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Effect of Biocides {$AgNO_3$, $Al_2(SO_4)_3$, 8-HQC and Sucrose} on the Post Harvest Life of Carnation (*Dianthus caryophyllus* L.)

Ram Vilas, Pushpendra Kumar Karhana, Rakesh Kumar Meena* and Smriti Singh

Department of Horticulture, R.B. (P.G.) College, Muri Crossing Agra,

Dr. Bhim Rao Ambedkar University, Agra (U.P.)

*Corresponding Author E-mail: rakeshhorti.meena678@gmail.com

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ABSTRACT

A major cause of quality deterioration in cut flowers is the blockage of xylem vessels by microorganism that accumulate in the vase solution or in the vessels themselves. The vase life of cut flower carnation depends on the genotype and also influenced by different chemicals and sucrose added to the vase solution. The present investigation was carried out at department of the Horticulture in the faculty of Agriculture, R.B. (P.G.) College, Agra during the February 2011. The main objective of the study was to find out the best treatment in extending the vase life of carnation. The cut flowers were harvested at the commercial stage in the morning hours by pulling the space of 50–60 cm from the crown and kept in a bouquet containing tap water. After recording the fresh weight, all cut stems were kept in holding solution containing $AgNO_3$, 25 & 30 ppm , $Al_2(SO_4)_3$ 200 & 400 ppm , 8 HQC 20 ppm and 40 ppm , Sucrose 2 & 4 % and distilled water under the ambient condition at 22 ± 2 ^0C temperature and 60-80% relative humidity. There were total 9 treatments replicated five times. Thus, there were total 45 treatments, tested with the application of CRD (Complete Randomized Design). From the results of the present investigation it was found that 8-HQC 40 ppm solution was most effective in increasing cut carnation flower's vase life, diameter, solution uptake and fresh weight.

Key words: *$AgNO_3$, $Al_2(SO_4)_3$, 8-HQC, Sucrose and carnation*

INTRODUCTION

For the most part, carnations express love, fascination and distinction, though there are many variations dependent on colour. Carnation (*Dianthus caryophyllus* L.) is an important cut flower of Caryophyllacae family. It is the first cut flower grown commercially at high altitudes in the tropics for export to North America and Europe. Carnation has generated wide interest because of its ease of genetic manipulation, valued for its excellent keeping quality, wide array of coleus and forms, ability to withstand long distance transportation and remarkable ability to rehydrate after continuous shipping. Among the three i.e. spray and standard types the later belong to modem world crop with greater economic value in international market.

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Carnation is indigenous to Mediterranean area and grown in many countries. France, Netherlands, USA, Australia, Chile, Italy, Israel, South Africa, Germany, Japan and it has made roads into Indian floriculture Cut Carnation flowers often show wilting symptoms as well as bending of the stem just below the flower probably due to a low water potential, which causes vascular occlusion[3,8,13]. Increase is respiration and hydrolysis of cell components are the two major metabolic changes that lead to the petal senescence of cut carnation. Vascular occlusion is created which decreases water uptake in cut stems. Mostofi[9] and several workers have shown a sharp increase in the activity or some hydrolytic enzymes during petal senescence[5] including a drop in the level of macro-molecular components *i.e.*, starch and protein. Various antimicrobial compounds that have been used to extend the vase life of cut flowers are silver nitrate[10], Aluminium Sulphate, hydroquinoline compounds and cobalt salts**.** There are several reports of the damage of flowers induced by ethylene such as premature senescence and wilting of corolla. Since, ethylene plays a critical role in flower senescence, it is desirable either to check ethylene biosynthesis or to inhibit ethylene action the inhibitors used to inhibit the ethylene action are CO_2, silver ions and cyclic olefins whereas, amino-oxyving glycine and amoni-oxyacetic acid are used to check the ethylene biosynthesis. Several pre-harvest, harvest and post-harvest factors including genetic environmental and management factors influence post-harvest quality and longevity of cut carnation. of floral preservatives at all stages of flower handling and marketing is known to improve the flower quality, longevity and better consumer acceptability. The basis constituents of floral preservatives are: water to maintain turgidity, sugar as an energy source, a germicide to inhibit the growth of micro organisms, an acidifying agent for maintaining pH of vase solution and plant bio-regulators to reduce senescence.

MATERIALS AND METHODS

The experimental flowers were hold in the laboratory at about 22 ± 2°C ambient room temp, 72% (R.H.). Cool white fluorescent tubes, using a 12 hours photo period. A single experiment was conducted, with nine treatments, replicated 5 times. One cut spikes of carnation was taken for each replication to evaluate vase life of cut carnation flower. Holding solution with $AgNO_{3,}$ 25 & 30 ppm (T_1, T_2), $Al_2 (SO_4)_3$ 200 & 400 ppm (T_3, T_4), 8 HQC 20 ppm and 40 ppm (T_5, T_6), Sucrose 2 & 4 % (T_7, T_8) and distilled water (T_9) was used. Three chemicals *viz.* $AgNO_3$, $Al_2 (SO_4)_3$, 8-HQC (8-hydroxyquinoline citrate) & Sucrose were used to study the effect of vase life and quality parameters of cut carnation flowers. The stock solution of $AgNO_3$, $Al_2(SO_4)_3$, 8-HQC and sucrose made on 1000 ppm prepared by dissolving proportionate weight in gram of individual chemical in distilled water and final volume take up to up to 500 ml. and Observations Recorded Water uptake (g/cut carnation),Flower diameter (cm), Vase-life (days), Fresh weight (Percent of initial weight).

RESULT AND DISCUSSION

The water uptake by the cut carnation showed significant variation with different concentrations of $AgNO_3$, $Al_2 (SO_4)_3$, 8 HQC and Sucrose. Highest water uptake by cut carnation flower was observed with the treatment 8 HQC 40 ppm (T_6), while the minimum water uptake was recorded under control (distilled water).The result of present investigation is in the close proximity of the findings of Zhang *et al*[15] reported profound beneficial effect of chemical treatments on solution uptake over control. Similar results were also observed by Krishnappa and Reddy[7] and Shanan, *et al.*[11]. All the treatments influenced the floral diameter significantly but treatment T_6 **(**8-HQC 40 ppm) highly influenced the flower diameter as compared to other treatments under present investigation. *Verma, et al*[14].reported that the preservative solution increased flower diameter and petal area compared with distilled water. The trend of flower diameter in wheat plant in cut carnation was similar to that of reported by Avila and Pereyra[1] and the findings of Terek, *et al.*[12] showed that the greatest diameter of flowers was obtained with 30 g sucrose/litre. The floral preservative significantly increased the vase-life of cut carnation over the control. The longest vase life (11.20 days and 10.20 days) of cut carnation was observed with the treatment of $AgNO_3$ 25 ppm and 8 HQC 40 ppm respectively which significantly influenced the vase-life of cut carnation flower over all other treatments tested in present experiment. Maximum vase-life (days) has been obtained with $AgNO_3$ 25 ppm. The highest positive correlation coefficient was recorded between vase life and net water uptake. $AgNO_3$ increase water uptake, maintained a water balance, increase the fresh weight of flowers which finally contributed to the increased vase-life over all other treatments tested in this experiment. The minimum vase life was observed in control (distilled water).The above mention results are in close conformity with the findings of Feigel *et al*[4]. Similarly beneficial effects on the vase life with the application of silver nitrate with different concentration were also reported by and Kazemi, *et al.*[6] and Appreciably less weight was lost by the cut carnation flowers placed in holding solution of 8-HQC 40 ppm while the cut carnation flower with sucrose 4% solution reduced maximum weight followed by holding solution containing silver nitrate 30 ppm. Similar results were obtained by Chandrashekhar and Gopinath[2].

Table 1: Effect of Biocides {$AgNO_3$, $Al_2(SO_4)_3$, 8- HQC} and Sucrose on Uptake of Solution by cut carnation

Treatments	2^{nd} day	4^{th} day	6^{th} day	8^{th} Day	Average
$AgNO_3$ 25ppm (**T_1**)	7.38	7.84	8.84	9.38	8.36
$AgNO_3$ 30ppm(**T_2**)	7.26	8.36	8.46	8.94	8.26
$Al_2(SO_4)_3$ 200ppm(**T_3**)	6.96	7.14	7.46	8.16	7.43
$Al_2(SO_4)_3$ 400ppm(**T_4**)	5.74	6.56	7.24	7.50	6.76
8 HQC 20 ppm(**T_5**)	7.22	7.70	8.44	8.66	8.01
8 HQC 40 ppm(**T_6**)	7.82	8.22	8.60	8.90	8.39
Sucrose 2%(**T_7**)	7.06	7.28	7.46	7.42	7.31
Sucrose 4%(**T_8**)	7.18	7.56	7.76	7.88	7.60
Control (Distilled Water) (**T_9**)	5.80	6.66	6.98	7.54	6.75
SEm±	0.128				
CD at 5%	0.367				

Table 2: Effect of Biocides {$AgNO_3$, $Al_2(SO_4)_3$, 8- HQC} and Sucrose on Uptake of Solution by cut carnation

Treatments	Notations	Characters				
		Diameter (cm)	Vase life (days)	Fresh weight at harvest (g)	Fresh weight at the end of vase life (g)	Loss of weight (g)
$AgNO_3$ 25ppm	**T_1**	8.37±0.81	11.20± 0.84	22.72	19.52	3.20
$AgNO_3$ 30ppm	**T_2**	7.54±0.17	9.00±0.71	19.30	15.04	4.26
$Al_2(SO_4)_3$ 200ppm	**T_3**	7.32±0.26	8.60± 0.89	22.00	19.66	2.34
$Al_2(SO_4)_3$ 400ppm	**T_4**	7.34±0.49	8.40±1.14	22.94	20.62	2.32
8 HQC 20 ppm	**T_5**	8.06±0.59	8.80±0.45	24.30	22.12	2.18
8 HQC 40 ppm	**T_6**	8.51±0.49	10.20±0.84	23.70	22.52	1.18
Sucrose 2%	**T_7**	7.10±0.44	8.80±0.84	24.60	20.84	3.76
Sucrose 4%	**T_8**	7.63±0.27	8.20±0.45	25.60	20.80	4.80
Control (Distilled Water)	**T_9**	6.86±0.84	6.60±1.14	24.20	22.28	1.92
SEm(±)		0.051	0.051	0.123	0.053	0.089
C.D. (P=0.05)		0.146	0.146	0.353	0.153	0.254

CONCLUSION

From the results so obtain in the present investigation, it can be concluded that the 8-HQC 40 ppm solution was most effective in increasing flower's vase life, diameter, solution uptake and fresh weight of cut carnation. On the basis of improvement in these parameters the floral preservatives may be arrange in descending order as: $AgNO_3$ 25ppm >8-HQC 40 ppm> $AgNO_3$ 30 ppm>8 HQC 20 ppm> Sucrose 2%> Al_2 $(SO_4)_3$ 200ppm> Al_2 $(SO_4)_3$ 400ppm> Sucrose 4%>distilled water.

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