Enhancing Vase Life in LA Hybrid Lilies: An Exploration of Preservative Solutions and Varietal Influences

Abstract

The attraction of cut flowers lies in their aesthetic appeal, and among these, Lilium, or lilies, are renowned for their beauty and remarkable vase life. Vase life, the duration a cut flower remains fresh after harvesting, is a crucial factor for consumer satisfaction and commercial viability. Lilies, a significant economic crop, demand a thorough understanding of factors affecting their vase life. This research explored the impact of various preservative solutions on the vase life of two LA hybrid lily cultivars, Pavia and Arborifera. Notably, HQC 200 ppm demonstrated the highest water uptake, extended days until drooping, petal discoloration, and petal shriveling. Additionally, HQC 200 ppm treatment resulted in the longest vase life. These findings contribute to improving post-harvest practices for lilies and enhancing the floral industry's economic returns.

Key word:Vase Life, LA Hybrid Lilies, Varietal Influences , cut flowers

Introduction

The allure of cut flowers transcends mere aesthetics, touching the human soul with their natural beauty and fragrant elegance. Among the plethora of flowering plants cultivated for their ornamental value, Lilium, commonly known as the lily, stands as an epitome of grace, splendor, and timeless charm. The popularity of lilies as cut flowers is not only attributed to their exquisite petals and enchanting scent but also to their remarkable vase life, making them a perennial favorite among florists, event planners, and flower enthusiasts (Lucidos*et al.*, 2013).

The vase life of Lilium is of paramount importance not only from a decorative standpoint but also for the cut flower industry. Cultivated on a global scale, lilies have become a significant economic crop. Maximizing their vase life not only extends the period of customer enjoyment but also plays a pivotal role in reducing post-harvest losses and enhancing the economic returns for growers and florists.

Furthermore, the vase life of lilies is influenced by various pre- and post-harvest factors, including cultivar selection, growing conditions, harvesting techniques, transportation, and handling protocols. Scientific endeavors aimed at unraveling the mysteries of Lilium vase life have provided insights into the physiological and molecular processes involved. Research in this domain has opened doors to innovative practices and treatments that can extend the vase life of lilies and, by extension, other cut flowers.

It has been observed that there are several ways to prolong the vase life of cut flowers and maintain their freshness. As one of the primary access places for organisms that cause decay, cut flowers should be free of any deterioration (Hardenburg, 1968). The occlusion of xylem vessels by air and bacteria, which results in xylem degradation, is a significant factor in the deterioration of cut flowers (Hardenburg, 1968). According to Nowak and Rudnicki (1990), the 8-HQS is an important germicide in the preservatives used in the floral sector. It also functions as an antibacterial agent, which might lead to an increase in water uptake. While 8-HQS treatment reduced the formation of microorganisms in the xylem vessels of the cut flower stems and maintained water uptake, it also increased the vase life and fresh weight (% of initial) of the cut flowers. However, the 8-HQS treatment was more successful when

combined with sugar (Pun and Ichimura, 2003). Since the flowers are highly perishable, it is necessary to treat them with the proper chemicals to prolong their vase life and improve quality. Through a hormonal action, sucrose has the ability to speed up flower opening and prolong senescence in cut lily flowers (Arrom*et al.*,2012). Compared to flowers kept in a solution without sucrose, the presence of 2 % sucrose accelerated the chlorosis of lily leaves.

The present study embarks on a comprehensive exploration of the vase life of Lilium cut flowers, delving into the intrinsic and extrinsic factors that impact their post-harvest quality. By shedding light on the latest research findings and practical insights, this paper underscores the significance of understanding and enhancing the vase life of lilies in the cut flower industry. Through this exploration, we seek to contribute to the ongoing efforts to maximize the longevity of these enchanting blooms and ensure their enduring appeal in the world of cut flowers.

Material and Methods

The experiment was conducted in the lab of Department of Horticulture, CCSHAU, Hisar (Haryana). Two LA hybrid lily cultivars Pavia (Yellow) and Arborifera(Pink) were selected for the experiment. The fresh cut flower spikes at the colour break stage for the experiment were collected from the plants grown in the experimental plot under polyhouse condition at the research farm of the university. Distilled water (Control), Salicylic acid (150 ppmi.e., dissolving 150 mg Salicylic acid in 1L distilled water), Hydroxyquinoline citrate (HQC 200 ppm) and Sucrose (3%) were used for the vase life experiment. Immediately after harvest these were kept in the plastic buckets containing cool water so that the basal part of the flower spikes was immersed in water. Then these were taken to the department laboratory and were kept in conical flask of 500ml size containing 500 ml of distilled water in vertical position under ambient condition. Three replications of the Completely Randomized Block Design (CRD) were used to perform the study. Two spikes were kept per variety per replication and the average of these two was taken for analysis. Observations like Water uptake (ml), Days were taken into account for flower drooping, petal discoloration, petal shriveling, and vase life (days) from the first day to end of the vase's life. Statistical analysis was performed on all vase life data. Flowers in vases were inspected as needed and kept doing so until the end of the flower's vase life. A table with the analysis of variance was created. The effects were examined using a "F" test with a 5% level of significance. For the purpose of comparing the treatment means, the crucial difference at the 5% level was determined.

Fig.1 Lab view of the experiment

Result and Discussion

In the study, an investigation was conducted to assess various vase life parameters, including water uptake, days until flower drooping, days until petal discoloration, days until petal shrivelling, and overall vase life, across different lily varieties using various preservative solutions. The findings revealed that the application of different chemical solutions had a significant impact on water uptake by the flowers. Notably, flowers treated with HQC 200 ppm exhibited a higher water uptake capacity compared to the control, which absorbed 194.1ml of water (Table 1). This difference in water absorption can be attributed to the flowers' reduced ability to uptake water when placed in a vase due to potential vascular blockages, primarily at the stem base. These findings align with prior research by Soad*et al.* (2011), which observed a reduction in water absorption by cut flowers, potentially resulting from the proliferation of microorganisms causing vascular blockages in the stems of gerbera flowers during their vase life. Anjum*et al.* (2001) reported similar outcomes in the case of tuberose.

The study also noted variations in the days taken for flower drooping, with the highest duration observed in HQC 200 ppm (18.1 days), while the control group (T1) displayed the shortest period for water absorption (14.1 days) (Table 1). T_3 HQC 200 ppm exhibited the lengthiest duration for petal discoloration (10.0 days), whereas T1 control recorded the shortest duration for flower drooping (7.1 days). Regarding petal shrivelling, the maximum duration was also observed in T_3 HQC 200 ppm (13.1 days), statistically similar to T2 salicylic acid (12.9 days), while the minimum duration for petal shrivelling was observed in the flowers of the T1 control group (10.1 days). (Table 2)

Moreover, the vase life of the flowers was evaluated, revealing significant differences among the groups. The control group (T1) displayed the shortest vase life (8.1 days), while the flowers treated with T_3 HQC 200 ppm showcased the lengthiest vase life (12.1 days) (Table 3). This divergence may be attributed to enhanced water uptake by the flower stems, preventing vascular blockages and subsequently extending the vase life. These findings align with the results of a study conducted by Dineshbabu*et al.* (2002), which demonstrated that holding solutions incorporating 8-HQC and sucrose improved the quality and longevity of dendrobium flowers. The application of salicylic acid and 8-HQC 200 ppm likely played a role in reducing microbial growth and averting vascular blockages, ultimately prolonging vase life and enhancing the turgidity of the flower stems. These findings were consistent with previous research that indicated infections affecting water uptake and contributing to vascular blockages in floral stems (Vahdati*et al.*, 2012).

Furthermore, among the lily varieties assessed, "Arborifera" exhibited maximum water uptake (149.0 ml) and recorded the most extended durations for flower drooping (17.7 days), petal discoloration (9.2 days), petal shrivelling (12.7 days), and overall vase life (11.4 days). Additionally, higher levels of leaf chlorophyll were observed in "Arborifera," which was associated with increased carbohydrate storage, thereby promoting both vegetative and floral characteristics, such as flower bud length, flower bud diameter, flower diameter, and vase life. The additional food production by the leaves facilitated improved vegetative and reproductive growth of "Arborifera," consistent with previous studies by Zubair*et al.* (2006), and Javvad*et al.* (2012).

These findings underscore the significance of the study's contributions to understanding and enhancing vase life parameters in lilies, offering valuable insights for the floral industry and contributing to the scientific understanding of floral physiology.

Table 1: Effect of preservatives on water uptake (ml) and flower drooping (days) in LA hybrid lily

	Water Uptake (ml)			**Flower Drooping (Days)**		
Treatments	**Pavia**	**Arborifera**	**Mean**	**Pavia**	**Arborifera**	**Mean**
T_1 : Control (distilled)	116.3	121.3	118.8	12.8	15.4	14.1
T_2: Salicylic acid (150ppm)	133.7	146.2	140.0	15.8	18.1	17.0
T_3 : HQC(200ppm)	193.9	194.3	194.1	16.7	19.5	18.1
T_4 : Sucrose (3%)	126.3	134.2	130.3	14.4	17.9	16.2
Mean	142.6	149.0		14.9	17.7	
CD at 5%	**P=4.5**	**V=3.2**	**P × V= NS**	**P=0.7**	**V=0.5**	**P × V= 1.0**

Table 2: Effect of preservatives on petal discoloration and petal shrivelling in LA hybrid lily

	Petal Discoloration (Days)			**Petal Shrivelling (Days)**		
Treatments	**Pavia**	**Arborifera**	**Mean**	**Pavia**	**Arborifera**	**Mean**
T_1 : Control (distilled)	6.5	7.7	7.1	8.7	11.5	10.1
T_2: Salicylic acid (150ppm)	8.5	9.8	9.2	12.5	13.2	12.9
T_3 : HQC(200ppm)	9.4	10.5	10.0	12.6	13.6	13.1
T_4 : Sucrose (3%)	7.8	8.7	8.3	11.1	12.6	11.9
Mean	8.1	9.2		11.2	12.7	
CD at 5%	**P=0.5**	**V=0.3**	**P × V= 0.6**	**P=0.5**	**V=0.4**	**P × V= 0.7**

Table 3: Effect of preservatives on vase life (days) in LA hybrid lily

Treatments	**Pavia**	**Arborifera**	**Mean**
T_1 : Control(distilled)	7.1	9.5	8.3
T_2 : Salicylic acid (150ppm	9.5	11.6	10.6
T_3 : HQC(200ppm)	10.6	13.6	12.1
T_4 : Sucrose (3%)	8.6	10.9	9.8

Mean	9.0	11.4	
CD at 5%	**P=0.4 V=0.3 P × V= 0.6**		

Conclusion

In conclusion, the study delved into the vase life parameters of LA hybrid lilies, examining the impact of various preservative solutions. The findings revealed that flowers treated with HQC 200 ppm exhibited superior water uptake, prolonged flower drooping, delayed petal discoloration, and extended petal shrivelling. Additionally, the same treatment led to the longest vase life. These outcomes were particularly pronounced in the Arborifera lily variety.

The study underscores the critical role of preservative solutions in enhancing the post-harvest quality and longevity of LA hybrid lilies. The findings hold significant practical implications for the cut flower industry, offering insights into optimizing vase life and post-harvest management of lilies. Further research in this area has the potential to contribute to the commercial success of lily cultivation, benefiting both growers and consumers alike.

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