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National Academy of Agricultural Science (NAAS) Rating : 3. 03

Effect of Different Vase Solutions on Vase Life of Cut Rose Flowers Cultivar Taj Mahal

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Abstract: *The present investigation entitled "Response of cut rose cv. Taj mahal to different vase solutions on flower vase life" was carried out during 2013-14 at Horticulture College and Research Institute, Dr.Y.S.R. Horticultural University, Anantharajupet, Y.S.R. Kadapa District of Andhra Pradesh. The experiment was laid out in Factorial RBD with three replications*

Cut roses kept in Aluminium sulphate (200 ppm) registered maximum fresh weight on the 2nd - 3rd day (31.24 g) and minimum fresh weight on 11th - 12th day (16.76 g). The maximum transpiration loss of water was recorded from flowers treated with Al_2SO_4 *(200 ppm) on 3rd - 4th day (33.02 g) and minimum transpiration loss of water (5.84 g) was noticed on 11th - 12th day of the study. The maximum water uptake was recorded from flowers treated with* Al_2SO_4 *(200 ppm) on 2nd - 3rd (34.86 g) and minimum water uptake (6.23 g) was noticed on 11th- 12th day of vase life studies. Among all the chemical treatments tried maximum final flower diameter (8.02 cm) and maximum vase life (11.94 days) was observed with flowers kept in vase solution containing* Al_2SO_4 *(200 ppm) whereas minimum vase life (8 days) was recorded in flowers kept in vase solution containing sucrose 4% .*

INTRODUCTION

Rose is one of the nature's most beautiful creations and is universally extolled 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). In India, cut roses are grown as cut flowers for export, to make bouquets, in flower arrangement and vase decorations. Today, there are about 150 species of red roses, most of them developed by flower breeders, and every single species has its own unique origin, shape, and shade of red. Among the reds, Taj Mahal is one of the important cultivar in India for export. Red roses in full bloom symbolize a strong, mature love that has with stood the test of time and the trappings of love. An ideal cut flowers should remain fresh with respect to colour and fragrance and should have long vase life. A flower, when detached from its source plant is deprived of its metabolic and water supply and shows tendencies of wilting. The development of opening of cut flowers is an active growth process, characterized by an increase in the respiration rate during its opening which requires an adequate water

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supply. Thus, water is the most important and universal ingredient of a holding solution to which other chemical preservatives are added to increase the shelf life of the cut flowers.

Marketing the flowers with guaranteed vase life being in practice and there is a need to know/ standardize the flower vase life according to time of flowering, locality and growing conditions. Postharvest flower preservatives are the chemicals added to water to make flowers last longer. They contain a germicide, a food source, a P^H adjuster and water. The addition of chemical preservatives to holding solution in order to prolong the vase life of cut flowers was reported by several workers (Tiwari and Singh, 2002; Karki *et al.,* 2004). By considering all these factors present study was initiated with the objective to evaluate suitable vase solution for flowers of rose cv. Taj Mahal. Ddifferent chemical preservatives were tested as holding solution for rose cut flowers of cv. Taj Mahal and the results are discussed here under.

MATERIALS AND METHODS

The harvested stems of 45 cm further trimmed to 40 cm in the laboratory. The lower leaves were removed leaving the top two pairs of upper leaves. All the vase life studies were carried in room conditions at 28°C - 30°C temperature, 50 to 60 per cent relative humidity. A total of eight treatments with three replications were maintained. For practical convenience, two cut flower stems were accommodated in each container and replicated thrice. Treatment details are T_1 - 8 HQC @ 100 ppm, T_2 - 8 HQS @ 200 ppm, T_3 - $AgNO_3$ @ 100 ppm, T_4 - 4 % Sucrose, T_5 - Florissant 10 ml l^{-1}, T_6 - Aluminium sulphate @ 200 ppm, T_7 - Silver thiosulfate @ 4 ppm, T_8 - Citric acid @ 200 ppm,

During Vase life period observations were recorded on various parameters viz Fresh weight of the flowers (g), Transpiration loss of water (g), Water uptake (g), Initial and Final flower diameter (cm) d Vase life (days) .The difference between the weight of the bottle + solution + flower and the weight of the bottle + solution on the same day represent the fresh weight of the flower on that particular day and expressed in grams. The difference between the consecutive weights of bottle + solution + flower represents the transpiration loss of water in gram for that period.The difference between consecutive weights of the bottle with the solution (without the flowers) represents the water uptake in grams for that period. Maximum diameter of bud was taken as diameter of bud and was measured by digital vernier calipers in centimeter before placing in vase life bottles.The whole flower diameter in centimeter was recorded on full expansion.The point of termination of vase life varies from the first sign of wilting or fading to the death of all flowers with all the intermediate values between these points (Halevy and Mayak,1974).

RESULTS AND DISCUSSION

Various treatments containing different chemicals in vase solutions significantly affected various parameters that influence the vase life of rose cv. Tajmahal. The fresh weight of rose cv. Taj Mahal flowers as influenced by different vase solutions is presented in the Table 1. All the treatments showed a significant increase in fresh weight up to 2^{nd} to 3^{rd} day. Later from 3^{rd} to 4^{th} day onwards, the fresh weight of the flowers decreased continuously except in sucrose (4%) solution. In vase solutions containing Florissant (10 ml l^{-1}) and silver thiosulfate (4 ppm) it was observed that continuous decrease in weight from 1^{st} to 2^{nd} day onwards. Cut roses kept in aluminium sulphate (200 ppm) showed maximum fresh weight on 2^{nd} to 3^{rd} day (31.24 g) and minimum fresh weight on 11^{th} to 12^{th} day (16.76 g). This increase in flower weight in treatments containing Aluminium sulphate was attributed to its anti microbial action as well as reduced transpirational loss and improved water balance of cut roses by inducing stomatal closure as reported by Schnable and Ziegler (1975).

Transpiration loss of water (g): The data pertaining to the water loss through transpiration at different days of vase life studies was depicted in the Fig. 1. Almost all the treatments showed a significant increase in transpiration loss of water up to 3^{rd} to 4^{th} day and from there onwards it decreased gradually except in florissant (10 ml l^{-1}) that showed decreasing trend from 2^{nd} to 3^{rd} day onwards. The maximum transpiration loss of water was recorded

Table 1
Effect of vase solutions on cut flower fresh weight (g) in rose cv.Taj Mahal

Treatments	*0-1 (days)*	*1-2 (days)*	*2-3 (days)*	*3-4 (days)*	*4-5 (days)*	*5-6 (days)*	*6-7 (days)*	*7-8 (days)*	*8-9 (days)*	*9-10 (days)*	*10-11 (days)*	*11-12 (days)*
T_1 - 8 HQC @100 ppm	28.10	29.06	30.36	28.86	26.54	25.65	24.54	23.12	20.46	18.59	16.24	14.62
T_2 - 8 HQS @ 200 ppm	26.93	27.61	27.98	26.02	25.86	24.78	23.89	22.78	21.63	17.07	0.00	0.00
T_3 - $AgNO_3$ @100 ppm	24.51	25.66	26.64	25.76	24.02	23.34	21.68	20.64	19.34	17.66	0.00	0.00
T_4 - 4% Sucrose	22.50	24.68	23.46	22.86	21.46	20.65	19.02	18.72	0.00	0.00	0.00	0.00
T_5 - Florissant @10ml l^{-1}	25.59	26.56	26.34	25.02	24.64	22.12	20.46	19.68	18.66	0.00	0.00	0.00
T_6 - Al_2SO_4 @ 200 ppm	29.51	31.04	31.24	29.97	28.65	26.95	25.14	24.12	22.04	19.25	17.04	16.76
T_7 - Silver thiosulfate @ 4 ppm	26.37	27.46	26.12	25.68	25.56	24.64	23.86	22.04	19.12	0.00	0.00	0.00
T_8 - Citric acid @ 200 pp^m	27.19	27.68	28.19	27.41	26.24	25.45	23.12	22.54	19.25	16.16	14.46	0.00
S.Em ±	1.03	0.83	0.50	0.53	0.52	0.59	0.65	0.66	0.62	0.49	0.25	0.24
C D (P=0.05)	3.08	2.47	1.50	1.60	1.56	1.78	1.96	1.98	1.87	1.48	0.76	0.71

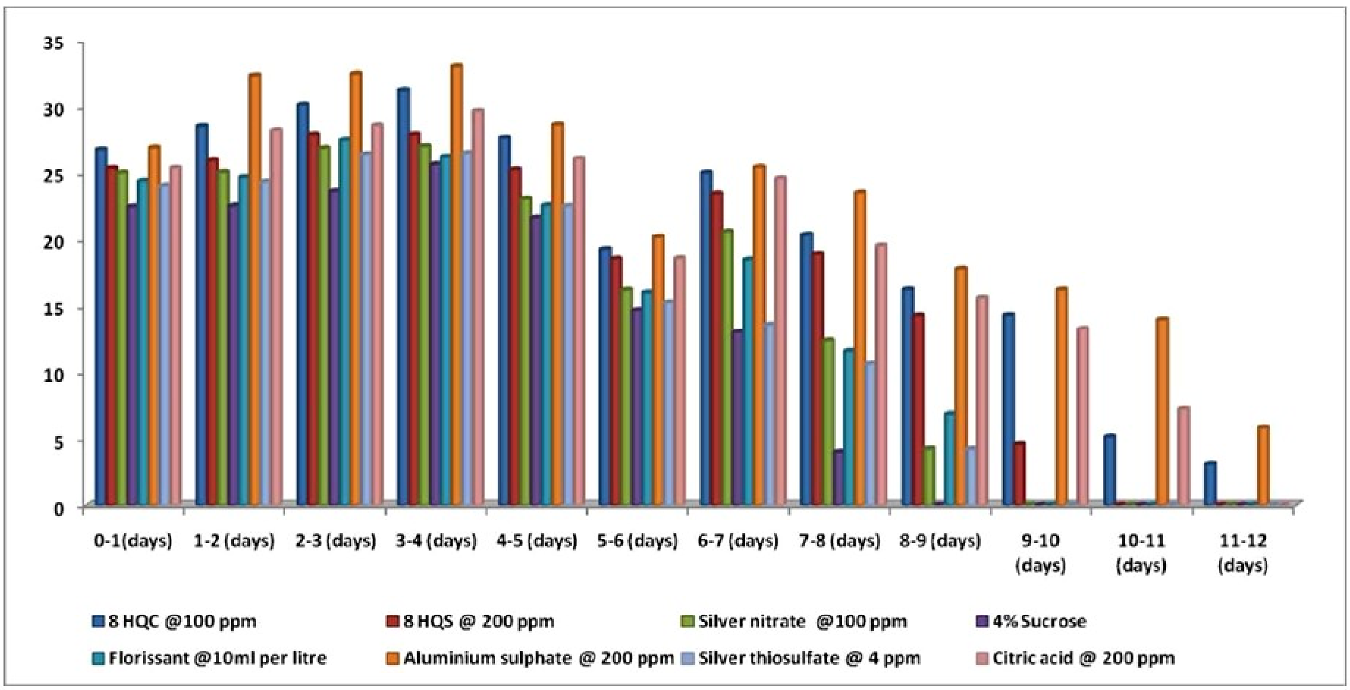

Figure 1: Effect of different vase solutions on Transpirational loss of water (%) of rose cultivar Tajmahal

from flowers treated with Al_2SO_4 (200 ppm) on 3rd to 4th day (33.02 g) and minimum transpiration loss of water (5.84 g) was noticed on 11th to 12th day of vase life studies. Flower turgidity is the result of the balance between the rate of water uptake and water loss and gain in fresh weight can occur only when the rate of water uptake is greater than transpiration. The roses held in aluminium sulphate were most effective in maintaining an improved water balance as compared to other treatments. Aluminium in the holding water induced stomatal closure thereby reducing transpiration and improving water balance of cut roses (Schnable and Ziegler, 1975).

Water uptake (g): Optimum and continuous absorption of water by the cut stem is a necessary factor influencing the vase life of the cut flower which can be assessed by determination of water uptake by the cut flower stem. The data pertaining to the water uptake at different days of vase life was depicted in the Fig. 2 All the treatments showed a

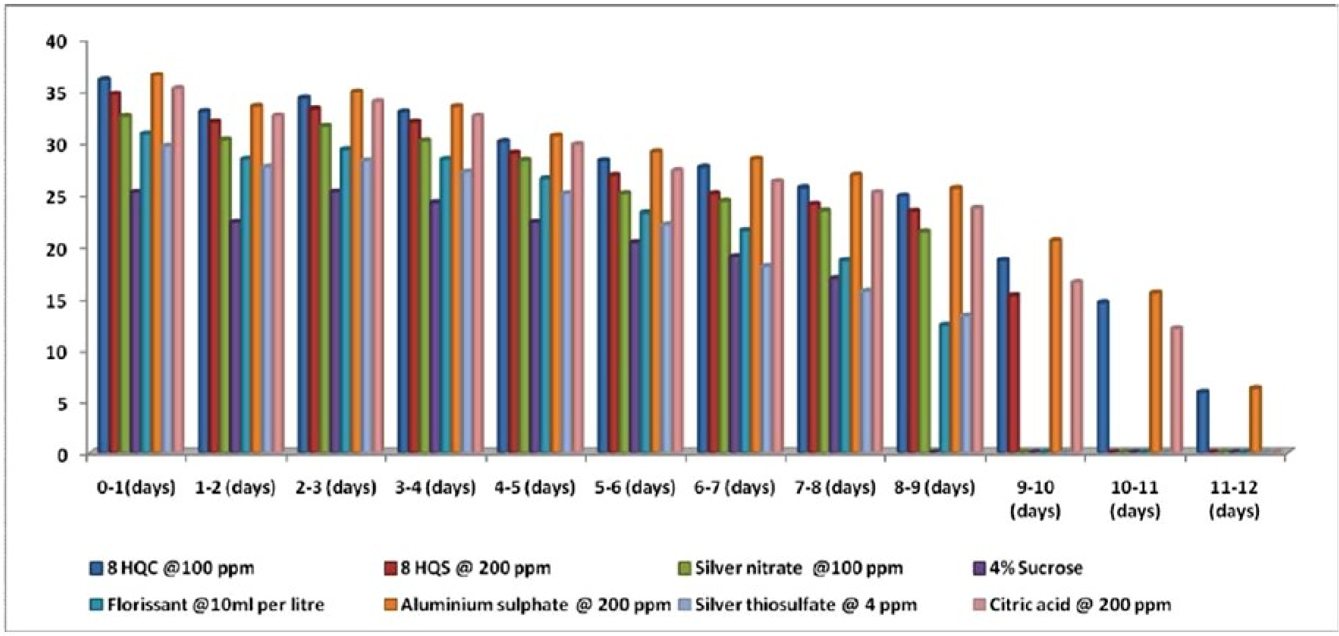

Figure 2: Effect of different vase solutions on water uptake (g) of rose cultivar Tajmahal

significant increase in water uptake up to 2nd to 3rd day and from 3rd to 4th day onwards decreased gradually. The maximum water uptake (34.86 g) was recorded from flowers kept in vase solution containing Al_2SO_4 (200 ppm) on 2nd to 3rd day. The maximum solution absorption by aluminium sulphate may be attributed to its germicidal and acidifying action in the holding solution, retarding bacterial growth and preventing vascular blockage there by encouraging continuous water uptake through the cut stem (Nowak and Rudnick, 1990; Shoba and Gowda, 1993; Singh *et al.*, 2003; Karki *et al.*, 2004).

Initial flower diameter (cm): The data pertaining to the initial flower diameter was depicted in the Fig.3 and showed a significant variation for initial flower diameter among the treatments. Sucrose at 4% concentration (T_4) showed maximum initial flower diameter (4.13 cm) followed by T_7 (4.10 cm), T_5 (4.01 cm), T_3 (3.95 cm), T_2 (3.80 cm) and are at par with T_4. However, the minimum initial flower diameter was noticed in at aluminium sulphate at 200 ppm concentration T_6 (3.24 cm) followed by T_8 (3.26 cm), T (3.35 cm), T_2 (3.80 cm) and are at par with T_6.

Final flower diameter (cm):The data pertaining to the final flower diameter was depicted in the Fig. 3 showed a significant variation for final flower diameter among the treatments. The flowers treated with aluminium sulphate (200 ppm) (T_6) recorded higher final flower diameter (8.02 cm) followed by citric acid (200 ppm) treated flowers (7.45 cm) and are on par with each other. However, the minimum final flower diameter of 6.02 cm was noticed with (T_4) sucrose (4%) treated flowers. The results are in support with the findings of Shoba and Gowda (1993); Singh *et al.* (2003); Karki *et al.* (2004) that aluminium sulphate retarding bacterial growth by preventing vascular blockage.

Vase life (days): A close perusal of data from Fig.3 showed that there was significant difference between the vase life (number of days) of rose flowers of cv. Taj mahal, kept in different vase solutions treatments. The maximum vase life 11.94 days was noticed in the flowers treated with aluminum sulphate (200 ppm) followed by 8 HQC (100 ppm), citric acid (200 ppm) and 8 HQS (200 ppm) with 11.24, 10.26 and 9.96 days respectively and significantly at par with aluminum sulphate (200 ppm). Roses held in Aluminium sulphate at 200 ppm remained fresh for a longer period in comparison to other treatments recording a significant higher vase life of 11.94 days over the other treatments which might be due to its better water balance and an increase in fresh weight up to

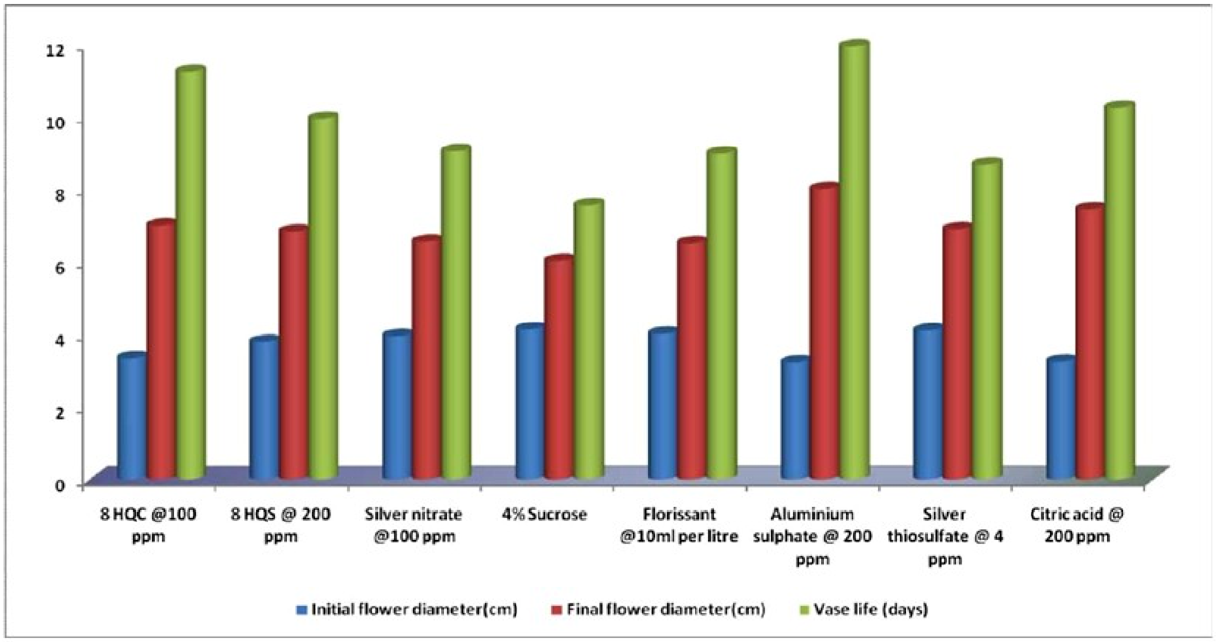

Figure 3: Effect of vase solutions on Initial and Final flower diameter, vase life in rose cv. Taj Mahal

third day. The results are in support with the findings of Shoba and Gowda (1993); Singh et al. (2003); Karki et al. (2004) who reported that germicidal and acidifying action of Aluminium sulphate in the holding solution by retarding bacterial growth by preventing vascular blockage.

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