Int.J.Curr.Microbiol.App.Sci (2020) Special Issue-11: 3714-3718

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Special Issue-11 pp. 3714-3718**
Journal homepage: http://www.ijcmas.com

Original Research Article

Effect of Aluminum Sulphate and Silver Nitrate on Vase Life of Cut Rose cv. First Red

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Keywords

Rose, vase-life, silver nitrate and aluminum sulphate

A B S T R A C T

An effort was made to study the effect of aluminum sulphate and silver nitrate on vase life of cut rose cv. First Red in the laboratory of the Department of Horticulture, Chaudhary Charan Singh University Campus, Meerut (U.P.) during 2018. The experiment was laid out in completely randomized design and replicated thrice. Rose cuttings at half-opened stage were used for the research purpose. The treatment involved in the study were nine in numbers *i.e.*T_1 (Al_2SO_4@ 100ppm), T_2 (Al_2SO_4@ 150ppm), T_3 (Al_2SO_4@ 200ppm), T_4 (Al_2SO_4@ 250ppm), T_5 ($AgNO_3$@ 50ppm), T_6 ($AgNO_3$@ 75ppm), T_7 ($AgNO_3$@ 100ppm), T_8 ($AgNO_3$@ 125ppm) and T_9 (Control). Experimental data shows that the use of $AgNo_3$ @ 125ppm as vase solution gave the significantly better result in respect to change in fresh weight, water uptake, flower diameter and vase life of cut rose cultivar First Red. So, based on experimental findings, it may be concluded that for achieving high production of quality cut rose flowers with maximum vase life, the rose cut flower may be treated with $AgNo_3$ @ 125ppm concentration.

Introduction

Flowers are considered as the best medium to express tenderness feeling of hart, love affection and scene of celebration. Flowers are also associated with joy, beauty, grace, wisdom, purity, passion, strength, paradise, rebirth, loyalty etc. Human's love for flowers is as old as human civilization. In the modern era as the change in lifestyle of peoples and their migration from natural habitats to concrete states so, they realized the importance of the natural flora and fauna. Considering all these facts, the demand for flowers like rose, carnations, gerbera, gladiolus, marigold, orchid etc is increasing in domestic as well as international market.

Among the flowers, the rose has a unique importance and often called a queen of flowers. Rose has a great demand for some international festivals such as New Year day, Valentine's Day and Christmas day etc. On such a special day the demand and price of rose spike go very high. Roses also commonly used in social events like marries, birthday and are regularly exchanged between loves ovens. Fresh flowers of rose are mainly used as cut flowers due to great diversity in slow opening of a flower and

good keeping quality. The shelf life and quality of cut flower to a good exert is associated with the turgidity (Rogers 1973).

The cut flower industries and consumers face challenges due to less longevity of flowers. To maintain the vase life of cut flower various methods and technique may be used. The use of sucrose and the chemicals with or without certain additive to the pulsing solution show practical significance for prolonging the vase life of many cultivars of cut rose. Such preservatives might be useful and to extend flower life would be beneficial both for consumers and producers.

Bacteria and Fungi present in vase-water associated with the xylem clogging and the premature senescence of cut flowers. Many researchers reported that silver nitrate and aluminum sulphate in vase solution act as biocide and delay senescence of cut flowers. The application of $AgNO_3$ with gives prominent results to improve stem and leaf size, vase life and the length or plantlets. Silver nitrate inhibited the activation of cut flowers without interrupting the smoothness of body mechanism at the cellular level for cells survival to a longer period. Similarly aluminum sulphate is another important biocide used for enhancing vase life and water retention of cut rose. Halevy and Mayak, (1981) reported that the aluminum sulphate reduces petal to stabilize the anthocyanin of petals to acidified the holding solution, to reduce fungal and bacterial growth.

Materials and Methods

The present investigation was carried out in the laboratory of Department of Horticulture, Chaudhary Charan Singh University, Campus, Meerut, (U.P.) India to observe the effect of different concentrations of aluminum sulphate and silver nitrate on postharvest physiology of cut rose cultivar First Red in vase under normal room temperature. The experiment was laid out in a completely randomized design (CRD) and replicated three times. Two chemicals ($AgNO_3$ and Al_2SO_4) each at four different concentrations were tried as holding solution. A total number of nine treatments *i.e.* T_1 (Al_2SO_4@ 100ppm), T_2 (Al_2SO_4@ 150ppm), T_3 (Al_2SO_4@ 200ppm), T_4 (Al_2SO_4@ 250ppm), T_5 ($AgNO_3$@ 50ppm), T_6 ($AgNO_3$@ 75ppm), T_7 ($AgNO_3$@ 100ppm), T_8 ($AgNO_3$@ 125ppm) and T_9 (Control) were used for investigation. Cut flowers of rose variety First Red were obtained from a commercial grower namely Mr. Dile Ram, Mawana, Meerut (U.P). The cut flower having 45-50 cm stem length were harvested in the morning between 7:00 am to 8:00 am at tight bud stage, when only one or two petals had unfolded, with the help of a clean and sharp secateurs. After this, the cut flowers were brought to the laboratory in a bucket containing fresh tap water. In laboratory, the stem ends were cut in uniform length of 40 cm each and retained only four uppermost leaves on stem. After recording the fresh weight of each cut stem in the laboratory, the cut flowers were kept in conical flask. Each conical flask contains 500 ml solution of different concentration of $AgNO_3$ and Al_2SO_4. Flower stalks containing conical flask were placed in ambient condition at 21±2˚C temperatures, 65 – 69 % relative humidity with adequate aeration. The change in fresh weight was measured as the difference between the fresh weight at harvest to final weight at 4^{th} day and at senescence. Flower diameter was measured at 4^{th} day and at senescence. Water uptake (ml) was measured by the difference in the initial amount of water in the conical flask (500 ml) to the final amount of water in the conical flask at senescence with the help of measuring cylinder. Vase life was recorded since when time the cut flowers were kept in

vase till senescence. The total period of vase life was noted in days. The end of useful vase life or senescence symptoms was marked either by appearance of bent neck, bluing of petals in case of the flowers, wilting, blackening, or drying of outer petals or opening at center petal drop and color fading etc. The data recorded during the course of investigation were subjected to statistical analysis for drawing conclusions.

Results and Discussion

As regards to the effect of various treatments on cut stems of rose flower clearly indicated Al_2SO_4 and $AgNO_3$ had significant effect on fresh weight of flowers, flower diameter, water uptake and vase life (table-1). The maximum increase in fresh weight (+3.32 g) at 4^{th} day was observed under the treatment T_8 ($AgNO_3$@125 ppm) and followed by treatment T_7 ($AgNO_3$ @ 100 ppm) (+3.02) and T_4 (Al_2SO_4@250 ppm) (+2.68 g) as compared to other treatments. Similarly, the least reduction in the fresh weight (-0.78 g) at senescence day was recorded under treatment T_8 ($AgNO_3$@125 ppm). However, the control treatment shows the maximum reduction in fresh weight of cut stem (-1.92 g) at senescence. Similar findings were also observed by Sivasamy and Bhattacharjee (2000). It might be due to effect of $AgNO_3$ and Al_2SO_4, act as bactericides which inhabit the growth of bacteria, cause of blockage of xylem vessels stopped the supply of nutrients in solution form, is essential for all physiological activities like absorption of water, respiration, transpiration etc.

The maximum water uptake (18.26 ml and 27.49 ml) at 4^{th} day and at senescence day respectively, were recorded under the treatment T_8 ($AgNO_3$@125ppm) followed by the treatment T_7 ($AgNO_3$@100 ppm) in compared to other treatments as well as control (distilled water). This result is in agreement with the findings of Jamil *et al.*, (2016) in rose, Gowda and Gowda (1990) in gladiolus and Mukhopadhyay (1982) in cut tuberose. It might be due to the effect of $AgNO_3$ act bactericides provides the energy for physiological activities like absorption of water, respiration, transpiration and maintains of integrity. The presence of AgNO3 which acts as strong antimicrobial agent would increase water uptake and improve water relations. Similarly, aluminum sulphate acts as a germicide, thereby encouraging continuous water transport through the cut stem by inhibiting the vascular blockage. This result is confirmed with the findings of Shobha and Gowda (1994) in cut calendula flowers

The maximum flower diameter (8.72cm) was recorded with treatment T_8 ($AgNO_3$@ 125ppm) followed by treatment T_7 ($AgNO_3$@ 100ppm) (8.00 cm). Where $AgNO_3$ acts as anti-ethylene in enhancing the flower diameter and vase-life of cut rose flowers cv. First Red. Al_2SO_4 help in closing the stomata and reduces water loss. Similarly maximum vase life (9.86 days) of cut flower of rose cv. First Red was recorded under the treatment T_8 ($AgNO_3$@125ppm) followed by treatment T_7 ($AgNO_3$@100ppm) (9.33 days) as compared to others. The findings are closely confirmed with the findings of Farahat *et al.*, (2014) and Butt (2005). The increase in flower diameter and vase life might be due to the uptake more water by the cut stem which helps in Maintain the physiological process and turgidity of flowers for long time as resulted by using of $AgNO_3$ and Al_2SO_4 in different concentration. Many researchers reported that $AgNO_3$ greatly reduce microbial population in vase solution and improve water uptake by the cut stem, which helps in increasing flower diameter and vase life of flower. Silver nitrate (AgNO3) is relatively potent inhibitors of ethylene action in plant tissues (Mohy, 2011).

Table.1 Effect of aluminum sulphate and silver nitrate on vase life of cut rose cv. First Red

Treatments	Notations	Concentration (ppm)	Change in Fresh weight at 4th day (g)	Change in fresh weight at senescence	Water uptake (ml) on 4th day in vase	Water uptake (ml) at senescence	Flowers diameter (cm) on 4th day in vase	Vase life (days)
Al_2SO_4	T_1	100	+2.26	-1.9	10.91	18.03	6.93	7.12
	T_2	150	+2.47	-1.84	12.11	21.00	7.34	7.96
	T_3	200	+2.66	-1.69	14.32	22.74	7.71	7.63
	T_4	250	+2.68	-1.69	15.68	24.59	7.87	8.85
$AgNO_3$	T_5	50	+2.59	-1.74	12.10	20.61	7.36	7.97
	T_6	75	+2.86	-1.36	15.36	23.99	7.39	8.85
	T_7	100	+3.02	-0.93	16.97	25.90	8.00	9.33
	T_8	125	+3.32	-0.78	18.26	27.49	8.72	9.86
Control	T_9	Distilled water	+2.12	-1.92	10.17	16.67	6.73	5.87
C.D			0.212	0.084	1.154	1.451	0.592	0.257

This could explain the effective role of AgNO3 in prolonging the vase life of rose cut flowers. Jowkar *et al.*, (2012) also reported that a solution of aluminum sulphate significantly increased vase life of cut Charry Brandy roses.

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