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INFLUENCE OF CHEMICALS AND GROWTH REGULATORS ON THE SHELF LIFE OF *CALENDULA* AND *ALYSSUM*

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Chemicals like sucrose, cobalt nitrate, calcium nitrate, sodium benzoate, citric acid, IAA, GA3 and kinetin were used to study the vase life of cut flowers of Calendula officinalis and Alyssum odoratum. The fresh weight, transpiration water loss, water uptake and water balance were studied. Sodium benzoate (100 ppm) and Calcium nitrate (150 ppm) improved shelf life of *Calendula* and *Alyssum* respectively.

Key Words : Cut flowers, Post harvest shelf life.

The cut flower twigs of *Calendula officinalis* and *Alyssum odoratum* were used in the present study. The plants were grown in the botanical garden of Gujarat University, Ahmedabad. The flower twigs were harvested on the day when flowers opened. These were immediately immersed in water, brought to the laboratory. The flowers were cut under water. They were placed in 1inch test tubes with 25 ml of preservative solutions, viz. distilled water, 1% Sucrose, 2% Sucrose, and 5% Sucrose, 150 ppm cobalt nitrate, 150 ppm calcium nitrate, 100 ppm sodium benzoate, 100 ppm citric acid, 15 ppm IAA, 15 ppm GA3 and 15 ppm kinetin. They were kept at room temperature. The test tubes containing flowers were capped to prevent evaporation loss. The fresh weight, transpiration loss, water uptake and water balance of flowers were measured after the method by Venkatarayappa et al., (1980). Ten flowers were kept for each set and ten sets were maintained. Average values were noted.

In *Calendula*, the flowers had a shelf life of five days in distilled water and different sucrose concentrations. However, overall water balance and increase in fresh weight was best in flowers placed in distilled water. Further, flowers placed in distilled water with 100 ppm sodium benzoate showed a shelf life of six days and the flowers showed less transpiration loss, better water uptake, better water balance and so, an improved shelf life (Table 1).

Table 1 Total water balance in flowers of *Calendula* during post harvest shelf life under different treatments.

S.No.	Treatments	Total Transpiration water loss in g/flower/day	Total water uptake in g/flower/day	Total water balance in g/flower/day
1	Distilled water	4.40 ± 0.04	4.64 ± 0.05	0.24 ± 0.01
2	1% Sucrose	2.30 ± 0.21	2.50 ± 0.23	0.20 ± 0.02
3	2% Sucrose	3.37 ± 0.16	3.55 ± 0.20	0.18 ± 0.04
4	5% Sucrose	1.58 ± 0.01	1.58 ± 0.02	0.00 ± 0.01
5	DW + Cobalt nitrate	2.23 ± 0.64	2.30 ± 0.66	0.07 ± 0.02
6	DW + Calcium nitrate	1.98 ± 0.55	2.18 ± 0.60	0.20 ± 0.05
7	**DW+ Sodium benzoate**	**2.31 ± 0.36**	**2.83 ± 0.38**	**0.52 ± 0.02**
8	DW + Citric acid	2.31 ± 0.08	2.43 ± 0.20	0.12 ± 0.12
9	DW + IAA	2.90 ± 0.09	2.92 ± 0.11	0.02 ± 0.02
10	DW + GA_3	2.76 ± 0.61	2.87 ± 0.66	0.11 ± 0.05
11	DW + Kinetin	2.69 ± 0.75	2.41 ± 0.80	-0.28 ± 0.05

Table 2 Total water balance in flower of *Alyssum* during post harvest shelf life under different treatments.

S.No.	Treatments	Total Transpiration water loss in g/flower/day	Total water uptake in g/flower/day	Total water balance in g/flower/day
1	Distilled water	0.66 ± 0.63	0.79 ± 0.66	0.13 ± 0.03
2	1% Sucrose	0.47 ± 0.51	0.52 ± 0.55	0.05 ± 0.04
3	2% Sucrose	0.43 ± 0.01	0.55 ± 0.09	0.12 ± 0.08
4	5% Sucrose	0.62 ± 0.11	0.84 ± 0.15	0.22 ± 0.04
5	DW + Cobalt nitrate	1.74 ± 0.16	1.56 ± 0.21	0.82 ± 0.04
6	**DW + Calcium nitrate**	**1.65 ± 0.36**	**2.68 ± 0.38**	**1.03 ± 0.02**
7	DW + Sodium benzoate	2.05 ± 0.02	2.35 ± 0.04	0.30 ± 0.02
8	DW + Citric acid	1.86 ± 0.55	1.75 ± 0.58	-0.11 ± 0.03
9	DW + IAA	1.70 ± 0.44	1.62 ± 0.49	-0.08 ± 0.05
10	DW + GA_3	2.31 ± 0.29	2.25 ± 0.32	-0.06 ± 0.03
11	DW + Kinetin	1.79 ± 0.25	1.55 ± 0.29	-0.24 ± 0.04

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In *Alyssum*, the flowers had a shelf life of four days in distilled water and different sucrose concentrations. However, overall water balance. The increase in fresh weight was best in flowers placed in 5% sucrose. Further, flowers placed in 5% sucrose with 150 ppm calcium nitrate had a shelf life of seven days. These flowers showed less transpiration loss, better water uptake, better water balance and thus exhibited improved shelf life (Table 2). According to Nagarajaiah and Reddy (1991) sucrose reduced the water uptake and water loss, while calcium and zinc increased both. The positive effective of preservative solutions containing sugars on cut flowers has been attributed to the ability of sugars to maintain respiration, contribute to the maintenance of osmotic potential of tissues and membrane integrity (Mayak and Halevy, 1980). Sodium benzoate has also been reported to have positive effect on improving post harvest shelf life of cut flowers. Sodium benzoate is used as a microbicide and helps in reducing microbial buildup and thus vascular blockage (Janick, 1986). The use of bactericides with their resulting reduction of bacterial population improves water balance, inhibits senescence and prolongs the vase life of flowers (Van Doorn and Perik, 1990). This is also noted in the study of vase life of Chinaaster by Singh et al., 2003. Use of Distilled water has been found beneficial in *Chrysanthemum* (Patel and Mankad, 2002). The present study indicated that socium benzoate (100 ppm) and calcium nitrate (150 ppm) were found to be better in improving the shelf life of *Calendula* and *Alyssum*.

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