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Studies on wet storage of cut rose stems in relation to post storage treatments

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ABSTRACT

Stems of rose cv. MERCEDES were subjected to wet refrigerated storage up to 21 days by dipping basal 5-7 em basal stem portions in water. After storage, the stems were held in vase solutions comprising of aluminium sulphate [$Al_2(SO_4)_3 16H_2O$], 300 ppm, sucrose 1.5% + [$Al_2(SO_4)_3 16H_2O$] 300 ppm ahd. water *i.e.* control. post-storage vase solutions comprising of sucrose (1.5%) + $Al_2(SO_4)_3$ $16H_2O$ (300 ppm) followed by $Al_2(SO_4)_3$ $16H_2O$ alone, significantly improved keeping quality of the stems.

Key words : Chemical treatments, Rose, Wet storage.

Refrigerated storage is an essential operation for preventing glut and regulating the supply of flowers in the market. Among storage methods, wet refrigerated storage is the most widely used. It has, however, been reported that in wet storage, flowers exhibit high metabolic activity due to continuous supply of water or chemical preservative solution (Goszcznska and Rudnicki, 1988; Singh *et al.,* 2001). Flowers also show decrease in the vase life following storage (Redman *et al.,* 2002*;* Zencirkiran and Menguc, 2003). Both pre and post storage application of floral preservatives, are also reported to improve vase life of stored flowers (Goszcznska and Rudnicki, 1988; Nowak and Rudniucki, 1990; Singh *et al.,* 2001). The present studies report the effect of post storage vase solutions on keeping quality of wet-stored cut stems of roses cv. MERCEDES.

MATERIALS AND METHODS

The stems of rose cv. MERCEDES (≈70 cm long) procured from Indo Israel Project, IARI, New Delhi at commercial. stage of harvest were transported dry in pre-cooled boxes. The bunches were immediately put in water, cooled at 2-3°C for 6 hours and cut to a uniform length of 60 cm. The stems were stored in a cool chamber (2-3°C; 90-95% R.H) for 3, 6, 9, 12, 15, 18 and 21 days by dipping basal 5-7 cm basal stem portions in water.

After storage, the stems were put in vase solutions comprising of aluminium sulphate [$Al_2(SO_4)_3$ $16H_2O$] 300 ppm (T_1), sucrose, 1.5%+[$Al_2(SO_4)_3$ $16H_2O$] 300 ppm.(T_2) and. water *i.e.* control (T_3). Observations were recorded for degree of bud opening (based on numerical score 1-4; 1- up to 25% opening; 2- >25 to 50% opening; 3- >50% to 75% opening; and 4- >75% opening), vase life, final size attained by the bud in vase and total water absorbed/stem (ml), in an air-conditioned laboratory at 23 ± 2^0C temperature, 60-70 per cent R.H. and 16 h illumination of 1000 lux intensity provided by 40 W white fluorescent tubes. Vase life was considered to be terminated when stems showed signs of bent neck or petals showed signs of wilting. The unstored stems, similarly treated with vase solutions served as control. The data presented are mean of three replications each of three stems. The data were analyzed by the Least Square Difference test (LSD) using complete randomized design.

RESULTS AND DISCUSSION

Degree of bud opening and vase life:

Results presented in Table 1 show that there was a decline in the degree of bud opening with increase in storage duration. Bud opening was, however, slightly better in T_2 *i.e.* sucrose, 1.5% + $Al_2(SO_4)_3$ $16H_2O$, 300 ppm (3.63) than T_1 *i.e.* $Al_2(SO_4)_3$ $16H_2O$ alone (3.60) and was the minimum in T_3 *i.e.* control (3.31)

Vase life of the stems also showed decline with increase in storage duration (Table 1). Vase life was, however, maximum (12.24 days) with T_2 *i.e.* (sucrose+ $Al_2(SO_4)_3$ $16H_2O$) and minimum (9.12 days) in control. Not only this, treatment T2 followed by TI also maintained higher vase life than the control stems, throughout the storage duration. The flowers held in solution of sucrose, 1.5% + $Al_2(SO_4)_3$ $16H_2O$, 300 ppm exhibited vase life of 10.11 days whereas those held in $Al_2(SO_4)_3$ $16H_2O$ (300 ppm) lasted for 9.33 days after 18 days of storage as compared to 5.89 days in control. Addition of sugars to $Al_2(SO_4)_3$ $16H_2O$ solution, thus slightly synergized the

Table 1: Effect on post-storage vase solutions on degree of bud opening and vase life of cut rose stems cv. MERCEDES

Storage duration (days)	Degree of bud opening			Mean	Vase life (days)			Mean
	T_1	T_2	T_3		T_1	T_2	T_3	
3	3.78	4.00	3.67	3.82	12.89	15.33	13.00	13.74
6	3.56	3.89	3.56	3.67	10.56	14.22	9.89	11.56
9	3.65	3.78	3.11	3.51	11.33	13.11	9.44	11.29
12	3.67	3.67	3.11	3.48	10.67	12.78	8.78	10.74
15	3.45	3.67	3.34	3.48	10.21	10.33	8.11	9.55
18	3.78	3.22	2.89	3.30	9.33	10.11	5.89	8.44
21	2.89	2.78	2.78	2.82	5.00	5.78	3.44	4.74
Control (0 day)	4.00	4.00	4.00	4.00	15.66	16.22	14.44	15.44
Mean	3.60	3.63	3.31		10.71	12.24	9.12	
LSD (P=0.05) Storage duration (A)=0.16;Treatment (B}=0.26; AxB =0.89					LSD (P=0.05) Storage duration (A)= 0.67 ; Treatment (B)=1.01; AxB =1.89			

effect on vase life. Earlier studies have also shown that $Al_2(SO_4)_3$ $16H_2O$ inhibits bacterial growth in vase water and improves vase life of cut roses(Singh *et al.*, 2004)

Cut roses also exhibit loss of soluble sugars during storage (data unpublished). Addition of sucrose as a post-storage treatment hence, supplemented the loss of sugars thereby, improved the vase life.

Flower diameter and water absorption:

Flower diameter attained by the bud in vase continued to decrease with increase in storage durations and was minimum (3.40 cm) after 21 days of storage but maximum in unstored control stems (6.51 cm). Similar decrease in floret size with the progress of storage duration has also been reported in gladiollols (Grover, 2001).The stems treated with sucrose+ $Al_2(SO_4)_3$ $16H_2O$ (T_2), however, maintained higher flower diameter (5.18 cm) followed by T_1 (4.76 cm). The bud diameter was minimum (4.17 cm) in control (Table 2).

Similar trends were observed with respect to water absorption by the stems. The total water absorbed/stem decreased with increase in storage duration and stems held in solution of $Al_2(SO_4)_3$ $16H_2O$ alone or sucrose + $Al_2(SO_4)_3$ $16H_2O$ (T_1 and T_2) maintained higher water absorption than the control stems held in water (T_3) (Table 2).

It was thus concluded that post-storage treatment with sucrose (1.5%) + $Al_2(SO_4)_3$ $16H_2O$ (300 ppm) followed by $Al_2(SO_4)_3$ $16H_2O$ alone, significantly improved keeping quality of cut rose stems.

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Table 2 : Effect on post-storage vase solutions on flower diameter and total water absorbed in cut rose stems cv. MERCEDES

Storage duration (days)	Flower dia. (cm)			Mean	Total water absorbed/ stem (ml)			Mean
	T_1	T_2	T_3		T_1	T_2	T_3	
3	5.30	6.08	4.43	5.27	50.20	51.23	47.42	49.62
6	4.98	5.81	4.34	5.04	47.17	47.07	46.03	46.76
9	5.07	5.69	4.00	4.92	45.20	48.70	42.37	45.42
12	4.69	4.80	4.17	4.55	44.70	46.33	40.70	43.91
15	4.14	4.31	4.11	4.19	36.27	35.07	35.17	35.50
18	4.00	4.14	3.23	3.79	33.80	37.23	34.43	35.15
21	3.33	3.82	3.04	3.40	33.80	36.50	26.23	32.18
Control (0 day)	6.56	6.81	6.14	6.51	60.98	62.30	55.33	59.54
Mean	4.76	5.18	4.17		44.02	45.55	40.96	
LSD (P=0.05) Storage duration (A)=0.33; Treatment (B)=0.54; AxB = NS					LSD (P=0.05) Storage duration (A); 3.02 Treatment (B)=4.93; AxB =8.54			

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