



Research Article

Morphological Comparison of Oriental Lily (*Lilium longifolium*) Cultivars Grown in Four Production Systems in Pothwar Region, Pakistan

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Abstract | The field experiment aimed to evaluate the growth response of three Lilly cultivars (Sorbonne, Montezuma, and Crystal Blanco) under four cultivation conditions: open field, shade lath house, green shade netting, and polyethylene tunnels. The study was conducted at the Cut Flower Production and Technology Dissemination Islamabad, Pakistan) using a randomized complete block design (RCBD) with factorial arrangements. All plant growth parameters were measured at maturity. Results demonstrated that variety Crystal Blanco exhibited the greatest plant height (86.9 cm) under green shade netting. This cultivar also produced the thickest stems (8.4 mm) under both shade lath house and green netting conditions. Additionally, Crystal Blanco displayed the largest leaf area (153.9 cm²) when grown in polyethylene tunnels. The maximum number of leaves per plant (38) was observed for Crystal Blanco cultivated in a greenhouse environment. Notably, the number of flower buds per plant did not exhibit significant variation across growing conditions, although Crystal Blanco again displayed a trend of superior performance. The largest bud diameter (20.2 mm) was recorded for Crystal Blanco grown under green netting. Crystal Blanco cultivated in a shade lath house demonstrated the longest vase life (8 days). In conclusion, this investigation suggests that the Crystal Blanco cultivar exhibited superior growth performance compared to the other two cultivars under both green shade netting and polyethylene tunnel in Pothwar region of Pakistan. Further research is warranted to elucidate the underlying physiological mechanisms responsible for the enhanced performance of Crystal Blanco under these specific growing conditions.

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Introduction

Lilium is a bulbous flower comes on sixth number in genera produced worldwide (Hertogh and Nard, 1993). Lilium is a cut flower with perennial growing habit and belongs to family Liliaceae. The cut flower has great economic importance in the international cut flower market (Jimenez *et al.*, 2012). Due to its size, beauty and longevity Lilium is one of the ten most superior cut flowers in the world (Thakur *et al.*, 2005). It's highly demanded all over the world due to its ornamental and medicinal value, since centuries it has been growing as ornamental plant. Genus lilium includes almost 100 species and its native to Asia, Europe and America (Rae, 1998). Lilium has a wide range of shapes and colors produced via technique of interspecific hybridization. These hybrids are in great increasing demand especially Asiatic and oriental types as cut flower and pot plant (Lian *et al.*, 2003). The Netherlands is the global leader in cultivating lilies, dedicating the most land to this crop at roughly 3,699 hectares. France follows in second place with a production area of 438 hectares, while Chile comes in third, cultivating lilies on 240 hectares of land (Anonymous, 2009).

Improved varieties/ hybrids are one of many factors responsible for growth, yield and quality of flowers, including lilium, which plays a significant role that need proper evaluation for their performance under local agro-climatic condition (Sharma *et al.*, 2018). Lilium is amazingly attractive ornamental plant with varied significance grown on border or planted in lines along formal footpaths, beds, and beautiful pots. Lilies are beautiful cut flowers of superb appearance with enormous color range, fragrance and adaptability to several environmental conditions.

Lilies (Lilium) are gaining popularity in Pakistan due to their vibrant colors, long vase life, and high market demand. This demand has historically been met through imports, but Pakistani growers are now starting their own cultivation efforts. However, a lack of information on local production techniques is a significant hurdle. In recent years, Oriental and Asiatic lilies have become increasingly popular as ornamentals and potted plants, with both hobbyists and professionals incorporating them into their gardens. Despite this growing interest, many growers remain hesitant due to limited knowledge about cultivating lilies. Recognizing the ideal climate

conditions of the Pothwar region for ornamental plants, this study aimed to evaluate four Oriental lily cultivars under different growing conditions within this area.

Materials and Methods

This study, conducted between December 2018 and February 2020 at the Horticultural Research Institute for Floriculture and Landscaping in Islamabad, Pakistan, investigated the performance of three Oriental lily varieties under four different growing conditions. The selected varieties were Sorbonne, Montezuma, and Crystal Blanco. The experiment employed a Randomized Complete Block Design with four growth conditions: Open field, lath house, green net, and polytunnel. Plant bulbs were sourced from a reputable seed dealer in Lahore and brought to Islamabad. Before planting, the bulbs were stored at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 48 hours. Each plot was prepared thoroughly, and bulbs were planted 7.5 cm deep with 20 cm spacing between plants and 60 cm spacing between rows. Ten bulbs of each variety were planted in each replicate, with three replicates per treatment. Standard cultural practices such as hoeing, weeding, staking, irrigation, and integrated pest management (IPM) were applied uniformly across all treatments.

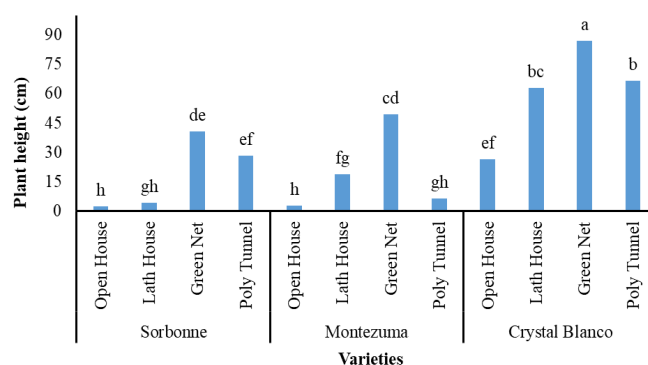


Figure 1: Plant height (cm) of varieties under different growth conditions.

Results and Discussion

Plant height was maximum in case of crystal blanco under greenhouse condition which was observed 86.9 cm, followed by 62.9 cm in same variety under lath house, while the minimum plant height was observed in sorbonne under lath house which was 4 cm (Figure 1). From the data recorded it is clear that the environmental condition plays a major role in growth and development of different ornamental plants.

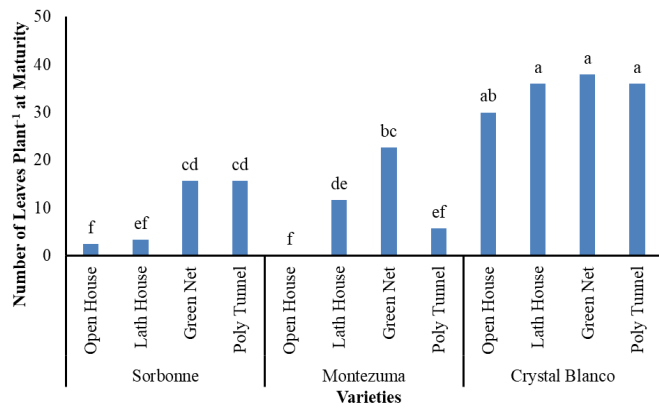


Figure 2: Number of leaves of varieties under different growth conditions.

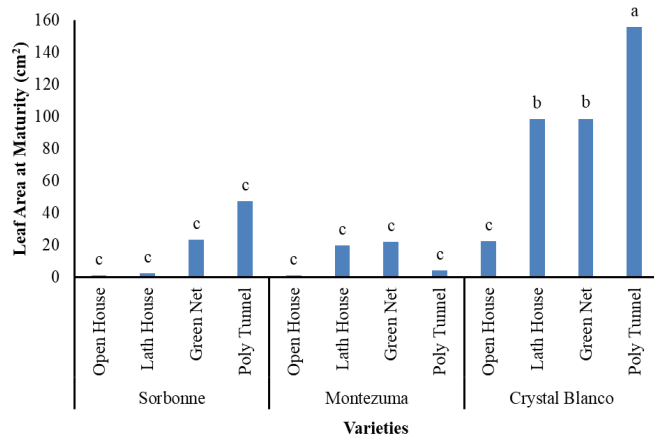


Figure 3: Leaf area cm² of varieties under different growth conditions.

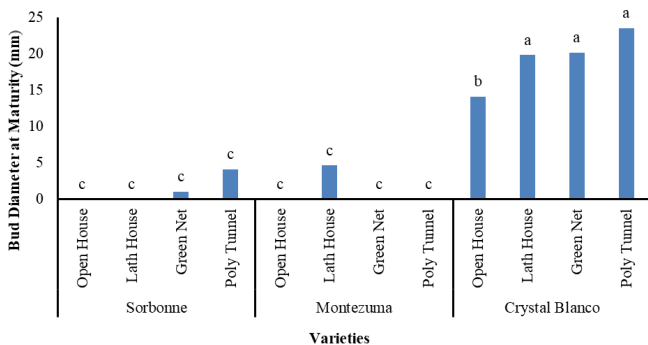


Figure 4: Stem diameter (mm) of varieties under different growth conditions.

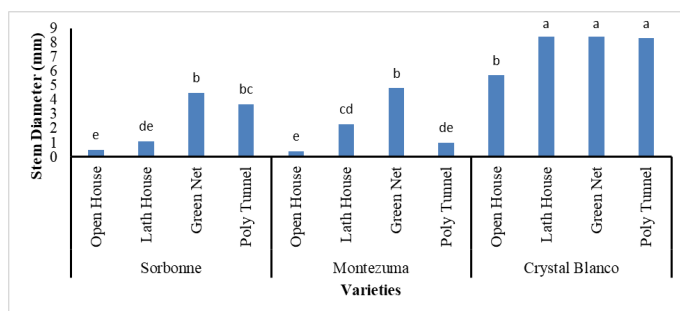


Figure 5: Number of buds per plant of varieties under different growth conditions.

The same results were studied by [Fatmi et al. \(2017\)](#). The number of leaves plant per plant (38) were maximum under green net in Crystal Blanco while minimum was observed (2.4) in Sorbonne in open field ([Figure 2](#)). The same result were studied by [Mohanty et al. \(2011\)](#) who described that under green net conditions plant obtained maximum productivity. In case of leaf area, the maximum leaf area (153.9 cm²) was observed under poly tunnel in Crystal Blanco, while minimum was observed (2.4 cm²) in Sorbonne under lath house condition ([Figure 3](#)). The same results were reported by [Slathia et al. \(2018\)](#), who found that under poly tunnel the light availability is maximum which leads to active photosynthesis resulting maximum leaf area. In case of stem diameter, maximum reading (8.4 mm) was observed in Crystal Blanco under lath house and green net with no significant difference, while minimum (1 mm) was observed in Montezuma under poly tunnel as shown in [Figure 4](#). These results are in line with the work of [Naik et al. \(2006\)](#) who reported that gerbera attain maximum value under green net conditions. Number of buds plant per plant were recorded maximum (2.55) in Crystal Blanco under lath house while the minimum was observed in Sorbonne under poly tunnel ([Figure 5](#)). Bud diameter was maximum (20.2 mm) in Crystal Blanco under green net, while minimum (4.1 mm) was observed in Sorbonne under poly tunnel which ([Figure 6](#)). Same results were reported by [Fatmi et al., 2017](#) who observed maximum bud diameter in lilies under control condition. The data of vase life showed that, maximum vase life (8.3 days) was recorded in Crystal Blanco under lath house condition, while minimum (0.6) was observed in Montezuma under poly tunnel ([Figure 7](#)). The results were in lined with [Bhosale et al. \(2011\)](#), who reported that Gerbera attain maximum vase life under control conditions.

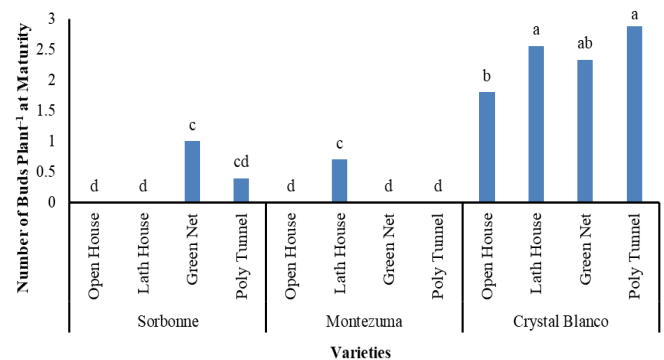


Figure 6: Bud diameter (mm) of varieties under different growth conditions.

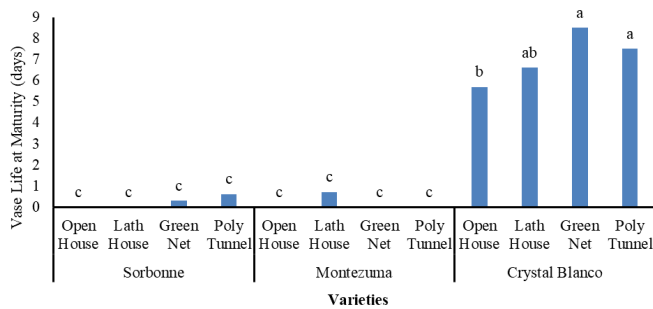


Figure 7: Vase life (days) of varieties under different growth conditions.

Conclusions and Recommendations

The data suggests that Crystal Blanco (variety# 3) performed best overall. Poly tunnels and green netting were also effective growing conditions. These findings indicate that lilies in the Pothwar region may benefit from warmer temperatures during initial growth stages, potentially explaining the positive results observed in poly tunnels. However, green netting appears to be sufficient for optimal growth later in the season (end of January onwards).

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Novelty Statement

Help growers to work on best performer variety in Pothwar region for commercial use.

Author Contribution

Atyab Amjad: Compiles the data and wrote menu-script.

Riaz Ur Rhman and Riaz Bukhari: Suggested the improvements.

Shafique Khalid and Samia Ikram: Help out in statistical analysis.

Shafique and Muhammad Luqman: Help out in the write up of this paper.

Conflict of interest

The authors have declared no conflict of interest.

References

Amjad. A. and I. Ahmad. 2012. Optimizing

- plant density, planting depth and postharvest preservatives for *Lilium longifolium*. J. Ornament. Hortic. Plants, pp. 13-20.
- Anonymous, 2009. Hydroponic forcing. www.bulbousonline.com
- Bhosale, M.Y., R.D. Shelke, V.K. Aher and B.A. Shenewad. 2011. Production and marketing of gerbera cut-flowers. Int. Res. J. Agric. Econ. Stat., 2(2): 328-331.
- Fatmi, U., D. Singh and Deepansh. 2017. Influence of two different protected structures on growth and flowering of Asiatic Lily Cv. Pollyanna. Acad. Environ. Life Sci. India, 6(11): 91-93.
- Hertogh, A.D., 1993. The physiology of flower bulbs. Volume 1: A comprehensive treatise on the physiology and utilization of ornamental flowering bulbous and tuberous plants. Elsevier Science Publishers. Netherlands.
- Jimenez, S., B.M. Plaza, M.L. Segura, J.I. Contreras and T.M. Lao. 2012. Peat substrate reuse in *Lilium* “Haveltia” crop. Commun. Soil Sci. Plant Anal., 43: 243-250. <https://doi.org/10.1080/00103624.2011.638585>
- Lian, M.L., D. Chakrabarty and K.Y. Paek. 2003. Growth of oriental hybrid Casablanca bulblet using bioreactor culture. Sci. Hortic., 97: 41-48. [https://doi.org/10.1016/S0304-4238\(02\)00086-9](https://doi.org/10.1016/S0304-4238(02)00086-9)
- Mohanty, C.R., A. Mohanty, A.B. Das and D.S. Kar. 2011. Comparative performance of some rose varieties under open and protected environment. Asian J. Hortic., 6(2): 288-293.
- Naik, B.H., N. Chauhan, A.A. Patil, V.S. Patil and B.C. Patil. 2006. Comparative performance of gerbera cultivars under naturally ventilated polyhouse. J. Ornament. Hortic., 9(3): 204-207.
- Rae, M.C., 1998. Lilies. Timber Press, Poland.
- Sharma, R., R. Kumar and D.S. Dhaiya. 2018. Studies on the performance of *lilium* varieties under polyhouse. J. Pharma. Phytochem., 7(4): 2711-2713.
- Slathia, D., M.U. Nisa, M.D.T. Reshi and S. Hussain. 2018. Protected cultivation of ornamentals. Glob. J. Biochem. Biotechnol., 7(2): 1-10.
- Thakur, R., A. Sood, P.K. Nagar, S. Pandey, R.C. Sobti and P.S. Ahuja. 2005. Regulation of growth of *Lilium* plantlets in liquid medium by application of paclobutrazol or ancymidol for its amenability in bioreactor system growth parameters. Plant Cell Rep., 25: 382-391. <https://doi.org/10.1007/s00299-005-0094-1>