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Studies on Chemical Preservatives Effect on Vase Life of Carnation Cut Flower CV. Soto

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ABSTRACT: *A study the effect of different chemical preservatives on vase life of Carnation (*Dianthus caryophyllus *L.) Cv. Soto carried out at Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere during 2011 and 2012. Vase life experiment was carried out with eight treatment combinations comprising three chemicals* viz., *Citric acid (200 ppm and 400 ppm), Cobalt Chloride (100 ppm and 200 ppm) and 8-HQS (200 ppm and 400 ppm), at two concentrations each along with a control and were replicated thrice. Sucrose @ 4 per cent was added for all the treatments. Vase solution containing Citric acid (200 ppm) improved the vase life of flowers of cut Carnation and sucrose synergized the effect of Citric acid. Water uptake and cumulative water uptake was recorded maximum in the vase solution containing Citric acid (200 ppm) along with sucrose (4 %) however, resulted in minimum transpiration loss. Hence, the same preservative solution i.e., Citric acid @ 200 ppm and Sucrose @ 4 percent resulted in maximum (12.00 days) of cut Carnation flower Cv. Soto. This was closely followed (11.00 days) by Citric acid (400 ppm) along with Sucrose (4%).*

Key words: *Carnation, Preservatives, Vase life*

INTRODUCTION

Carnation is one of the most important cut flower of the world belongs to the family Caryophyllaceae, having diploid chromosome number 2n=30. It is grown extensively in several parts of the world, which holds an esteemed position among the top ten cut flowers in the International trade and is believed to be originated in the Mediterranean region. Cut flowers of Carnation are sensitive to ethylene and senescence is accomplished by sequential rise in ethylene production by different flower parts.

Longevity of cut flowers is related to the maintenance of fresh weight, good water uptake and low transpiration loss, which can be obtained using certain chemical preservatives. Addition of Sucrose and anti-ethylene agents to the holding solutions and curtailing the growth of micro-organisms at the cut end of the stems could be an effective means to prolong vase-life. Cut flowers are precious products of horticulture. Maintaining good quality of cut flowers and extending the vase life are considered as prime important and practical for having acceptable products for the markets which strongly affects the consumer satisfaction and repeat purchasing finally influences the economic value of the cut flowers. For this reason, a considerable number of studies have been undertaken for this purpose. Water relation and balance play a major role in postharvest quality and longevity of cut flowers. Water relation interruption is mostly due to micro-organism proliferation in vase solution and occlusion in the basal end of the cut flower stem by microbes lead to blockage of xylem vessels thereby, accelerate senescence. Therefore, controlling and reducing microbial proliferation is a prerequisite for extending quality and longevity of cut flowersespecially Carnation is of prime importance. Hence, in order to overcome these constraints different chemical preservatives were tried on Carnation Cv. Soto at different concentrations to extend vase life cut flowers to the maximum extent.

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MATERIALS AND METHODS

Experiment was carried out at Department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere during 2011 and 2012 to study the effect of different chemical preservatives on vase life of Carnation (*Dianthus caryophyllus* L.) cut flower Cv. Soto.

The flower stems were harvested when buds were in paint brush stage in the morning. Soon after harvesting flowers were kept in fresh water and were pre cooled at 4 °C in order to remove latent heat. Later, these flower stalks were cut again to have a uniform stem length of 30 cm under water, the leaves were removed till sixth node and such prepared flowers were kept in conical flask containing 250 ml of the solution along with a control as tap water. Sucrose @ 4 per cent was added for all the treatments tried. The experimental data was collected by weighing flask with and without solution as well as with flower stalk were recorded every day. The data on flask with solution and with or without flower stalk were weighed every day, with this water uptake, cumulative water uptake and water loss was worked out separately. Flowers were observed daily till they were found unfit for containing in vase. Fading of one or two outer petals was considered as end of vase life of flowers and was expressed in terms of days from the date of harvested to final observation. The experimental data was analyzed for each treatment by following Completely Randomized Design (CRD) with three replications each of which had three flowers as experimental units.

RESULTS AND DISCUSSION

Chemical preservatives its effect on water uptake was found to be significant in Cv. Soto. The water uptake was recorded maximum in the vase solution containing Citric acid (200 ppm) plus Sucrose (4 per cent) during the entire period of vase studies, which was found to be superior over the other treatment combinations (Table 1). As Sucrose acts as a carbon source, maintains mitochondrial structure, function and improves water balance in cut flowers reported by [6 and 11]. Citric acid also reduces the risk of vascular blockage there alleviate water uptake and extend vase life of cut flowers through its anti-embolism trait [2].

The perusal of data on cumulative water uptake (Table 1) also showed the similar results of the highest (60.88 g) uptake by Citric acid vase solution. Citric acid increased the water uptake and decreased the transpiration loss from the treated stalks. Such action can be credited to the lowering of pH by Citric acid. It is also known as an acidifier which helps in maintaining water balance, by its bactericide action which inhibits the growth of micro-organisms and reduces the stem plugging [12].

Citric acid had a significant effect on transpiration rate of Carnation flowers compared to other treatment combinations. Citric acid (200 ppm) along with Sucrose (4 per cent) recorded minimum transpiration loss per flower throughout the vase studies by this way it helped in maintaining the fresh weight (Table 2). The preservative combination of Citric acid @ 200 ppm found to be the best for maintaining

Table 1
Effect of Chemical Preservatives on Uptake of Water (g/flower) by Carnation cut flower cv. Soto

Treatments	*Water uptake (in Days)*												*Cumulative water uptake (g)*
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	
Tap water	4.07	3.62	3.44	3.22	2.54	2.00	1.67	1.20	0.74	0.63	0.00	0.00	23.08
Sucrose 4 %	4.43	3.96	3.54	3.40	2.85	2.80	2.60	1.90	1.48	0.97	1.61	1.17	27.50
Citric acid @ 200 ppm + 4% Sucrose	6.13	6.53	6.36	6.25	6.01	5.85	5.50	5.24	4.81	4.36	3.06	2.37	60.88
Citric acid @ 400 ppm + 4 % Sucrose	5.66	5.84	5.46	5.23	5.14	4.99	3.97	3.37	2.34	2.67	1.67	1.23	47.18
Cobalt chloride @ 100 ppm + 4% Sucrose	4.39	4.93	4.50	3.91	3.60	3.42	2.02	2.57	2.18	1.43	1.71	1.27	35.61
Cobalt chloride @ 200 ppm + 4% Sucrose	5.07	5.00	4.89	4.68	4.58	4.15	4.09	2.17	2.71	2.33	1.67	1.07	42.32
8-HQS @ 200 ppm + 4% Sucrose	5.44	5.48	5.04	4.70	5.03	4.57	4.17	3.80	3.84	3.21	1.89	1.36	48.27
8-HQS @ 400 ppm + 4% Sucrose	4.34	4.13	3.85	3.48	3.38	3.28	2.51	2.83	2.37	1.83	1.67	0.93	36.70
S. Em±	0.37	0.42	0.41	0.37	0.38	0.40	0.59	0.33	0.33	0.42	0.38	0.21	0.24
CD@ 1 %	1.13	1.26	1.24	1.11	1.16	1.21	1.77	1.01	0.99	1.28	1.14	0.65	0.73

Table 2
Effect of Chemical Preservatives on Transpiration rate (g/flower) by Carnation cut flower cv. Soto

Treatments	*Transpiration rate (g/flower)*											
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Tap water	8.17	7.67	6.90	6.50	6.10	5.67	5.18	4.94	4.62	4.32	0.00	0.00
Sucrose 4 %	5.00	4.67	4.67	3.00	3.00	4.00	2.33	3.17	3.17	2.00	1.67	0.99
Citric acid @ 200 ppm + 4 % Sucrose	4.67	4.33	2.33	1.33	2.33	2.00	1.67	2.17	1.83	2.00	1.00	0.73
Citric acid @ 400 ppm + 4 % Sucrose	5.00	6.33	4.67	2.33	2.67	4.00	2.33	3.00	3.00	1.67	2.67	1.67
Cobalt Chloride @ 100 ppm + 4 % Sucrose	6.67	6.33	5.33	3.00	3.33	4.33	3.33	3.33	3.33	2.00	2.00	0.83
Cobalt Chloride @ 200 ppm + 4 % Sucrose	7.00	6.33	6.00	4.33	3.67	4.67	3.67	3.67	3.67	3.00	2.00	1.00
8-HQS @ 200 ppm + 4 per cent sucrose	6.50	4.74	5.99	2.89	3.07	3.83	2.07	2.50	2.37	1.17	2.77	2.43
8-HQS @ 400 ppm + 4 % Sucrose	7.00	6.00	5.63	5.40	5.20	4.97	4.70	4.10	3.80	3.42	3.87	2.87
S. Em±	0.53	0.46	0.64	0.43	0.38	0.39	0.40	0.24	0.28	0.24	0.33	0.14
CD @ 1 %	1.60	1.39	1.92	1.31	1.16	1.19	1.21	0.74	0.85	0.73	1.01	0.44

maximum fresh weight and minimum transpiration loss of water [11] hence, it is commercially advised for a number of cut flowers.

Vase life of Carnation cut flowers varied significantly in Cv. Soto (Table 3). Citric acid (200 ppm) recorded maximum (12.00 days) vase life and found superior to rest of the treatment combinations. Citric acid treatments extended vase life in association with inhibition of ethylene production also by scaling up the water uptake and maintaining water balance. Similar increase in vase life due to Citric acid had been reported in tuberose [1]. Pathogens also affect vase life due to vascular blockage. Citric acid reduces the stem plugging in turn increases the vase life of cut Carnation flowers of cultivar Soto. However, minimum was noticed in Cobalt chloride (100 ppm) followed by 8-HQS (400 ppm). The deleterious effects of Hydroxyl Quinoline were observed, which reduced use of Hydroxyl Quinoline in some flower crops.

Table 3
Effect of Chemical Preservatives on Vase Life (Days) in Carnation cut Flowers of cv. Soto

Sl. No.	*Treatments*	*Vase life*
1.	Tap water	9.00
2.	Sucrose 4 per cent	9.50
3.	Citric acid @ 200 ppm + 4 per cent sucrose	12.00
4.	Citric acid @ 400 ppm + 4 per cent sucrose	11.00
5.	Cobalt chloride @ 100 ppm + 4 per cent sucrose	9.33
6.	Cobalt chloride @ 200 ppm + 4 per cent sucrose	10.83
7.	8-HQS @ 200 ppm + 4 per cent sucrose	10.83
8.	8-HQS @ 400 ppm + 4 per cent sucrose	10.50
S. Em±		0.27
CD @ 1%		0.81

CONCLUSION

Among the different preservative solutions tried, Citric acid @ 200 ppm along with 4 per cent Sucrose was found to be the best vase solution for extending the life of cut Carnation in Cv. Soto. Adding Citric acid to cut flower preservation solutions, increases vase life and preserves cut flowers for a longer period. Through present investigation we can generally say that, Citric acid as natural, cheap, safe and biodegradable compounds can be suitable alternative chemical treatments in order to prolong vase life of Carnation (*Dianthus caryophyllus* L.) Cv. Soto which is a fact that would be much appreciated by the growers.

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