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RESPONSE OF ORCHID CUT FLOWERS AS AFFECTED BY FLORAL PRESERVATIVES ON THE POSTHARVEST QUALITY

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Abstract

This study was undertaken to evaluate the performance of cut Dendrobium pink sunshine under various holding solutions at post graduate lab Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamil Nadu, India, during February 2016. The treatments with three replications were carried out in completely randomized design with 3 spikes in each replication. Nine chemical preservative solutions were used for extending the vase life and the treatments are T_1 8-HQC (200-ppm), T_2 Citric Acid (200-ppm), T_3 STS (200-ppm), T_4 GA (200-ppm), T_5 $Al_2(SO_4)_3$ (10-ppm), T_6 8-HQC (200-ppm) + 5% sucrose, T_7 Citric Acid (200-ppm + 5% sucrose, T_8 STS (200-ppm) + 5% sucrose, T_9 GA (200-ppm) + 5% sucrose,T_{10} $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose and T_{11} Distilled water. Postharvest observations including bud open (%), flower drop (%), flower colour retention (days), flower diameter (cm), vase life and water uptake (ml). Among the treatments (T_{10}) $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose recorded maximum performances in the postharvest studies followed by (T_8) STS (200-ppm) + 5% sucrose.

Introduction

Orchids belongs to the family Orchidaceae, with nearly 1,000 genera and more than 22,000 species of attractively flowered plants distributed throughout the world, are found in diverse habitats especially in wet tropics. Orchids, one of the most fascinating creations of the nature and one of the most widely distributed groups of flowering plants on the earth. Orchids are perennial epiphytes, which grow anchored to trees or shrubs in the tropics and subtropics (Akon and Mondal. 2009). Species such as are lithophytes, growing on rocks or very rocky soil. Other orchids are terrestrial and can be found in habitat areas such as grasslands or forest (Ketsa and Kosonmethakul. 2001). Orchids attached to other plants often are vine like and have a spongy root covering called the velamen that absorbs water from the surrounding air. Most species manufacture their own food. Dendrobium is a genus of mostly epiphytic and lithophytics. The bewildering colours, shapes, and sizes of these flowers coupled with a longer self-life made them one of the top ten ‘cut flowers’ in international market occupying a major share in the global floricultural trade with extremely high returns.

Horticulturists worldwide today grow orchids not only because they are curious, but mainly due to their great demand and high price. The economic importance of orchids lies mainly in their ornamental and therapeutic value (Medhi, 2011). Very little is known about other uses though many orchid species are being used in ethnic food, fragrance and flavour industry, dry flowers, jewellery and many other minor uses. All orchids are perennial herbs that lack permanent woody structure. Some orchids have single flowers, but most have a racemose inflorescence, sometimes with a large number of flowers. The flowering stem can be basal, apical, meaning it grows from the apex of the main stem, in *Cattleya*. In the present cut flower industry, Dendrobium pink sunshine has taken a prominent place due to its colors, attractiveness and long season of bloom, therefore this experiment was conducted to extend the post-harvest vase-life of cut flower dendrobium pink sunshine by the use of floral preservatives under tropical conditions where there is a shortage of cut flowers at affordable prices.

Materials and Methods

This study was undertaken to evaluate the performance of cut Dendrobium pink sunshine under various holding solutions at post graduate lab Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamil Nadu, India, during February 2016. The treatments with three replications were carried out in completely randomized design having 3 spikes in each replication. Eleven treatments were used for extending the vase life and the treatments are T_1 8-HQC (200-ppm), T_2 Citric Acid (200-ppm), T_3 STS (200-ppm), T_4 GA (200-ppm), T_5 $Al_2(SO_4)_3$ (10-ppm), T_6 8-HQC (200-ppm) + 5% sucrose, T_7 Citric Acid (200-ppm + 5% sucrose, T_8 STS (200-ppm) + 5% sucrose, T_9 GA (200-ppm) + 5% sucrose,T_{10} $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose and T_{11} Distilled water. Postharvest observations including bud open (%), flower drop (%), flower colour retention (days), flower diameter (cm), vase life, initial and final weight (g) of the spike were recorded.

Result and Discussion

Significant results had been generated from various postharvest parameters of Dendrobium pink sunshine at various holding solutions (Table 1). Maximum bud opening percent were observed with holding solutions $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose that opened 100 % buds followed by STS (200-ppm) + 5% sucrose opened 99.52%, maximum flower diameter 31.89 cm was noted with $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose followed by STS (200-ppm) + 5% sucrose 31.32 cm. Flower diameters having higher values and flower bud opening were easier due to more water uptake and more relative fresh weight of flowers. Aluminum sulfate application in combination with sucrose in cut gladiolus "Pink friendship" flowers had shown an increase in flower diameter (Pal and Kumar, 2004). Other investigations have also shown similar results about positive effect of aluminum sulfate on flower diameter (Bhattacharjee and Jaipur, 2005; Singh and Sharma, 2008).

Maximum vase life of 33.95 days was observed with $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose followed by 32.71 days with 8-HQC (200-ppm) + 5% sucrose (Fig. 2), zero flower drop percent (0.00) was noted with $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose followed by STS (200-ppm) + 5% sucrose. Maximum days to color retention 22.53 days were improved with $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose followed by STS (200-ppm) + 5% sucrose 22.07 days (Fig 3). The effect of aluminum sulfate is related to its antimicrobial effect. Aluminum sulfate application resulted in more water uptake than other treatments (Seid and Yassin, 2013). Antimicrobial compounds like metal salts prevent and slowdown bacterial growth, ensure proper water uptake and delay senescence (Liao *et al.*, 2001; Särkkä, 2005). Aluminum sulfate application acidifies the solution and diminishes bacterial growth (Hassanpour Asil *et al.*, 2004). This compound acts as a bacterial filter by forming $Al(OH)_3$ sediment on the cut surface of stem (Put Henriette *et al.*, 1992). Effectiveness of aluminum sulfate application has been proved in cut gladiolus flowers by Gowda, (1990). It is well known that bacterial proliferating in the vase water shortens the vase life of cut flowers (Liao *et al.*, 2001).

The observations regarding the fresh weight of cut flower stems were taken initially and the final weight was observed at the end of the experiment (Fig. 1). The cut flowers stems kept in treatment T_{10} ($Al_2(SO_4)_3$ (200-ppm) + 5% sucrose) showed minimum weight loss till the end of the experiment, whereas maximum weight loss was observed in treatment T_{11} (control) till end. The stems of orchids are highly prone to water stress. The blockage of the base of stem due to bacterial plugging results in decrease of water uptake by stem which results in gradual weight loss. $Al_2(SO_4)_3$ decreased ethylene production and also highly efficient in reducing bacterial growth in the vase solution and the cut stem ends. Sucrose helps in maintaining the water balance and turgidity. Hence, addition of sucrose to the holding solution might have led to increased uptake of the holding solution and thereby freshness is enhanced and weight loss is prevented.

Table 1: Effect of holding solutions on various postharvest parameters of Dendrobium pink sunshine

Treatments	Bud open (%)	Flower drop (%)	Colour retention (days)	Flower diameter (cm)
T_1 8-HQC (200-ppm)	91.77	27.62	11.21	17.86
T_2 Citric Acid (200-ppm)	88.56	31.22	10.15	19.89
T_3 STS (200-ppm)	74.44	28.96	11.31	21.32
T_4 GA (200-ppm)	80.35	13.90	13.76	21.32
T_5 $Al_2(SO_4)_3$ (200-ppm)	80.55	12.86	12.36	25.09
T_6 8-HQC (200-ppm) + 5% sucrose	93.33	7.54	17.68	30.44
T_7 Citric Acid (200-ppm + 5% sucrose	99.22	18.88	17.56	30.32
T_8 STS (200-ppm) + 5% sucrose	99.52	1.81	22.07	31.32
T_9 GA (200-ppm) + 5% sucrose	98.33	2.67	21.71	30.12
T_{10} $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose	100.00	0.00	22.53	31.89
T_{11} Distilled water	59.98	46.81	7.61	11.67
SE(d)	1.21	0.05	0.18	0.66
CD (p=0.05)	2.47	0.09	0.37	1.34

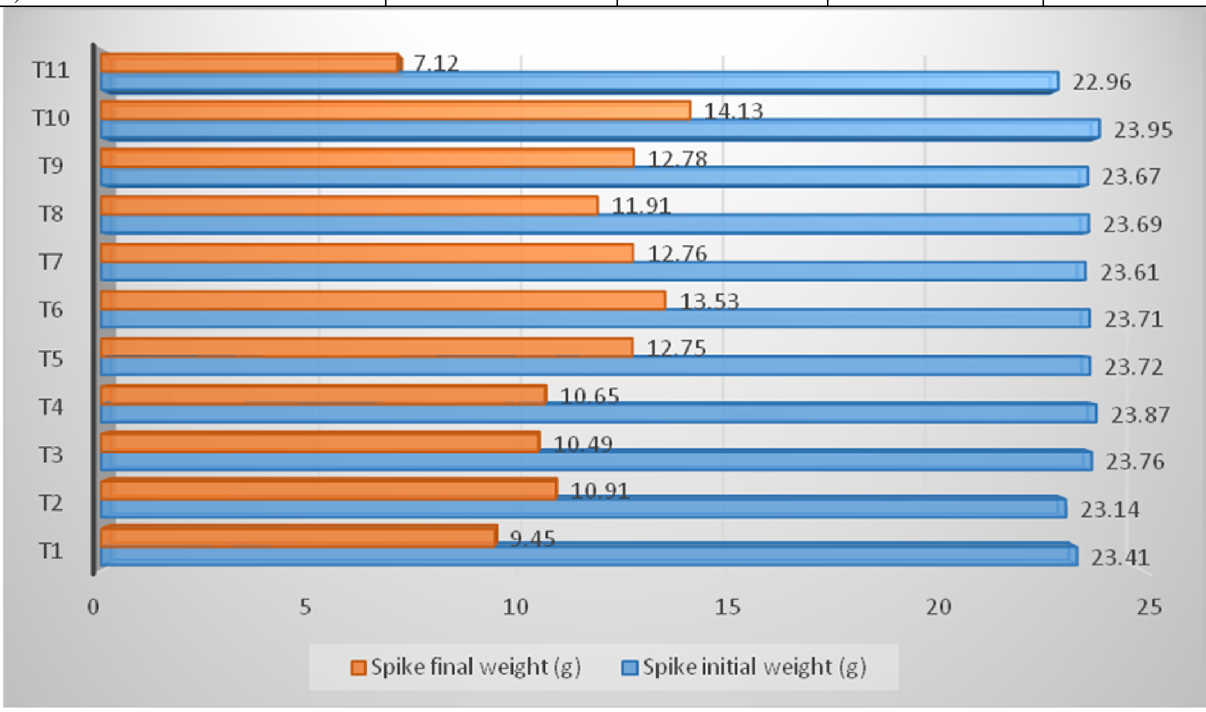

Fig. 2 : Effect of holding solutions on the initial and final spike weight

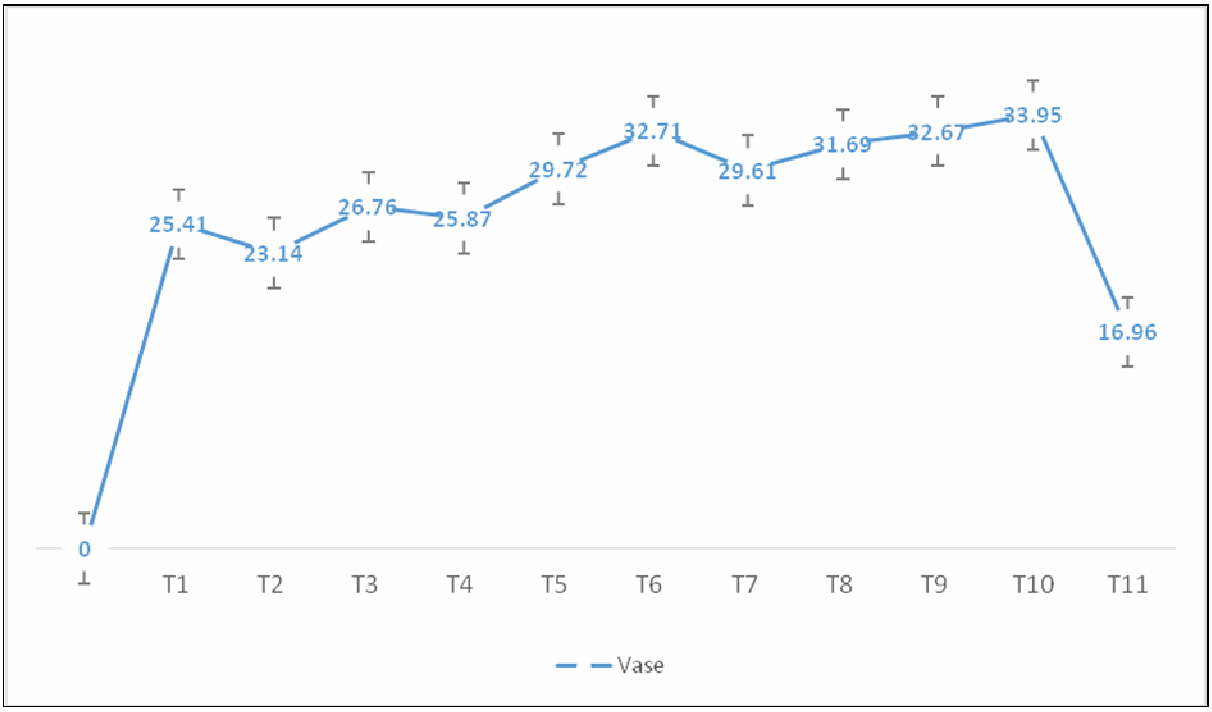

Fig. 2 : Effect of holding solutions on the vase life

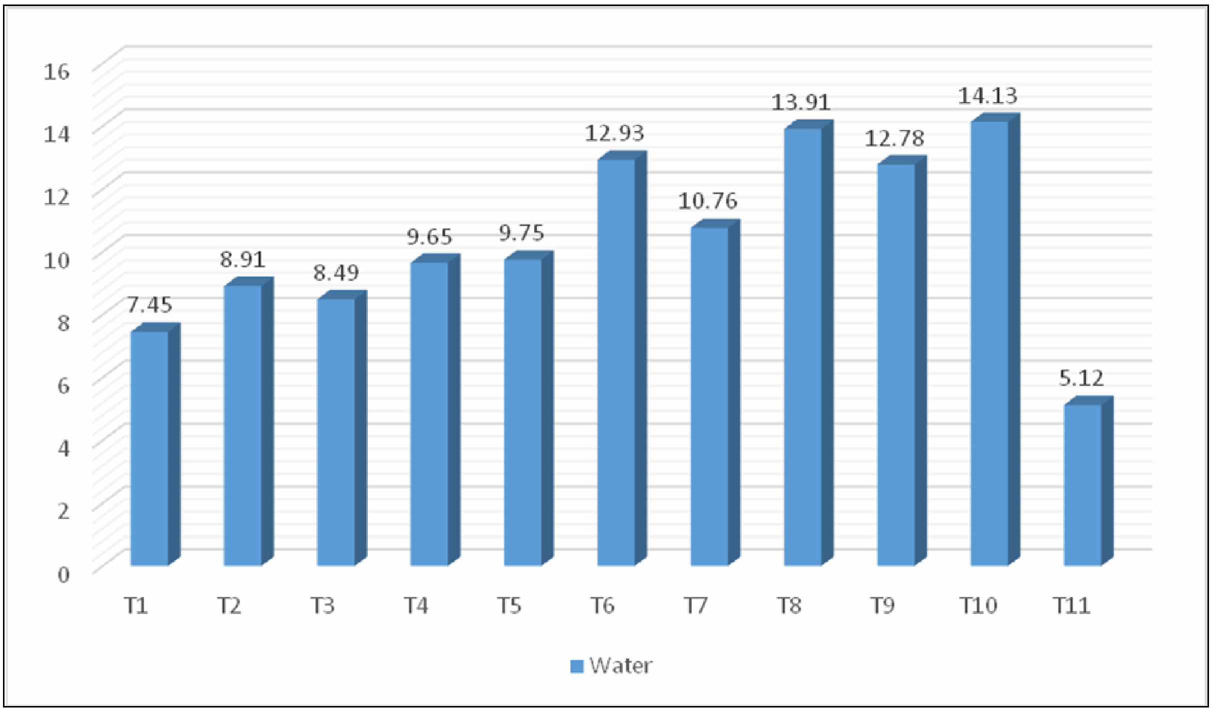

Fig. 3 : Effect of holding solutions on the water uptake of the cut flowers

Conclusion

From the experimental results it can be concluded that the improvement in prolonged vase-life, colour retention of the flowers in spikes, flower diameter in the treatment T_{10} $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose, solution might be due to the appropriate concentration of chemical floral preservatives. $Al_2(SO_4)_3$ decreased ethylene production and also highly efficient in reducing bacterial growth in the vase solution. Maximum bud opening percent were observed with holding solutions $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose that opened 100 % buds because aluminum sulfate application in combination with sucrose uptake more water easier and improve the relative fresh weight of flowers. Hence $Al_2(SO_4)_3$ (200-ppm) + 5% sucrose can be effectively used for increasing the vase life

Reference

Akon, M.R. and Mondal, M.F. (2009). Extending vase life of orchid, Journal of the Bangladesh Society for Agricultural Science and Technology, 6: 71-76.

Bhattacharjee, S.K. and Jaipur, L.C.De (2005). Post Harvest technology of flowers and ornamental plants, ISBN 81-7132-404-5.

Gowda, J.V.N. (1990). Effect of calcium, aluminum and sucrose on vase life of gladiolus. Crop Research., 3(1): 105- 106.

Hassanpour, A.M.; Hatamzadeh, A. and Nakhai, F. (2004). 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, 1(4): 121- 129.

Ketsa, S. and Kosonmethakul, N. (2001). Prolonging vase life of Dendrobium flowers, Acta Horticulturae, 543: 41- 46.

Liao, L.J.; Lin, Y.H.; Huang, K.L. and Chen, W.Sh. (2001). Vase life of *Eustoma grandiflorum* as affected by aluminum sulfate. Botanical Bulletin of Academia Sinica., 42: 35- 38.

Medhi, R.P. (2011). Vision Document-2030, National Research Centre for Orchids, Pakyong, Sikkim, India, 1-2.

Pal, A. and Kumar, S. (2004). Response of floral preservatives on postharvest quality of gladiolus spike cultivar 'Pink Friendship'. Advances in Plant Science, 17(2): 529- 532.

Särkkä, L. (2005). Yield, quality and vase life of cut roses in year round greenhouse production. Academic Dissertation, University of Helsinki, Finland. 64pp.

Seid, H. and Yassin, H. (2013). Review on the impact of different vase solutions on the postharvest life of rose flower, International Journal of Agricultural Research Reviews, 1(2): 13-17.

Singh, P.V. and Sharma, M. (2008). The postharvest life of pulsed gladiolus spikes : The effect of preservative solutions. Acta Horticulturae, XXVI International Horticultural Congress: Elegant Science in Floriculture, 624: 389- 398.