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Extension of vase life of cut chrysanthemum (*Chrysamthemum moriifolium* Ramat.) flower cvs. WHITE FIZII and PEACH FIZII

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ABSTRACT

With an objective of improving the post harvest life of cut chrysanthemum flower cvs. WHITE FIZII AND PEACH FIZII, were harvested when the flowers fully opened and taken to the laboratory within 24 hours after harvest. The flowers were treated with Aluminium sulphate ($Al_2(SO_4)_3$) (100, 200 and 300 ppm) and Cobalt sulphate ($CoSO_4$) (0.5, 1.0 and 1.5 m M). The best concentration obtained from previous trial was treated with sucrose (2 and 4 %). Finally, the best combination obtained from combining mineral salts and sucrose was incorporated with germicide, 8- Hydroxy Quinoline Sulphate (8- HQS) at 100 and 200 ppm. Among the treatments tested, 300 ppm $Al_2(SO_4)_3$ + 4 % sucrose + 100 ppm 8- HQS had recorded maximum vase life of 25.8 days in cv. WHITE FIZII as compared to 14.8 days in control and registered better water balance (+ 8.0) in comparison to control (- 10.0). Whereas, in case of cv. PEACH FIZII, 0.2mM $CoSO_4$ + 4 % sucrose not only showed increased vase life of 29.0 days against 19.2 days in control but also recorded positive water balance (+ 20.8) verses control (- 8.6).

Key words : Cut flower, Charysanthemum, Vase life

INTRODUCTION

Chrysanthemum (*Chrysanthemum morifolium* Ramat.) is grown for its attractive, elegant, decorative flowers with different colour shades. The termination of vase life of many flowers is characterized by wilting and senescence of petals. Cobalt has been shown to reduce transpiration rate, microbial growth, increase the water retention and at higher levels it is toxic for fungal growth (Venkatarayappa, 1983). Aluminium compounds acidify the holding solution and lower the pH thus, reducing microbial growth and development. In addition, aluminium ions affect the stomatal status by diminishing the opening and subsequently decrease the water evaporation. The aluminium sulphate acts as an effective bacterial filter (Put *et al.*, 1992). The main effects of sucrose were to inhibit the physiological deterioration, to maintain respiratory substrates and to enhance protein synthesis (Hayashi and Todoriki, 1996). The 8-HQS has strong inhibiting effects on fungi, yeast and bacteria.

MATERIALS AND METHODS

The cut chrysanthemum cvs. WHITE FIZII and PEACH FIZII flowers were received from the Dutch flowers for vase life study, which were harvested when the flowers fully opened and brought to the laboratory within 24 hours. The flowers were sorted out for uniform flower size so as to maintain uniformity within the replications. The stems were then cut to a uniform length of 50 cm and stripped off all but the top five pairs of leaves in both the cultivars. Then each flower stock was placed in a 500 ml bottle containing 250 ml of aqueous solutions of aluminum sulphate and cobalt sulphate used individually or in combination with sucrose and or 8- HQS, distilled water or deionized water as control.

Each treatment unit considered of five flowers with each flower represented a replication. Observations on water relations and vase life were recorded.

RESULTS AND DISCUSSION

In both the cvs. WHITE FIZII and PEACH FIZII, the maximum cumulative water uptake was recorded in treatment with $CoSO_4$. The treatments, 1.5µM (98.40g/fl) and 0.5µM $CoSO_4$ (106.80g/fl) recorded maximum cumulative water uptake as compared to control (58.00g/fl and 73.60g/fl) in cvs. WHITE FIZII and PEACH FIZII, respectively (Table 1). Cobalt ion suppress the microbial growth and development and thereby, reduces the vascular blockage. Similar results were recorded by Saradhi and Ram (1989). Treatment with 0.5µM $CoSO_4$ in both the cultivars resulted in positive water balance. This is in accordance with the results of Reddy (1988).

Among the treatments, the maximum vase life of 22.20 days was recorded in 0.5µM $CoSO_4$ in cv. White Fizii. The extension of vase life using $CoSO_4$ is attributed to cobalt ions acting as a inhibitor of ethylene biosynthesis and action (Halevy and Mayak, 1981). The Peach Fizii flowers recorded maximum vase life of 23.00 days in 300 ppm $Al_2(SO_4)_3$ vase solution. These results are in line with the observations made by Rajagopalan and Khadar (1993).

Among the different concentrations of $Al_2(SO_4)_3$and $CoSO_4$ the best concentration was selected and further

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Table 1 : Effect of mineral salts as vase solution on water relations and vase life of cut chrysanthemum flower cvs. WHITE FIZII and PEACH FIZII

Treatments	White Fizii				Peach Fizii			
	CWU (g/fl)	CWL (g/fl)	Balance	Vase life (days)	CWU (g/fl)	CWL (g/fl)	Balance	Vase life (days)
$Al_2(SO_4)_3$100ppm	52.80	58.00	-5.20	19.00	89.20	91.60	-2.40	21.40
$Al_2(SO_4)_3$ 200ppm	65.20	67.80	-2.60	17.80	67.80	69.60	-1.80	22.20
$Al_2(SO_4)_3$ 300ppm	74.40	76.40	-2.00	21.40	68.00	66.60	-1.40	23.00
$CoSO_4$ 0.5µM	92.40	87.80	4.60	22.20	106.80	102.00	4.80	21.40
$CoSO_4$ 1.0µM	95.20	96.60	-1.40	18.20	91.20	94.40	-3.20	20.20
$CoSO_4$ 1.5µM	98.40	101.60	-3.20	17.40	93.40	102.00	-8.60	19.40
Control	58.00	63.40	-5.4	17.40	73.60	82.20	-8.60	19.00
F. test	*	*		*	*	*		*
S.E. ±	1.23	0.89		0.30	0.98	1.23		0.75
C.D. (P=0.05)	3.58	2.60		1.47	2.85	3.56		2.19

* CWU: Cumulative water uptake CWL: Cumulative water loss

Table 2 : Effect of best concentration of mineral salts in combination with sucrose as vase solution on water relations and vase life of cut chrysanthemum flower cvs. WHITE FIZII and PEACH FIZII

Treatments	White Fizii				Peach Fizii			
	CWU (g/fl)	CWL (g/fl)	Balance	Vase life (days)	CWU (g/fl)	CWL (g/fl)	Balance	Vase life (days)
$Al_2(SO_4)_3$300ppm+ 2 % sucrose	63.20	66.20	-3.00	17.00	57.00	65.80	-8.80	15.00
$Al_2(SO_4)_3$300ppm+ 4 % sucrose	59.40	66.60	-1.20	23.40	65.40	65.00	0.40	25.80
$CoSO_4$ 0.5µM + 2 % sucrose	94.00	93.80	0.20	23.00	76.60	75.00	1.60	25.00
$CoSO_4$ 0.5µM + 4 % sucrose	92.00	86.80	5.20	23.40	142.40	121.60	20.80	29.00
Control	84.80	90.60	-5.80	17.00	73.60	82.20	-8.60	19.20
F. test	*	*		*	*	*		*
S.E ±	1.24	1.18		0.81	1.06	1.04		0.43
C.D. (P=0.05)	3.66	3.49		2.39	3.14	3.09		1.28

* CWU: Cumulative water uptake CWL: Cumulative water loss

combined with 2 and 4 % of Sucrose. In cv. PEACH FIZII, 0.2µM $CoSO_4$ + 2 % sucrose recorded maximum cumulative water uptake of 94.00g/fl, however, same concentration of $CoSO_4$ along with 4% sucrose accounted better positive water balance (5.20). Applications of sucrose exogenously into the vase solution resulted in positive influence of the water balance in roses (Yogitha, 1997) and in tuberose (Murali, 1990). This could be explained that effect of sugars on closure of stomata combined with decrease in water loss leading to decrease in transpiration (Van doorn, 1997).

In cv. WHITE FIZII, the maximum vase life of 23.40 days was recorded in holding solutions containing 300 ppm $Al_2(SO_4)_3$+ 4% sucrose and 0.5µM $CoSO_4$ + 4 % sucrose as compared to control (17.00 days) (Table 2).

In case of Peach Fizii, maximum cumulative water uptake of 142.40g/fl and progressive water balance of 20.80 was recorded in vase solution containing 0.5µM $CoSO_4$ in combination with 4 % sucrose. This combination also showed maximum vase life of 29.00 days as against control (19.20 days). Sucrose enhance the vase life by improving the role of cytokinins in delaying senescence of cut flowers by reducing the effect of ethylene action.

Between the two levels of sucrose tried with best concentration of mineral salts, the good comboination again tested with 100 and 200 ppm of 8-HQS. In White Fizii flowers, the holding solution consisting of 0.5µM $CoSO_4$ + 4 % sucrose +100 ppm 8-HQS recorded maximum cumulative water uptake of 78.60 g/fl. Whereas, vase solution comprising of 300 ppm $Al_2(SO_4)_3$+ 4% sucrose + 100 ppm 8-HQS showed better water uptake (8.00) and also recorded maximum vase life of 25.80 days (Table 3). The results are in parallel to the observation made by Yogitha (1997) in rose cv. Cream Prophyta.

In case of cv. PEACH FIZII the maximum cumulative water uptake (73.60g/fl) was observed in control. Inspite of 8-HQS is being bactericide reduced level of water uptake was noticed. This can be inferred that microbial contamination could be the explanation for the decrease in water uptake and this reduction may be due to a

Table 3 : Effect of best concentration of mineral salts and sucrose in combination with 8-HQS as vase solution on water relations and vase life of cut chrysanthemum flower cvs. WHITE FIZII and PEACH FIZII

Treatments	White Fizii				Peach Fizii			
	CWU (g/fl)	CWL (g/fl)	Balance	Vase life (days)	CWU (g/fl)	CWL (g/fl)	Balance	Vase life (days)
$Al_2(SO_4)_3$300ppm+ 4 % sucrose + 100ppm 8-HQS	75.00	67.00	8.00	25.80	64.20	58.20	6.00	26.20
$Al_2(SO_4)_3$300ppm+ 4 % sucrose + 200 ppm 8-HQS	70.80	69.60	1.20	24.80	60.40	53.60	6.80	24.00
$CoSO_4$ 0.5µM + 4 % sucrose + 100 ppm 8-HQS	78.60	74.80	3.80	24.20	62.20	67.00	-4.80	19.80
$CoSO_4$ 0.5µM + 4 % sucrose + 200 ppm 8-HQS	65.80	67.90	-2.00	18.40	47.20	51.60	-4.40	20.80
Control	58.00	68.00	-10.00	14.80	73.60	82.20	-8.60	16.00
F. test	*	*		*	*	*		*
S.E. ±	1.18	1.34		0.51	1.41	1.84		0.60
C.D. (P=0.05)	3.49	3.95		1.52	4.18	3.07		1.77

* CWU: Cumulative water uptake CWL: Cumulative water loss

physiological blockage and or varietal effect (Jones and Hill, 1993). The better water balance (6.80) was noticed in the treatment, 300 ppm $Al_2(SO_4)_3$+ 4% sucrose + 200 ppm 8-HQS. The maximum vase life of 26.20 days was recorded in the vase solution containing 300 ppm $Al_2(SO_4)_3$+ 4% sucrose + 100 ppm 8-HQS as compared to control (16.00 days). The results are similar to the results obtained by Garibaloli and Deambrogio (1993) in cut roses.

REFERENCES

Garibaloli, E. A. and Deambrogio, F. (1993). Effect of sucrose on post harvest physiology of rose cv. 'SEREENA'. *Acta Hort.*, **33** : 105-113.

Halevy, A.H. and Mayak, S. (1981). Senescence and post harvest physiology of cut flowers- II. *Hort. Rev.*, **3**: 59-143.

Hayashi, T. and Todoriki, S.(1996). Sugars prevent the detrimental effects of gamma irradiation on cut chrysanthemum. *Hort. Sci.*, **31**(1): 117-119.

Jones, R.B. and Hill, M. (1993). The effect of germicides on the longevity of cut flowers. *J. American Soc. Hort. Sci.*, **118** (3): 350-354.

Murali, T. P. (1990). Mode of action of metal salts and sucrose in extending the vase life of gladioli. *Acta Hort.*, **266**: 307-316.

Put, H.M.C., Klop, W., Clerkx, A.C.M. and Bokestein, A. (1992). Aluminium sulphate restricts migration of *Bacillus subtilis* in xylum of cut roses: A scanning electron microscope study. *Scientia Hort.*, **51**(3-4): 261-274.

Rajagopalan, A. and Khader, A. (1993). Effect of pulsing treatments on the vase life of chrysanthemum cut flowers. *South Indian J. Hort.*, **41**(1): 61-63.

Reddy, T.V. (1988). Mode of action of cobalt in extending the vase life of cut roses. *Scientia Hort.*, **36**(3-4): 303-313.

Saradhi, P.P. and Ram, H.Y.M. (1989). Prolongation of vase life of chrysanthemum blooms by cobolt chloride. *Acta Hort.*, **261**: 309- 312.

Vandoorn, W.G. (1997). Water relations of cut flowers. *Hort. Rev.* **18** : 1-85.

Venkatarayappa, T. (1983). Regulation of rose flower and bean leaf senescence, Ph. D. Thesis, University of Guelph, Ontario, Cannada.

Yogitha, N. (1997). Chemical regulation of bud opening of cut roses. M.Sc. Thesis, UAS, Bangalore (Karnataka).

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