INTERNATIONAL JOURNAL OF PROCESSING AND POST HARVEST TECHNOLOGY (December, 2010); 1 (2) : 77-80

RESEARCH PAPER

Received : Sept, 2010; Accepted : Oct., 2010

Effect of different holding solutions on post harvest life of Asiatic hybrid lily cv. 'APELDOORN'

B.P. SHARMA, H.M. BESHIR, B.S. DILTA AND Y.C. GUPTA

● ABSTRACT ●

The investigation entitled, "Effect of different holding solutions on post harvest life of Asiatic hybrid lily cv. Apeldoorn" was carried out in the field laboratory of Department of Floriculture and Landscaping, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni – Solan in the year 2007-08. The experiment was laid out in Completed Randomized Design (CRD) with sixteen treatments replicated thrice. It was observed that holding solution comprising of 2 per cent sucrose + 200 ppm 8-HQC + 50 ppm GA_3 resulted outstanding improvements in most of economical characters such as flower diameter (16.44 cm), opening of all flower buds, vase life (16.00 days), weight gain (18.31 %) and amount of holding solution consumed (125.50 ml) by the cut stems.

KEY WORDS : Asiatic hybrid lily, Holding solutions, Vase life

Sharma, B.P., Beshir, H.M., Dilta, B.S. and Gupta, Y.C. (2010). Effect of different holding solutions on post harvest life of Asiatic hybrid lily cv. 'APELDOORN', *Internat. J. Proc. & Post Harvest Technol.,* **1** (2) : 77-80.

● INTRODUCTION ●

The genus lilium belongs to the family *Liliacea* .The lilies are the showiest flowers of the plant world and being grown in borders, beds and pots. These are excellent cut flowers of magnificant appearance and beautiful colours. They are one of the leading cut flowers, occuping 4th position by turn over in cut flower trade (Sharma, 2007). Hybrid lilies are 'low volume' and 'high value' flower crops for growers to get considerably higher returns in short time periods. Most cut flowers have limited vase life owing to their moisture content, delicacy and tenderness .Due to high perishability, cut flowers are vulnerable to large post harvest losses upto 50 % of the farm value (Singh *et al.*, 2007). In recent years, a considerable progress has been made in the study of postharvest physiology and development of postharvest technology for extending longevity and improvement in the quality of cut flowers. In order to preserve the best quality flowers after harvest and making them tolerant to fluctuations in the environmental conditions, treatments with floral preservations have been recommended. These treatments can be given to the flowers during the entire marketing chain from growers to wholesalers, retail florists and finally to the ultimate users. Floral preservatives affect the quality of cut flowers by extending the vase life, increasing the flower size and maintaining the colour of leaves and petals. Commonly most preservative solutions consists of carbohydrates, germicides, ethylene inhibitors, growth regulators and some mineral compounds. Carbohydrates are the main source of nutrition for cut flowers and thus support the process fundamental in prolonging vase life *i.e.* maintainance of mitochondrial structure and functions and improvement in water balance by regulating transpiration. Keeping in view the above facts, the present study was therefore, undertaken to find out the best holding solution for prolonging post- harvest life of Asiatic hybrid lily cut flowers cv. APELDOORN.

Correspondence to:
B.P. SHARMA
Department of Floriculture and Landscaping
Dr. Y.S. Parmar University and Horticulture and Forestry,
Nauni, SOLAN (H.P.), INDIA

Authors' affiliations:
H.M. BESHIR, B.S. DILTA AND Y.C. GUPTA
Department of Floriculture and Landscaping
Dr. Y.S. Parmar University and Horticulture and Forestry,
Nauni, SOLAN (H.P.), INDIA

● MATERIALS AND METHODS ●

Under Nauni condition, the Asiatic hybrid lily cv. 'Apeldoorn' came into bloom during the first week of May, 2007. The stems were harvested about 15 cm above the ground level on 5th May, 2007, when the lowermost bud was fully coloured. One hundred and forty four good cut

stems of 45 cm length with three to five floral buds were prepared at this stage. Immediately after harvest, cut stems were put in the bucket containing water. The lower leaves of cut stems were removed and then fresh weight was recorded. These cut stems were placed in test tubes measuring 100 ml size with holding solutions comprising of sixteen treatment combinations *viz.,* 2% Sucrose along with 100 ppm, 200 ppm, 300 ppm of 8-HQC and 50 ppm, 100 ppm, 150ppm and 200 ppm of GA_3 were prepared and sucrose concentration being kept constant for all except the distilled water (control). 200 mg of each 8-hydroxy quinoline (8-HQ) and citric acid were weighed and dissolved separately in one litre of double distilled water. These two solutions were mixed together, that formed 100 ppm 8-HQC and hence, for the other treatments as well. Solution of GA_3 50 ppm was prepared by dissolving 50 mg GA_3 in one litre of water and in similar manner for others too. Two per cent sucrose being prepared by weighing 20 g sucrose and then was dissolved in double distilled water to make the final volume one litre.

The difference between the initial and final volume of solution at the end of vase life was recorded as amount of holding solution consumed (Bravdo *et al*., 1974). Number of days taken for opening of first flower bud was also recorded. Flower diameter was calculated by averaging the equitorial diameters of two flower buds at two places each after maximum opening. The vase life was determined by the number of days taken from placing of cut stems in holding solutions till wilting and falling off petals of two lower flower buds (Lee and Suh, 1996). Weight change was recorded at the termination of vase life by subtracting the initial weight from final weight and percentage worked out as:

$$\text{W.C.}(\%) = \frac{\text{Final weight of cut stems(g)} - \text{initial weight of cut stems (g)}}{\text{Initial weight of cut stems(g)}} \times 100$$

An appearance of cut blooms was recorded at an interval of two days after opening of two lower flower buds till they remained presentable. The colour change was observed as per colour chart of Royal Horticultural Society, London and flowers being graded as A, B, C based on points out of five.

● RESULTS AND DISCUSSION ●

It evident from the data presented in Table 1 that flowers on cut stems of Asiatic hybrid lily cv. APELDOORN opened earliest when placed in holding solution containing 2% Sucrose + 100 ppm 8-HQC + 50 ppm GA_3 as compared to control. It was observed that flowers in all the different solutions opened earlier as compared to control .This might be due to the fact that 8-HQC enhances solution uptake and hence increase turgidity of cells that expand and help to open early. On the other hand due to availability of different microorganism in distilled water and the reduced stem conductivity, the flower may open slowly (Larsen and Cromarty, 1967).

Largest flower size (16.44 cm) was found in cut stems treated with 2 % sucrose + 200 ppm 8-HQC + 50 ppm GA_3. This result was in accordance with findings of Song *et al*. (1996) and Sindhu and Pathania (2003) in other cultivars of Asiatic hybrid lily. The various holding solutions also increased the flower diameter over control. This might be due to the fact that sucrose served as substrate (Roger, 1973) while, 8-HQC avoided vascular blockage and it ultimately lead to increase in flower diameter. The increase in flower diameter in presence of GA_3 in the holding solution might be due to acceleration of cell elongation and maintenance of structural integrity of chloroplast membrane as well as stimulate photosynthesis (Salisbury and Ross, 1985). This might lead to an increase in petal length (Song *et al*., 1996) and accumulation of dry matter (Wittwer and Bukovac, 1958; Lukaszewska, 1997) that ultimately increased flower diameter. Holding solution comprising of sucrose, 8 HQC and GA_3 showed outstanding improvement in encouraging flower opening over control (30.35%). The present result is in line with the findings of Song *et al*. (1996) and Nowak and Hynett (1985 b) who reported similar outcome while working in other cultivars of Asiatic hybrid lily.

The best appearance of cut stems (4.75) was observed in holding solution containing 2 % sucrose + 100 ppm 8-HQC + 50 ppm GA_3 as compared to other treatments. On contrary, cut stems which was held in holding solution containing sucrose and 8-HQC showed poor appearance, even less than in cut stems which were held in distilled water. The result of these findings are in conformity with the findings of Marousky (1971) who reported that foliage on chrysanthemum stems held in sucrose + 8-HQC developed severe chlorosis that resulted poor appearance of cut stems. Inclusion of GA_3 in holding solution significantly improved the appearance of cut stems. This is because of the fact that GA_3 prevents flower fading and leaf yellowing by delaying the onset of senescence associated with proteolysis (Eason, 2002; Ranwala and Miller, 2002). Under the present study it seemed that negative effect of sucrose and 8-HQC causing foliage chlorosis might have been amended by the inclusion of GA_3 in the holding solution.

All the holding solutions tested in the experiment

Table 1 : Effect of different holding solutions on post- harvest life of Asiatic hybrid lily cv. 'APELDOORN'

Treatments	Days for flower opening (days)	Flower diameter (cm)	Unopened flower buds (%)	Appearance (freshness and colour)	Vase life (days)	Weight change (%)	Amount of holding solution consumed (ml)
T_1	2.00	14.17	30.55	3.00	9.89	-19.44	39.93
T_2	1.56	15.18	12.04	2.69	11.56	2.25	56.67
T_3	1.67	14.39	8.33	2.55	11.67	1.51	66.10
T_4	1.56	15.05	10.00	2.08	12.61	2.25	80.00
T_5	1.10	16.22	2.22	4.75	15.39	17.70	123.40
T_6	1.44	16.25	0.00	4.58	15.33	14.46	122.30
T_7	1.33	16.22	0.00	4.35	15.22	13.82	120.20
T_8	1.45	15.89	0.00	4.14	14.72	13.41	118.40
T_9	1.22	16.44	0.00	4.50	16.00	18.31	125.50
T_{10}	1.56	15.97	0.00	4.30	15.23	14.89	123.20
T_{11}	1.44	16.17	0.00	3.81	15.11	11.67	122.50
T_{12}	1.56	15.86	0.00	3.75	14.78	11.36	120.60
T_{13}	1.56	15.72	2.22	3.75	14.61	12.14	121.80
T_{14}	1.78	15.69	2.22	3.81	14.76	12.85	120.80
T_{15}	1.89	15.61	0.00	3.58	14.61	12.50	121.10
T_{16}	1.67	15.18	0.00	3.64	14.87	12.74	120.20
C.D. (P=0.05)	0.48	0.67	11.61	0.26	0.89	6.87	3.25

T_1 = Distilled water (control)
T_2 = 2 % sucrose + 100 ppm 8-HQC
T_3 = 2 % sucrose + 200 ppm 8-HQC
T_4 = 2 % sucrose + 300 ppm 8-HQC
T_5 = 2 % sucrose + 100 ppm 8-HQC + 50 ppm GA_3
T_6 = 2 % sucrose + 100 ppm 8-HQC + 100 ppm GA_3
T_7 = 2 % sucrose + 100 ppm 8-HQC + 150 ppm GA_3
T_8 = 2 % sucrose + 100 ppm 8-HQC + 200 ppm GA_3
T_9 = 2 % sucrose + 200 ppm 8-HQC + 50 ppm GA_3
T_{10} = 2 % sucrose + 200 ppm 8-HQC + 100 ppm GA_3
T_{11} = 2 % sucrose + 200 ppm 8-HQC + 150 ppm GA_3
T_{12} = 2 % sucrose + 200 ppm 8-HQC + 200 ppm GA_3
T_{13} = 2 % sucrose + 300 ppm 8-HQC + 50 ppm GA_3
T_{14} = 2 % sucrose + 300 ppm 8-HQC + 100 ppm GA_3
T_{15} = 2 % sucrose + 300 ppm 8-HQC + 150 ppm GA_3
T_{16} = 2 % sucrose + 300 ppm 8-HQC + 200 ppm GA_3

significantly increase the vase life of cut flower over control. The longest vase life (16.00 days) was registered in 2 % sucrose + 200 ppm 8-HQC + 50 ppm GA_3 holding solution. This may be due to the fact that cut stems in this treatment consumed highest amount of solution that helped to the flowers stay longer in the vase, as the volume of solution absorbed is directly correlated with vase life (Joti and Balakrishanamoorthy, 1999). These results are in accordance with the findings of Song *et al*. (1996) who explained that holding solutions containing 3% sucrose +200ppm8-HQC +50ppm GA_3 significantly extended vase life of Asiatic hybrid lily 1-8 times as compared to control. Among the different holding solutions, cut stems held in 2 % sucrose + 200 ppm 8-HQC + 50 ppm GA_3 recorded the highest percent weight gain (18.31%) over control.The treatment resulted maximum weight gain in cut stems exhibiting the longest vase life. This outcome is in conformity with the work of Marounky (1972) who reported that vase life paralleled with the changes in fresh weight of cut flowers. Although the magnitude of the change varied in cut stems in various holding solutions during the investigation showed some kind of weight gain except the control.This might be due to the fact that sucrose is used as nutrition (Marousky, 1972) while, 8-HQC prevent microbial growth and physiological vascular blockage as well as stimulate stomatal closure (Larsen and Frolich, 1969) that ultimately led to increase in the weight of cut stems. Moreover, weight gain by cut stems dramatically increased in the presence of GA_3 in the holding solutions ,accelerated cell elongation and maintained structural integrity of chloroplast membrane system as well as stimulated photosynthesis (Salisbury and Ross, 1985) and finally resulted in the increase in weight of stems. It was also observed that cut stems held in holding solution comprising 2% sucrose + 200ppm8-HQC+50ppm GA_3consumed higher amount of solution (125.50ml) over the flowers in control. This result is in accordance with Marousky (1971) who reported that vascular blockage was avoided by the inclusion of 8-HQC in holding solutions and hence cut flowers absorbed maximum amount of solution. The amount of solution consumed by the cut stems was significantly increased by far with the incorporation of GA_3 in the holding solution. This might probably be due to delay of senescence by

GA_3 that led to maintenance of metabolic activities including photosynthesis (Salisbury and Ross, 1985) and in combination with sugar enhanced the osmotic driving force of the cells by making the cells water potential more negative that increase solution uptake (Emongor, 2004). An increase in the concentration of 8-HQC and/or GA_3 did not show further significant increment in the absorption of holding solution by cut stems.

● LITERATURE CITED ●

Bravdo, B., Mayak, S. and Gravrieli, Y. (1974). Sucrose and water uptake from concentrated sucrose solution by gladiolus shoots and the effect of these treatments on floral life. *Canadian J.Bot.,* **52**: 1271-1281.

Eason, J. R. (2002). Sandersonia aurantiaca: an evaluation of post harvest pulsing solutions to maximize the flower quality. *New Zealand J. Crop & Horticultural Sci.,* **30**(4): 273-279.

Emongor, V. E. (2004). Effect of giberrllic acid on post harvest quality and vase life of gerbera cut flowers (*G. jamesonii*). *J. Agron.,* **3**(3): 191-195.

Joti, L. J. and Balakrisnamoorthy, G. (1999). Effect of pulsing and packing materials on post harvest life of rose cv. 'Happiness'. *South Indian J. Hort.,* **47**(1-6): 361-363.

Larsen, F. E. and Cromarty, R. W. (1967). Micro-organism inhibition by 8 Hydroxyquinoline citrate as related to cut flower senescence. *J. American Soc. Hort. Sci.,* **90**: 546-549.

Larsen, F. E. and Frolich, M. (1969). The influence of 8-HQC, N-dimenthylamino sucinamic acid and sucrose on respiration and water flow in 'Red Sim' cut carnation in relation to flower senescence. *J. Hort. Sci.,* **94**: 289-292.

Lee, A. K. and Suh, K. S. (1996). Effect of harvest stage, pre and post harvest treatments on longevity of cut lilium flowers. *Acta Horticulturae,* **414**: 287-293.

Lukaszewska, A. J. (1997). Improving keeping qualities of nerine cut flowers with preservatives. *Acta Horticulturae,* **420**: 223-226.

Marousky, F. G. (1971). Vascular blockage on increased moisture retention in cut rose induced by 8-Hydroxyquinoline citrate and sucrose. *J. American Soc. Hort. Sci.,* **96**: 38-41.

Marousky, F.G. (1972). Water relations, effect of floral preservative on bud opening and keeping quality of cut flowers. *Hort. Sci.,* **7**(2): 114-117.

Nowak, J and Hynett, K. (1985b). The effect of sucrose, silver thiosulphate and 8-Hydroxyquinoline citrate on the quality of lilium inflorescence cut at the bud stage and stored at low temperature. *Scientia Horticulturae,* **25**: 299-302.

Ranwala, A. P. and Miller, B. (2002). Effect of gibberellin treatments on flower and leaf quality of cut hybrid lily. *Acta Horticulturae,* **570**: 205-210.

Rogers, M.N. (1973). An historical and critical review of pos-harvest physiology researcl on cut flowers. *Hort. Sci.,* **8**(3): 189-193.

Salisbury, F. B. and Ross, C. W. (1985). *Plant physiology*. Words Worth Publishing Conf., California.

Sharma, P. (2007). New generation export oriented projects: ray of hope in Indian Floriculture. *Floriculture Today*, Sept. 64-74.

Sindhu, S. S. and Pathanis, N. S. (2003). Effect of pulsing, holding and low temperature storage on keeping quality of Asiatic lily hybrids. *Acta Horticultureae,* **624**: 389-394.

Singh, A. Dhadhuk, B. K. and Desai, J. R. (2007). Post harvest technology and value addition in cut flowers. *Floriculture Today*, Sept. 40-52.

Song, C., Bang, C., Chung, S., Kim, J., Lee, D and Lee, J. (1996). Effect of post harvest treatment and preservative solutions on vase life and flower quality of Asiatic hybrid lily. *Acta Horticulturae,* **414**: 277-285.

Wittwer, S. H. and Bukovac, M. J. (1958). The effect of gibberllins on economic crops. *Econ. Bot.,* **12**(3): 213-255

● ● ● ● ● ● ●