadi (2011) [13] in lisianthus. Higher solution uptake might have been due to the aluminum sulphate, it acidifies vase solution, diminishes bacterial proliferation and enhances water uptake (Hassanpour *et al*., (2004) [8]. Non-significance of solution uptake might be due to very thin pedicel of *Cerbera fruticosa*.

The result revealed that holding solution of citric acid (lemon juice) @ 10ml/L showed significantly reduced solution uptake, shelf life & loss in weight percentage and increased wilting percentage. A solution of citric acid at pH 3-3.5 has been suggested for rehydration of cut flowers. Because of its acidity, this solution may initially inhibit bacterial growth, though when included in the vase water for 2 days or longer it usually results in a higher number of bacteria than in control reported by Sacalis (1993) [15].

Table 2: Effect of floral preservatives on post -harvest quality of *Cerbera fruticosa*

Parameters	Wilting percentage (%)			Shelf life (days)	Gain/loss in weight percentage (%)			Solution uptake(ml)
Treatments	Day-3	Day-4	Day-5		Day-3	Day-4	Day-5	
T_1 Distilled water (control)	34.44 (35.92)	82.22 (65.03)	96.67 (79.81)	3.00	10.75 (19.13)	28.74 (32.40)	-25.91 (-30.59)	262.00
T_2 Sugar (2%)	33.33 (35.24)	81.11 (64.35)	92.12 (73.75)	3.16	19.52 (26.21)	35.23 (36.40)	-19.82 (-26.43)	264.33
T_3 Aluminium sulphate (25ppm)	11.11 (19.41)	32.22 (34.57)	72.22 (58.18)	4.54	15.63 (23.28)	34.74 (36.10)	43.55 (41.28)	284.33
T_4 Aluminium sulphate (50ppm)	2.25 (8.62)	24.44 (29.62)	62.22 (52.06)	4.63	20.17 (26.64)	38.45 (38.31)	49.98 (44.97)	295.33
T_5 Sugar (2%) + Aluminium sulphate (25ppm)	15.56 (23.20)	45.56 (42.43)	81.11 (64.23)	3.51	15.14 (22.89)	34.78 (36.12)	45.25 (42.25)	281.33
T_6 Sugar (2%) + Aluminium sulphate (50ppm)	24.44 (29.62)	62.22 (52.07)	87.78 (69.55)	3.33	18.92 (25.77)	35.51 (36.53)	42.61 (40.73)	289.67
T_7 Soft drinks (Thumps up)@100ml/L	42.22 (40.51)	76.89 (61.29)	97.75 (82.17)	2.96	6.77 (15.08)	21.36 (27.52)	-19.88 (-26.47)	277.33
T_8 Citric acid (lemon juice)@10ml/L	58.89 (50.10)	99.91 (88.25)	99.91 (88.25)	2.17	5.40 (13.43)	-15.42 (-23.11)	-99.95 (-88.69)	275.67
T_9 Crocin tablet powder @500mg/L	37.78 (37.91)	61.11 (51.40)	84.45 (66.77)	3.63	10.22 (18.58)	25.64 (30.41)	-17.86 (-24.99)	268.00
T_{10} Tetracycline powder @100mg/L	21.11 (27.33)	41.11 (39.86)	74.44 (59.62)	4.16	10.86 (19.23)	28.76 (32.42)	-13.20 (-21.21)	284.33
SE (m) +	0.604	0.997	1.291	0.082	0.523	0.594	0.563	N/A
C.D.	1.80	2.96	3.83	0.24	1.55	1.77	1.67	8.782

Figures in parenthesis indicate angular transformed value/arc-sine value and (-ve) sign indicate loss in weight)

Fig 1: Precooling of *Cerbera fruticosa*

Fig 2: Full view of shelf life experiment of *Cerbera fruticosa*

Summary and Conclusion

Loose flowers of *Cerbera fruticosa*, showed statistically superior to the treatment T_4, where the flowers were floated in 50 ppm $Al_2(SO_4)_3$ than the rest of the treatments. Lower wilting percentage (62.22%), higher gain in weight percentage (49.98%), higher shelf life (4.63 days), highest solution uptake (295.33 ml) were recorded by the treatment of T_4 (50 ppm $Al_2(SO_4)_3$ on the fifth day of experiment. Holding solution of citric acid (lemon juice) @ 10ml/L showed significantly reduced solution uptake, shelf life & loss in weight percentage and increased wilting percentage.

References

1. Ahmad I, Dole JM John. Postharvest performance of cut marigold, rose and sunflower stems as influenced by homemade and commercial floral preservatives, Turkish Journal of Agriculture and Forestry. 2014;38:916-925.
2. Anju P, Santosh K, Ranjan S, Pal A, Kumar S, Srivastava S. Effect of floral preservatives on vase life of gladiolus cv. Friendship, Progressive Agriculture. 2002;2(1):65-67.
3. Bajwa TN, Miano TF, Wahocho NA. Effect of sucrose and aluminium sulphate on vase life of rose (*Rosa indica* L.), Sci. Int. (Lahore). 2016;28(3):3035-3040.
4. Balakrishna HV, Reddy TV, Rai BGM. Postharvest physiology of cut tuberoses as influenced by some metal salts, Mysore Journal of Agricultural Sciences. 1989;23(3):344-348.
5. Beura S. *In vitro* multiplication, Agrobacterium mediated transformation and post-harvest handling of spikes in Gladiolus, Ph.D. Thesis G.B Pant University of Agriculture and Technology. Pantnagar, 1998.
6. Bhattacharjee SK, Palanikumar S. Post-harvest life of roses as affected by holding solution, Journal of Ornamental Horticulture. 2002;5:37-38.
7. Bhattacharjee SK. Advances in Ornamental Horticulture, Pointer Publishers Jaipur 302 303, (Rajasthan) India, 2006, 6.
8. Hassanpour Asil M, Hatamzadeh A, Nakhai F. Study on the effect of temperature and various chemical treatments to increase vase life of cut rose flower "Baccara". Agricultural Science Research Journal of Guilan Agriculture Faculty. 2004;1(4):121-29.
9. Hossain ABMS. Development of Longevity of Allamanda Flower as Affected by Gibberellic Acid and Aluminium Salt. Research Journal of Environmental Sciences.

2015;9(4):178-185.
10. Ichimura K, Taguchi M, Norikoshi R. Extension of the vase life in cut roses by treatment with glucose, isothiazolinone germicide, citric acid and aluminum sulphate solution, Japan Agricultural Research Quarterly. 2006;40(3):263-269.
11. Jani G, Mankad A. Vase life and quality of Zinnia elegans cut flowers as influenced by holding solutions, International Journal of Biosciences. 2007;5(2):13-14.
12. Jowkar MM, Salehi H. Effects of different preservative solutions on the vase-life of cut tuberose (*Polianthes tuberose* L.) flowers at usual home conditions, Acta Horticulturae. 2005;669:411-416.
13. Kiamohammadi M, Hashemabadi D. The Effects of different floral preservative solutions on vase life of lisianthus cut flowers, Journal of Ornamental and Horticultural Plants. 2011;1:115-122.
14. Maryam S, Ahmad K, Younes M, Roohangiz N. Study on the effect of aluminium sulfate treatment on postharvest life of the cut rose 'Boeing' (*Rosa hybrida* cv. Boeing), Journal of Horticulture, Forestry and Biotechnology. 2012;16(3):128-132.
15. Sacalis JN. Cut Flowers: Prolonging Freshness, second edition, Ball Publishing, Batavia, 1993.
16. Waithaka K, Reid MS, Dodge LL. Cold storage and flower keeping quality of cut tuberose (*Polianthes tuberosa* L.), Journal of Horticultural Science and Biotechnology. 2001;76:271-275.