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VASE LIFE AND QUALITY OF SPRAY CHRYSANTHEMUM (*Dendranthema grandiflora* 'Tzevlev') AS INFLUENCED BY FLORAL PRESERVATIVES

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ABSTRACT : An experiment was conducted to study the effect of floral preservatives on the vase life and quality of chrysanthemum. The seven treatments *viz.,* T_1 ($AgNO_3$: 75ml + Sucrose : 75ml), T_2 ($AgNO_3$: 50ml + 8-HQC 50ml + Sucrose: 50ml), T_3 (8-HQC : 75ml + Sucrose : 75ml), T_4 (8-HQC : 150ml), T_5 ($AgNO_3$:150ml), T_6 (Sucrose : 150ml), T_7 (Control- Distilled water : 150ml) were evaluated in Completely Randomized Design with three replications with 21 cut stems. The experimental findings revealed that the treatment T_1 ($AgNO_3$ + Sucrose) was most effective for maximum increasing in fresh weight on 3rd and 6th day, minimum reduction in fresh weight at senescence day, maximum solution uptake on 3rd day and at senescence day, maximum bud opening % on 9th day and observed maximum vase-life with this treatment.

Keywords : *Vase life, $AgNO_3$, sucrose, 8-HQC*

Chrysanthemum is one among the important commercial flower crops of the world which belongs to family Asteraceae or Compositae. In India, chrysanthemum is grown commercially and it occupies third rank. The cut flowers (rose, gladiolus, tuberose, chrysanthemum etc.) are in demand both locally, as well as in international market. Among these chrysanthemum is one of the important cut flower, grown on a wide range of soil and climatic conditions though it flowers best in warm and humid climate. In cut flower industry, post harvest handling is the important aspect, because about 20% losses are occur due to improper handling. Post harvest factors affecting quality of cut flowers generally are: depletion of carbohydrate, water relation, xylem blockage, ethylene temperature and relative humidity. There are many commercial materials of unknown formulation and sold under many brand name. However, the three basic components are water pH regulator, a food source and a biocide. Senescence is delayed by sucrose in many cut flowers like carnation (Koyama and Uda, 5), rose (Kuiper *et al.,* 1997) and gladiolus (Kofranek and Halenery, 4). The present experiment was conducted to as certain role of $AgNO_3$, Sucrose and 8-HQC in combination and alone on vase life enhancement of chrysanthemum.

MATERIALS AND METHODS

The present investigation was carried out in the laboratory of Department of Horticulture, Ch. Charan Singh University, Campus Meerut (U.P) India during 2011-12. The seven treatments *viz.,* T_1 ($AgNO_3$: 75ml + Sucrose : 75ml), T_2 ($AgNO_3$: 50ml + 8-HQC 50ml + Sucrose : 50ml), T_3 (8-HQC : 75ml + Sucrose : 75ml), T_4 (8-HQC : 150ml), T_5 ($AgNO_3$: 150ml), T_6 (Sucrose : 150ml), T_7 (Control-Distilled water : 150ml) were evaluated in Completely Randomized Design with three replications with 21 cut stems. The cut stems having a length 70-76 cm, on which some flowers are fully opened, some partial opened and some tight buds, were brought to the laboratory in a bucket containing fresh tap water. The cut stem ends were then re-cut to uniform length of 35cm (standard stem length) each and retained only four upper most leaves.

After recording the fresh weight of each cut stem, transferred into the flask containing 150ml vase solution of $AgNO_3$, 8-HQC, and Sucrose separately and their combined solutions according to treatments. The experiment was laid out at ambient conditions of room temperature (26±2°C temp.) and 50 to 75% relative humidity. The experiment was laid out in Completely Randomized Design (CRD), consisting 7 treatment combinations and replicated three times. The data were recorded and analyzed statistically.

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RESULTS AND DISCUSSION

Fresh weight change (g) & solution uptake at different day in vase (ml/cut stem)

The weight of cut stems & solution uptake were recorded at various stages *i.e.* 3rd day, 6th day, 9th day, 12th day and at senescence day in vase. The difference between fresh weight of cut stems and

weight of cut stems in vase at different stages were measured with the help of digital weighing balance and solution uptake measured with the help of measuring cylinder.

A perusal of Table 1 and 2 revealed that at 3rd and 6th day, maximum fresh weight change i.e. total gain was 5.23 g and 6.40 g, respectively under the treatment with $AgNO_3$ 75ml + Sucrose 75ml (T_1) followed by T_2 (4.17 g and 5.90g, respectively). The minimum weight (1.79g) at 6th day was recorded with T_3. The maximum and minimum solution uptake (21 ml and 8 ml/cut stem, respectively) at 3rd day was observed in T_1 and T_2, respectively. While at 6th day, maximum and minimum solution uptake (38.33ml and 18.67ml) was recorded in treatment T_2 and control, respectively. On 9th day, total weight gain (6.08g) was maximum with the treatment T_2 and it was minimum (0.10g) with T_3. On 9th day, maximum solution uptake (62.67ml/cut stem) was noted under T_2 followed by T_1. On 12th day, maximum fresh weight gain (6.50g) and maximum solution uptake (78 ml/cut stem) were recorded in treatment T_2.

Data recorded on fresh weight change at senescence day clearly show that all the treatments start the reduction in weight of cut stems. At senescence day, the maximum reduction in weight (–211.31g) was recorded under the treatment T_5 ($AgNO_3$ 150ml), while minimum reduction in weight (–0.30g) was recorded under the treatment T_2 ($AgNO_3$ + 8HQC + Sucrose). The solution uptake at senescence day by the cut stems significantly influenced by the different floral preservatives.

Table 1: Effect of floral preservatives (Sucrose, $AgNO_3$ and 8-HQC) on fresh weight change (g).

Treatments	Fresh weight of cut stems (g)	Fresh Weight Change (g.)				
		On 3rd day	On 6th day	On 9th day	On 12th day	At Senescence day
T_1- $AgNO_3$ @50ppm +Sucrose @5%	19.65	5.23	6.40	5.74	5.15	-5.83
T_2-$AgNO_3$ @50ppm +8-HQC @50ppm +Sucrose @5%	25.15	4.17	5.90	6.08	6.50	-0.30
T_3- 8-HQC @50ppm +Sucrose @5%)	21.71	1.67	1.79	0.10	-1.65	-8.30
T_4-8-HQC @50ppm	22.87	2.62	3.69	3.31	2.47	-7.26
T_5-$AgNO_3$ @50ppm	23.59	3.86	4.44	3.52	1.32	-11.31
T_6-Sucrose@5%	20.83	2.79	4.29	5.29	4.48	-2.67
T_6-Control (Distilled water)	21.98	0.86	-0.013	-4.11	-6.72	7.13
C.D. (P=0.05)	NS	NS	NS	6.137	6.148	NS

Table 2 : Effect of floral preservatives ($AgNO_3$, 8-HQC and Sucrose) on Solution Uptake (ml/cut stem).

Treatments	Solution Uptake (ml./cut stem)				
	On 3rd day	On 6th day	On 9thday	On 12th day	At Senescence day
T_1-$AgNO_3$ @50ppm +Sucrose @5%	21.00	33.33	51.67	65.67	137.67
T_2-$AgNO_3$ @50ppm +8-HQC @50ppm +Sucrose @5%	18.33	38.33	62.67	78.00	126.00
T_3-8-HQC @50ppm +Sucrose @5%	13.33	29.00	45.33	57.00	103.67
T_4-8-HQC @50ppm	10.67	24.00	40.33	51.33	101.33
T_5-$AgNO_3$ @50ppm	8.00	25.67	52.67	59.67	70.67
T_6-Sucrose @5%	10.67	24.67	35.33	38.33	38.33
T_7- Control (Distil water)	8.33	18.67	37.33	45.33	55.33
C.D. (P=0.05)	7.311	NS	NS	NS	28.448

Maximum solution uptake (137.67ml) by cut stem at senescence day was recorded under the treatment T_1 ($AgNO_3$ + Sucrose) followed by treatments T_2 ($AgNO_3$ + 8-HQC+Sucrose). As regards to the effect of various treatments of floral preservatives on cut stems of spray chrysanthemum, it is clear that on 3rd day and 6th day, the maximum increase in fresh weight, Solution uptake (ml.) were observed in the treatment T_1 ($AgNO_3$ + Sucrose) over the control (Distil water). It may due to the combined effect of $AgNO_3$ and Sucrose, where $AgNO_3$ act as bactericides which inhibits the growth of bacteria, cause of blockage of xylem vessels and stopped the supply of nutrients in solution form, while sucrose provides the energy, is essential for all physiological activities like absorption of water, respiration, transpiration etc. Similar findings were also observed by Sivasamy and Bhattacharjee (7) in chrysanthemum.

Bud opening (%) at different day in vase

It is evident from Table 3 that bud opening percentage of cut stems of chrysanthemum was influenced significantly by the different treatment combination. On 3rd day in vase, the maximum bud opening per cent (65.47%) was recorded in cut stems treated with treatment T_6 Sucrose (150 ml) followed by treatment T_5 ($AgNO_3$ 150 ml) where 59.20% bud opened. However, minimum bud opening (45.23%) was recorded under control. Bud opening per cent on 6th day in vase was maximum (85.74%) under the treatment T_6 followed by treatment T_4 (77.25% bud opened), while minimum bud opening (66.27% and 69.42%) was recorded under the treatment T_1 ($AgNO_3$ + Sucrose) and T_5 ($AgNO_3$), respectively. The maximum bud opening (87.36%) on 9th day in vase was recorded in cut stems treated with $AgNO_3$ + Sucrose followed by 8-HQC+Sucrose (83.66% bud opened). The minimum bud opening (69.42%) was recorded under the treatment T_5. On 12th day, the maximum bud opening (95.83%) was recorded under the treatment T_6 followed by treatment T_3 (87.37% bud opened. At senescence day, the maximum bud opening (100%) was recorded in cut stems treated with treatment T_6 followed by treatment T_1 where 91.07% buds were opened. The minimum bud opening per cent (78.80%) was recorded under the treatment T_2 ($AgNO_3$ + 8-HQC+Sucrose). Bud opening is completely depend on the cut stems energy, sucrose is the source of energy, which provide more energy to the cut stems and result more bud opened. Similar effect, the $AgNO_3$ + sucrose are recommended best solution for bud opening and increased vase life in chrysanthemum Gupta *et al.* (3).

Flower diameter (cm) and Vase life (days)

Flower diameter significantly influenced by different treatments (Table 4). Maximum flower diameter (6.43 cm) was recorded under the treatment T_2 ($AgNO_3$ + 8 - HQC + Sucrose) followed by T_1 (5.98cm). The minimum flower diameter (4.60 cm) was recorded under the control. Vase life of cut stems of spray chrysanthemum significantly influenced by

Table 3 : Effect of floral preservatives (Sucrose, $AgNO_3$ and 8-HQC) on bud opening, flower diameter and vase life.

Treatments	No. of buds /stem	Bud Opening %					Flower diameter (cm)	Vase life (days)
		On 3rd day	On 6th day	On 9th day	On 12th day	At Senescence days		
T_1-$AgNO_3$ @50ppm +Sucrose @5%	8.0	50.07	66.27	87.36	87.36	91.07	5.98	24.00
T_2- $AgNO_3$ @50ppm +8-HQC @50ppm +Sucrose @5%	7.33	52.69	71.39	75.09	75.09	78.80	6.43	21.00
T_3-8-HQC @50ppm +Sucrose @5%	8.00	52.85	75.20	83.66	87.37	87.37	5.03	15.00
T_4-8-HQC @50ppm	7.67	54.49	77.24	82.00	82.00	82.00	5.38	16.33
T_5-$AgNO_3$ @50ppm	8.67	59.20	69.42	69.42	79.61	78.94	5.91	14.00
T_6-Sucrose@5%	7.67	65.47	82.74	82.74	95.83	100.00	5.63	11.00
T_7-Control (Distil water)	6.67	45.23	74.60	74.60	84.92	84.92	4.60	17.67
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	0.742	3.038

different treatments (Table 4). Maximum vase life (24.00 days) was recorded under the treatment T_1 ($AgNO_3$ + Sucrose) followed by treatment with $AgNO_3$ + 8-HQC+Sucrose (21.00 days). The minimum vase life of 14.00 days was recorded under the treatment T_5 ($AgNO_3$).

The maximum flower diameter was recorded with treatment T_2 ($AgNO_3$ + 8-HQC + Sucrose), where $AgNO_3$ acts as an anti ethylene and also help in enhancing the flower diameter and vase-life of cut chrysanthemum. 8-HQC closes the stomata and reduces water loss (Stoddard and Miller, 8) and sucrose provides the energy and increase the vase-life and flower diameter of cut stems of chrysanthemum. Similar results were also reported by Bhattacharjee (1).The significant influence of sucrose and silver nitrate ($AgNO_3$) on the vase-life were also reported by Butt (2).

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