

Effect of antimicrobial compounds on post-harvest life of rose

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Abstract

The effect of antimicrobial compounds viz., 8-hydroxyquinoline citrate (HQC) (200 ppm), 8-hydroxyquinoline (HQ) (200 ppm), CoSO_4 (200 ppm) and $\text{Al}_2(\text{SO}_4)_3$ (200 ppm) along with 4% sugar and 200 ppm citric acid in vase solution were studied for increasing the vase life of rose cultivar 'Superstar'. All antimicrobial compounds markedly influenced the vase life by influencing weight gain, flower diameter and solution uptake. Out of four antimicrobial compounds studied HQC(200 ppm) and CoSO_4 (200 ppm) were at par in influencing vase life and found much better than HQ and aluminum sulphate.

Key words: Antimicrobial chemicals, sugar, citric acid, cobalt sulphate, aluminum sulphate, vase life, rose

Introduction

Rose is the most beautiful among the flowers. Ever since the cultivation of the rose in India, it has been grown for various purposes, like garden flower, for aesthetic value and as cut flower for decorative purposes (Nagarajaiah *et al.*, 1989). Cut rose flowers often show wilting symptoms as well as bending of the stem just below the flower head probably due to a low water potential, which caused vascular occlusion (Mayak *et al.*, 1974, De Stigter, 1980 and Van Doorn *et al.*, 1986). Formation of such vascular plugs could possibly be induced by ethylene, produced either by cut surface or by bacteria (Van Doorn *et al.*, 1986). The improvement of keeping quality and enhancement of vase life of cut flowers are important areas of floriculture research. It has been shown that antimicrobial compounds in the vase solution may prolong the vase life of several cut flowers (Aarts, 1957). Among the antimicrobial chemicals that have been used to extend vase life of cut flowers are Silver nitrate (Aarts, 1957 and Reddy and Nagarajaiah, 1988), Aluminum sulphate, Hydroquinoline compounds (Nagarajaiah *et al.*, 1989) and Cobalt salts (Vankatarayappa *et al.*, 1980). The present investigation was planned to study the relative effect of HQC, HQ, $\text{Al}_2(\text{SO}_4)_3$ and CoSO_4 on post-harvest behaviour of field grown cut 'Superstar' roses.

Materials and methods

The rose cultivar 'Superstar' was used for this investigation. The flowers were harvested in the afternoon at the stage when all the sepals were well spread and one outer petal unfurled from the tip and immediately put in the bucket containing water. The basal portions of the stems were recut two cm from previous cut and the cut end was put in the graduated conical flask containing various vase solutions viz., 4% sugar and 200 ppm citric acid plus various antimicrobial compounds like 8-hydroxyquinoline citrate (HQC) (200 ppm), 8-hydroxyquinoline (HQ)(200 ppm), CoSO_4 (200 ppm) and $\text{Al}_2(\text{SO}_4)_3$ (200 ppm) together with distilled water as control. The treatments were repeated five times with three cut flowers in each of them in completely randomized

design at room temperature. Observations were recorded for weight, solution uptake, diameter of fully open flowers and vase life at Postharvest Laboratory of Department of Horticulture, G.B.Pant University of Agriculture and Technology, Pantnagar during January-February, 2000.

Results and discussion

In present investigation the weight gain was maximum on third day in HQC solution (3.75 g) which was at par with CoSO_4 (3.70 g) whereas, the minimum weight gain was observed in distilled water (2.00 g). However, HQ and $\text{Al}_2(\text{SO}_4)_3$ solution were at par in influencing weight gain. Initial increment of fresh weight until third day after harvest was observed by Veyama and Ichimura (1998), De and Bhattacharjee (1998) and Sivasamy and Bhattacharjee (2000). The maximum weight loss at senescence was observed in rose stems kept in distilled water (1.99 g) and the minimum was in $\text{Al}_2(\text{SO}_4)_3$ solution. However, HQ and HQC solution were at par with distilled water. The decrease in fresh weight at petal senescence might be due to reduced level of starch, cell wall polysaccharides, proteins and nucleic acid (Matile and Winkenbach, 1971). The higher membrane permeability due to lower phospholipid level might have made the cell vulnerable to leakage and weight loss (Borochoy *et al.*, 1978).

Strikingly greater diameter of flowers was observed in antimicrobial solutions. However, various antimicrobial solutions did not differ significantly among themselves. Larger flower in vase solution of antimicrobial solution might be due to the presence of sugars along with antimicrobial compound which provide energy for flower. The maximum uptake of solution was found in flowers kept in HQC (24.00 ml) which was at par with CoSO_4 (23.00 ml). HQ and $\text{Al}_2(\text{SO}_4)_3$ solution uptake were also at par, whereas the minimum uptake was observed in distilled water (14.00 ml). Burdett (1970) reported decrease in the 8-hydroquinoline solutions flow resistance by controlling microbial growth. Low distilled water uptake might be due to vascular occlusion (Mayak *et al.*, 1974). Microscopic examination of longitudinal tangential section of rose stems have revealed

Table 1. Effect of antimicrobial compounds on Post-harvest life of rose cv. "Superstar"

Treatments	Changes in fresh wt (g)		Flower diameter (cm)	Total sol. uptake (ml)	Vase life (days)
	3 rd day	Senescence			
Control	+2.00	-2.00	10.00	14.00	10.00
HQC(200 ppm)	+3.75	-1.75	14.80	24.00	15.20
HQ (200 ppm)	+3.56	-1.85	14.75	22.70	14.30
CoSO ₄ (200 ppm)	+3.70	-1.60	14.70	23.00	14.56
AlSO ₄ (200ppm)	+3.25	-1.50	14.75	21.50	14.00
S.Em.	0.05	0.07	0.17	0.41	0.18
CD ($p=0.05$)	0.14	0.20	0.51	1.21	0.53

vascular occlusion due to microbial growth and gum deposition (Lineberger and Steponkus, 1976). Formation of such vascular plugs could possibly be induced by ethylene, produced either by the cut surface or by bacteria (Van Doorn *et al.*, 1986). The role of bacterial infection in vascular blockage was inferred from the positive effects of bacteriostatic chemicals on water relation of flowers (Aarts, 1957) and the negative effect of bacterial solution (Van Doorn *et al.*, 1986).

The longest vase life was found with HQC (15.20 day), which was at par with CoSO₄ (14.56 day) while the shortest life was observed with distilled water (10.00 days). The shortest vase life of flowers kept in distilled water could be correlated with decreased water uptake in cut stems due to microbes, which stimulated the formation of vascular occlusions in the stem (Lineberger and Steponkus, 1976). Treatment of stems with 8-HQS was found to maintain xylem conductivity and enhance flower life (Mishra *et al.*, 1973). Cobalt has been shown to suppress the microbial growth (Mishra *et al.*, 1973) inhibit ethylene biosynthesis (Samimy, 1978), reduce vascular blockage and to partially close stomata (Reddy, 1988).

Thus, all antimicrobial compounds markedly influenced the vase life by influencing weight gain, flower diameter and solution uptake. Out of four antimicrobial compounds HQC (200 ppm) and CoSO₄ (200 ppm) were at par in influencing the vase life and were found much better than HQ and aluminium sulphate.

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