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Effect of Post Harvest Treatments on Keeping Quality and Vase Life of Asiatic Hybrid Lily cv. Arcachon

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ABSTRACT

An experiment was conducted at Model Floriculture Centre, G. B. Pant University of Agriculture and Technology, Pantnagar to study "effect of post harvest treatments on keeping quality and vase life of Asiatic hybrid lily cv. Arcachon" 2015-16. The experiment was laid out in completely randomized block design with nine treatments and three replications. The study reveal that the treatment aluminum sulphate @ 100 ppm was found significant effect on maximum days taken for basal (1.83 days) and upper (5.66 days) bud opening, diameter of basal florets (180.69 mm) and upper florets (167.21 mm), vase life of spike (16 days) and solution uptake (135 ml) as compared to control. The treatments were not affected number of bud per spike, length of spike (cm) and weight of spike (gm).

Introduction

Lily is most important bulbous flower in India as well as in world. It occupies second position in the world. It is used as cut flowers, pot plants and plant material used for park, landscape and garden decoration. The Netherlands has largest production area with 4000 hectares at global level (Benschop *et al.*, 2010). In India lilium are grown at hill region of Uttarakhand, Himachal Pradesh, Punjab and Jammu and Kashmir. Lilium are grown under polyhouse condition in Punjab, Trai region of Uttarakhand and Haryana.

Lily flowers have two whorls of colour floral leaves, called tepals. The inner whorl, consisting of three tepals, is homologous to the petals in flowers with petals and green sepals. The outer whorl, also consisting of three tepals, is homologous to the sepals in flowers with petals and sepals (van Doorn and Han, 2011). New groups of lily hybrids have been created during last 50 years by innovative hybrid breeding. Now lilium have thousands of cultivars which are classified in different hybrid groups (van Tuyl and Arens, 2011).

Major problem after harvesting of cut flowers as well as loose flowers is short vase life because they are highly perishable as compare to fruits and vegetables. So we have need to proper transport chain with preservatives which increase vase life of flowers. Short vase life of flowers is due wilting of petals, ethylene production, leaf yellowing and vascular blockage by air and micro-organisms (van Doorn (2011) and van Doorn and Han (2011). Preservative solutions provide energy source, prevent microbial growth and vascular blockage, increase water uptake of stems. Incorporation of different chemical preservatives to vase solution is recommended to prolong the vase life of cut flowers. Several researchers have used preservatives to improve keeping quality of flowers, application of ethylene inhibitor 1-methylcyclopropene (1-MCP) to prevent the effects of endogenous or exogenous ethylene (Blankenship and Dole, 2003), treatment with gibberellins or cytokinins (CKs), which delay leaf yellowing and may increase bud opening and flower life (Reid and Jiang, 2012). Treated by Salicylic acid (SA), Nickle (Ni), Cobalt (CO) and silver ions and sucrose (Kazemi and Ameri, 2012), K^+ and Ca^{2+} (Veen *et al.*, 1978) increase the vase-life by improving the membrane stability and reducing the oxidative stress damages during lily flower senescence (Kazemi and Ameri, 2012).

Common bactericides like as Aluminum sulphate, silver nitrate, silver thiosulphate and sodium thiosulphate are widely used as flower preservative. Silver thiosulphate competes with ethylene for the same site of action (Nowak and Rudnicki, 1990 and Asghari and Ahmadi, 2014) and therefore reduces the negative effect of ethylene.

Pulsing treatments in many lily flowers with the ethylene action inhibitor, $AgNO_3$ and silver thiosulfate (STS) induced extension of flower freshness and vase life (Zieslin, 1989 and Asghari and Ahmadi, 2014**)**. However work on effect of post harvest treatments on keeping quality and vase life of Asiatic hybrid lily is very limited. Keeping the above facts in view, the present investigation has been planned to study the effect of post harvest treatments vase life and flower quality of Asiatic hybrid lily.

Materials and Methods

The experiment was laid in completely randomized design with ten treatments and three replications. This experiment was conduct at Model Floriculture Centre, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (Uttarakhand). The treatments were sucrose @ 2 and 4% /L, Silver nitrate @ 30 and 60 ppm/L, Aluminum sulphate @ 100 and 200 ppm/L, Kinetin 50 and 100 ppm/L with one control. The crop was cultivated under 50 per cent shade net house condition with standard cultivation practices. The spikes of Asiatic hybrid lily cv. Arcachon were harvest 8–10 cm above from ground level at basal flower bud show 100 per cent colour develop stage. After harvesting the spike kept in cool running water to remove field heat. The length of spike varies from 58 to 69 cm as measured from the top of spike. The lower portion of stem was defoliate about 10 cm and 2-3 cm below portion of stem cut off under water to avoid air embolism before the stems were placed in vase solutions at room temperature ±25 ^{0}C and observation were recorded.

Results and Discussion

The significant differences were revealed among the treatments aluminum sulphate @ 100 ppm/L had maximum days to basal (1.83 days) followed by silver nitrate @ 30 ppm/L (1.50 days), sucrose @ 2 % per L (1.33 days) and aluminum sulphate @ 200 ppm/L (1.33 days 0 as compared to control (0.83 days). The maximum days taken for upper florets (5.66 days) opening followed by Silver nitrate @ 60 ppm/L (5.50 days), Kinetin @ 50 ppm/L (5.16 days) and Silver nitrate @ 30 ppm/L (4.46 days) as compared to control (2.83 days) (Table 1).

Table.1 Effect of post harvest treatments on flower quality characters and vase life of Asiatic hybrid lily cv. Arcachon

Treatments	Number of buds /spike	Length of spike (cm)	Weight of spike (g)	Delayed to basal bud opening (days)	Delayed to upper bud opening (days)	Diameter of basal florets (mm)	Diameter of upper florets (mm)	Vase life of spike (days)	Vase solution uptake (ml)
Sucrose 2%/L	3.33	69.00	120.26	1.33	2.83	176.13	165.60	15.00	123.33
Sucrose 4%/L	4.00	64.66	104.20	1.16	3.00	176.70	165.01	13.83	125.00
Silver nitrate @ 30 ppm/L	3.00	64.33	102.30	1.50	4.66	177.53	164.67	15.16	130.00
Silver nitrate @ 60 ppm/L	3.33	74.66	123.30	1.16	5.50	180.00	165.76	13.50	126.67
Aluminium sulfate @ 100 ppm/L	3.67	64.33	109.66	1.83	5.66s	180.69	167.21	16.00	135.00
Aluminium sulfate @ 200 ppm/L	3.67	63.00	110.93	1.33	5.33	176.82	165.35	13.66	128.33
Kinetin @ 50 ppm /L	4.33	58.00	99.26	1.16	5.16	174.28	165.98	13.00	126.66
Kinetin @ 100 ppm/L	3.67	66.66	111.20	0.83	3.00	171.98	164.49	11.83	128.33
Control	4.33	67.33	97.70	0.83	2.83	170.86	163.33	10.33	121.66
F-test	N/A	N/A	N/A	S	S	S	S	S	S
SE(m)	0.444	3.416	12.217	0.184	0.215	0.461	0.396	0.356	1.667
SE(d)	0.629	4.830	17.278	0.261	0.304	0.652	0.560	0.503	2.357

The maximum diameter of basal florets (180.69 mm) was found in treatment aluminum sulphate @ 100 ppm/L followed by Silver nitrate @ 60 ppm/L (180,00 mm), Silver nitrate @ 30 ppm/L (177.53 mm), Aluminum sulphate @ 200 ppm/L (176.82) and Sucrose 4%/L (176.70 mm) as compared to control (170.86 mm). The post harvest treatment also significantly affected the diameter of upper florets was obtained in treatment Aluminum sulphate @ 100 ppm/L (167.21 mm) after the Kinetin @ 50 ppm /L (165.93 mm) and Silver nitrate @ 60 ppm/L(165.76 mm) as compared to control. The highest vase life of spike was recorded in treatment Aluminum sulphate @ 100 ppm/L (16 days) followed by Silver nitrate @ 30 ppm/L (15.16 days) and Sucrose 2%/L (15.00 days) as compared to control (11.83 days) followed by Silver nitrate @ 30 ppm/L (130.00 ml) solution uptake (135 ml), Aluminum sulphate @ 200 ppm/L (128.33 ml) as compared to control (121.66 ml).

The short vase life of cut flowers was due to water stress due to growth of microbes and vascular blockage, high rate of transpiration and water loss (van Doorn, 1997), air embolism or microorganisms (Särkkä, 2005) after cut flower harvesting. The effect of bactericides are reduced the growth of bacteria, vascular blockage, maintained favorable conditions of water uptake, reduced water loss, inhibiting ethylene action and decrease in transpiration rate (Mori *et al.*, 2001, Zamani *et al.*, 2008, Mei-hua *et al.*, 2008 and Mohammadiju *et al.*, 2014). The preservative like as 8-hydroxyquinoline sulphate (8-HQS) and silver thiosulfate (Asghari and Ahmadi, 2014), silver nitrate + sucrose (Suh and Leh, 1996) and Nano silver and sucrose (Vinodh *et al.*, 2013) and combination of 8-HQC (200 $mg \cdot dm^{-3}$) and sucrose (20 $g \cdot dm^{-3}$) increased the keeping qualities i.e. vase life flower and inflorescence, rate of bud opening and flower diameter of complete flowering shoot of lily (Rabiza-Świder *et al.*, 2015).

Several research studies indicates that the bacterial proliferating in the vase water shortens the vase life of cut flowers (Liao *et al.*, 2001) and quality of flowers affected by the temperature but the use of aluminum sulfate is extending the postharvest life of flowers (Ichimura *et al.*, 1998) and 150 - 300 mgl^{-1} effective as reduce antimicrobial activity in stems Liao *et al.*, (2001). So that aluminum sulfate increase vase life and keeping quality of cut flowers has been proved in several experiments conducted by different research in different crop such as Cho and Lee (1979), Stigter (1981), Hassanpour *Asil et al.*, (2004), Seyf *et al.*, (2012) and Jowkar *et al.*, (2013) in rose and Jowkar *et al.*, (2012) in rose and carnation, Gowda, 1990, 1990b in gladiolus, Reddy and Singh (1996) in tuberose, Liao *et al.*, (2001) in *Eustoma grandiflorum*, Jamil *et al.*, (2016) in *Hippeastrum* cv. Apple Blossom, Singh *et al.*, (2016) in lilium.

In conclusion, aluminium sulphate @ 100 ppm was delayed to basal and upper florets opening increase diameter of basal florets and upper florets, vase life of spike and solution uptake as compared to control.

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