IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)
An International Open Access, Peer-reviewed, Refereed Journal

EFFECT OF PULSING SOLUTION ON QUALITY AND POST-HARVEST LIFE IN PP PACKAGED COLD STORED ROSE CUT FLOWERS CV. BORDEAUX

R. J. Makwana[1], B. K. Dhaduk[2] and Alka Singh[3]

[1] Assistant professor, Sheth D. M. Polytechnic in Horticulture model farm, AAU, Vadodara 390003
[2] Retired Professor, ASPEE College of Horticulture and Forestry, NAU, Navsari 396 450, Gujarat, India
[3] Principal & Dean, ASPEE College of Hort., NAU, Navsari,

Assistant professor, Sheth D. M. Polytechnic in Horticulture model farm, Anand Agricultural University, Vadodara, Gujarat, India Pin-390003)

Abstract: An experiment was conducted to study the effect of different pulsing solution *viz*., water, HQC 200mg/l, sucrose 50g/l + HQC 200 mg/l, citric acid 200mg/l, α-lipoic acid 200mg/l, GA_3 100 mg/l and BA 100mg/l on flower quality and vase life of PP (polypropylene) packaged cold storage (at 2°C) rose cv. Bordeaux, for the period of 10 days. Pre-storage pulsing of GA_3 100mg/l solution treatment showed highly promising results with maintained bud stage and flower quality just after storage and at 4^{th} DAS in vase life. Further, GA_3 100mg/l solution treatment recorded significantly, decreased physiological loss in weight after storage, higher water uptake and retention of fresh weight and maintained qualitative parameters like bud diameter and percent bud opening with increased quantitative parameters like MSI, TDS and dry weight as compared to other pulsed PP packaged stored (2°C) roses cv Bordeaux. Hence rose cut flowers pulsed in GA_3 100 mg/l solution for 3 hours retained best flower quality as well as recorded higher vase life in PP packaged cold stored rose cut flowers cv. Bordeaux.

Key words : Rose, Polypropylene, low temperature storage, Pulsing, GA_3, HQC

I. INTRODUCTION

Conventionally rose cut flowers are stored in wet storage for shorter time periods but storage of cut flowers during longer storage duration leads to advancement of flower stage which ultimately decreases the flowers marketable value. Dry storage of cut flowers with selective permeability of plastic films creates modified atmosphere packaging and helps in increasing storage life with maintained flower stage by reducing metabolic activities of the cut stems. Various poly packaging films was found to be most suitable to retain optimally high CO_2 and low O_2 levels inside packaging in gladiolus (Grover *et al.*, 2005), gerbera (Patel and Singh, 2009) and different rose cultivars (Makwana *et al.*, 2015a and Makwana *et. al.*, 2015b). In rose cv. Bordeaux Among various poly-films *viz.*, HDPE, LDPE and PP (polypropylene) best results were obtained in cold stored (2°C) rose cut flowers with PP packaging (Makwana *et al.*, 2024). A part from storage technique, pulsing treatment has also been known to increase the post-harvest life of cut flowers. Pulsing treatments constituting of germicides and sugar are used to improve flower opening, flower size, shape, colour and longevity of cut flowers (Singh *et al.*, 2007 and Vidhya Sankar and Bhattacharjee, 2002). The 8-HQ has been known to possess strong anti-microbial properties that eliminate vascular blockage and enhance water up take in flowers (Burdett, 1970). Rose cut flowers held in GA_3 at 150mg/l showed promising results from harvest to senescence (Bhattacharjee, 2000). Considering the immense importance of rose in domestic as well as overseas market, it is highly important to evaluate best pulsing solution that is suitable for packaging technology in cold stored rose cut flowers to improve flower quality and post-harvest life after storage. Hence, this experiment was planned to evaluate best pulsing solution suitable for polypropylene packaged cold stored rose cut flower.

II. MATERIAL AND METHODS :

Rose cut spikes of cv. Bordeaux were harvest fresh and moved from greenhouse and brought to the Floriculture Laboratory, ASPEE College of Horticulture and Forestry, NAU Navsari at an ambient room temperature (18-21°C). The experiment was laid down in completely randomized block design. There were total six treatments with each treatment was repeated three times. Cut spike of Cv. Bordeaux with uniform bud size, fresh weight (10±2 g) and stem length (50±5 cm) were selected and divided in to seven groups each having 30 flowers (10 in each replication) and are subjected to different pulsing solution treatment *viz.*, HQC 200 mg/l, Sucrose 50 g/l + HQC 200 mg/l, citric acid 200 mg/l, α lipoic acid 200 mg/l, GA_3 100 mg/l, BA 100 mg/l and water for 3 hour before storage. After pulsing treatment all the bunches were packed with PP packaging uniformly and moved to 2^0C cold storage for the duration of 10 days. After 10 day of storage, all the bunches were removed from cold storage and packaging were removed and stems were re cut 2 cm from the base and kept in distilled water at room temperature for taking observations and recording data.

Different postharvest parameters regarding quality of flowers were recorded at different intervals during vase life. Observations on post-harvest parameters like Change in fresh weight (%), water uptake (ml), bud diameter (cm) and percent bud opening (%) were recorded 2^{nd} and 4^{th} day after storage. Membrane stability index (MSI) and Total dissolve solids (^{o} brix) at 4^{th} DAS during vase life. MSI was calculated on the basis of electrolyte leakage (ion leakage) of petals. One ml of water was used to measure the TSS of the petals from the solution prepared for electrolyte leakage as per the method given by Franscistt *et al.*, (1971). Dry weight (g) was measured at the end of the vase life of cut flowers. The data recorded during the course of investigation were statistically analyzed (Panse and Sukhatme, 1978).

III. RESULT AND DISCUSSION

Pulsing treatment significantly influence Physiological loss in weight, change in fresh weight, water uptake, bud diameter, per cent bud opening, MSI, TDS, dry weight and vase life of the flowers (Table I). Among various pulsing solutions treated PP packed cold stored (2^oC) rose cut spikes cv. Bordeaux under observations cut flowers treated with GA_3 100 mg/l solution recorded significantly lower physiological loss in weight (2.15 %) just after storage and higher retention of fresh weight (14.61 % and 10.50 %), water uptake (77.51 ml and 59.58ml), bud diameter (2.85cm and 6.12cm) and percent bud opening (37.85% and 81.43%) at 2^{nd} and 4^{th} day after storage respectively. Moreover, same treatment recoded significantly higher MSI (81.97 %) and TDS (8.85 ^{o} brix) at 2^{nd} day after storage during vase life while higher dry weight (9.16%) of PP packed cold stored rose cut flowers. Whereas, GA_3 100 mg/l pulsing solution treated PP packaged cold stored rose cut flowers cv. Bordeaux recorded significantly higher vase life (6.88 days) which was at par with treatment P_2 (Sucrose 50 g/l + HQC 200 mg/l).

GA_3 enhance the liposomal permeability of the cell membrane to glucose (Wood and Paleg, 1972), hydrolyse starch, fructans and sucrose into glucose and fructose molecules (Salisbury and Ross, 1992). This might have facilitated the higher intake of the sugar in the cell, which further enhanced water uptake due to osmotic pull (Ho & Nichols, 1997). It also known to be involved in mobilization of stored food (Srivastava, 2005) and further, to increase water uptake and retention of fresh weight (van Doorn, 2004). Further antioxidant property of GA_3 contributed in stabilized cell membrane structure and thus reduced electrolyte leakage in the petal tissue as also reported in gladiolus (Dantuluri *et al.*, 2008), rose (Sabehat and Zeislin, 1994), in chrysanthemum (Elanchezhian and Srivastava, 2001). Enhanced bud opening and bud diameter can be attributed to better water balance in flowers due to high water uptake as explained earlier, high respiratory substrate for metabolic activities as a result of low PLW % after storage, high TDS as well as high MSI (Makwana *et. al.*, 2024). The enhanced vase life of rose cut flowers pulsed with GA_3 100 mg/l solution can be attributed to continued and increased water uptake, higher retention of fresh weight contributed to optimum continuation of the cell metabolism that facilitated cell growth and development, formation of cellular constituents and the liberation of energy for other cellular functions. Similar effects of enhanced postharvest vase life with GA_3 in gladiolus (Dantuluri *et al.*, 2008; Singh *et al.*, 2008) and delayed leaf and petal abscission in rose (Van Doorn *et al.*, 1994 and Ahmadi and Hassani 2015) has been reported earlier.

Table I: Effect of different pulsing solution on flower quality parameters in PP packaged cold stored rose cut flowers cv. Bordeaux

Treatment	PLW	Change in Fresh weight		Water uptake		Bud diameter		% bud opening		MSI	TDS	Dry weight	Vase life
		2nd DAS	4th DAS	2nd DAS	4th DAS	2nd DAS	4th DAS	2nd DAS	4th DAS				
P_0 (Water)	2.52	13.58	9.51	69.57	55.81	2.48	5.79	33.02	76.95	78.16	8.65	8.87	5.28
P_1 (HQC 200 mg/l)	2.39	13.79	9.63	70.65	56.63	2.53	5.81	33.69	77.28	78.63	8.68	8.91	6.30
P_2 (Sucrose 50 g/l + HQC 200 mg/l)	2.24	14.04	9.95	73.09	58.45	2.64	5.95	35.11	79.12	80.07	8.74	8.98	6.79
P_3 (Citric acid 200 mg/l)	2.38	13.68	9.76	71.69	56.85	2.54	5.84	33.75	77.66	78.34	8.69	8.89	6.21
P_4 (α-lipoic acid 200 mg/l)	2.46	13.76	9.75	72.86	57.05	2.53	5.82	33.58	77.33	78.37	8.70	8.93	6.23
P_5 (GA_3 100 mg/l)	2.15	14.61	10.50	77.51	59.98	2.85	6.12	37.85	81.43	81.97	8.85	9.16	6.88
P_6 (BA 100 mg/l)	2.27	13.93	9.73	72.70	58.12	2.58	5.87	34.24	77.99	79.47	8.73	8.97	6.45
S.Em. ±	0.01	0.13	0.08	0.89	0.27	0.03	0.03	0.43	0.45	0.45	0.02	0.04	0.04
CD at 5 %	0.04	0.38	0.22	2.58	0.77	0.09	0.10	1.25	1.31	1.29	0.07	0.12	0.12

IV. Conclusion:

In conclusion, GA_3 100 mg/l solution as pulsing treatment had a significant effect on increasing vase life of PP packed rose cut flowers cv. Bordeaux cold stored (2ºC) for 10 days and improving their quality of flowers by increase in retention of fresh weight, higher water uptake and opening of flower bud and therefore enhancing flowers quality and delaying senescence.

V. Acknowledgment

I convey the depth of my feeling and gratitude to my major advisor Dr. B. K. Dhaduk and to my advisory committee members Dr. Alka Singh and other for giving me proper guidance throughout the course of study.

References

Bhattacharjee, S. K. 2000. Postharvest life of "Eiffel Tower" cut roses and biochemical constituents of petal tissues as influenced by growth regulating chemicals in the holding solution. Haryana J. Hort. Sci., 29 (1/2): 66-68

Burdett, A. N. 1970. The cause of bent neck in cut roses. J. American. Soc. Hort. Sci., 95: 427-431.

Elanchezhian, R. and Srivastava G. C. 2001. Effect of growth regulators on senescence of chrysanthemum flowers. Indian J Plant Physiol, 6:233-243

Grover, J. K., Singh, K., Gupta, A. K. and Ashok K. 2005. Effect of pre-storage pulsing treatment on storage of gladiolus spikes under modified atmosphere. Indian J. Plant Physiol., 10 (3): 248-253.

Ho, L. C. and Nichols, R. 1997. Translocation of 14C sucrose in relation to change in carbohydrate content in rose corollas cut at different stages of development. Annals of Botany, 41:227-242.

Makwana R. J., Singh, A. and Neelima, P. 2015. Effect of cold storage techniques on flower quality and vase life of rose var. 'Sunking'. The Bioscan, 10(1): 1-4.

Makwana R. J., Singh, A, Ahlawat T.R. and Neelima, P. 2015. Standardization of low temperature storage technology with novel packaging techniques in rose cut flower cv. Passion. HortFlora Research Spectrum, 4(1): 44-47.

Makwana R. J., Singh A. and Dhaduk B.K. 2024. Effect of Low Temperature Storage Techniques on Post Storage Quality of Rose cvs. Bordeaux, Poison and Avalanche. Biological Forum – An International Journal, 16(1): 22-25.

Pastori, G. M. and Del Rio, L. A. 1997. Natural senescence of pea leaves. Plant Physil., 113 : 411-418

Patel, T. and Singh, A. 2009. Effect of different modified atmosphere packaging (MAP) films and cold storage temperatures (5, 10 and 15°C) on keeping quality of gerbera (*Gerbera jamesonii*) flowers. Acta Hort., 847 : 353-358.

Raju Dantuluri V.S., Misra R. L. and Singh V.P. 2008. Effect on polyamines on post harvest life of gladiolus spikes. Journal of ornamental Horticulture, 11(1); 66-68.

Sabehat A and Zeislin N. 1994. GA_3 effects on post harvest alteration in cell membranes of rose (Rosa x Hybrida) petals. Journal of Plant Physiology, 144: 513–7.

Salisbury, F.B. and Ross, C.W. 1992: Plant Physiology. Wadsworth Publishing Company, Belmont - California.

Singh, A., Dhaduk, B. K. and Desai, J. R. 2007. Post harvest Technology and Value Addition in Cut Flowers. Floriculture Today, 12 (4): 40-46.