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## EVALUATION OF ASIATIC LILY (*LILIUM SP.*) VARIETIES UNDER SHADE NET IN AGROCLIMATIC CONDITION IN BANDA DISTRICT OF BUNDELKHAND REGIONS

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### ABSTRACT

In the current study, "Varietal evaluation of Asiatic Lily (*Lilium sp.*) varieties under shade net in agroclimatic condition in Banda district of Bundelkhand regions," the under-shade net house at Hi Tech Nursery, College of Horticulture, Department of Floriculture and Landscape Architecture, Banda University of Agriculture and Technology Banda 210001, was performed. Finding the best cultivar and growing conditions for lithium in terms of flowering, bulb, post-harvest and vase life output is the goal for 2023–2024. Using a Randomized Block Design, the experiment was set up with three replications. Ten Asiatic hybrid lily cultivars scored well on floral parameters, bulb output, post-harvest, and vase life, according to the study's findings. According to the parameters, the Asiatic lily variety Colares (V<sub>3</sub>) was found to be the best. Number of flower bud per plant (5.53), length of flower (11.53 cm), flower stalk length (7.82 cm), water uptake (78.33 ml). The variety was found to be early Brindisi (V<sub>4</sub>) as it took least days to first flower opening after planting of bulbs (66.00 days), day to first harvest (64.33 days). Pavia (V<sub>7</sub>) was observed to be the best for flower yield per plant (67.31 g), fresh weight of flower bud (9.52 g). Nashville (V<sub>5</sub>) was found to be the most effective for flower bud width (28.10 cm). Albufeira (V<sub>2</sub>) was found to be the most suitable for weight of bulb per plant (57.50 g). Brunello (V<sub>10</sub>) was noted to be the most effective for vase life (16.00 days). Therefore, it can be said that the most promising variety that can be successfully grown in the Banda district is var. Colares (V<sub>3</sub>).

**Keywords :** Asiatic lily, Varietal evaluation, shade net, cut flower, flowering, bulb characters and post-harvest life.

### Introduction

The Asiatic lily, (*Lilium sp.*) is a significant decorative bulbous plant that is a member of the Liliaceae family. The species' basic chromosome number is  $x = 12$ , and its cultivars vary widely in their ploidy levels. *Lilium* is indigenous to Asia, Europe, and North America in the Northern Hemisphere. There are around 100 species and over 9,400 cultivars in the genus *Lilium* (Fatmi *et al.*, 2018). It is a highly sought-after flowering plant in the global cut flower commerce, ranking fourth in the top ten cut flowers worldwide, behind tulips, roses, and chrysanthemums (Chaudhary *et al.*, 2018). Approximately 76% of the lily bulbs produced globally are produced in the

Netherlands (Qu *et al.*, 2014). Showy flowers, eye-catching colour patterns, and persistent spikes are characteristics of the *Lilium*, which is renowned for its remarkable genetic diversity. In flower language, the lily represents innocence and purity. The Asiatic lily's non-fragrant blossoms are highly sought-after on the global market. In the floral industry, it is frequently used for cut flowers and potted plants. They are widely cultivated in greenhouses for use as cut flowers in the international flower trade because of their longer growth seasons, variety of hues, and durability (Barik and Mohanty, 2015). In the floral industry, it is frequently used for cut flowers and potted plants. Lilies are mostly grown in temperate and moist regions of the

world, and they are grown commercially in the Netherlands, Israel, the United States, South Africa, Japan, Chile, Italy, New Zealand, and Mexico. West Bengal, Chhattisgarh, Andhra Pradesh, Tamil Nadu, Karnataka, Madhya Pradesh, Assam, and Maharashtra are among the major floriculture hubs in India that are listed. In non-traditional locations, commercial liliium cultivation requires a controlled atmosphere (Sharma and Sharma, 2022). Since light is crucial for liliium development, it should not be grown in direct sunlight; instead, some shade should be kept in order to produce high-quality flowers. It is advantageous to use a shade net of 50–75% for shade (Thangam *et al.*, 2016). *Lilium* thrives in a greenhouse with low light levels of 2000–3000-foot candles and humidity values of 80–85%. Thus, a shade net can be employed to block off 50% of the light throughout the winter (Savita *et al.*, 2022). Key data and trends about India's commercial flower output. It should be between 10 and 15°C at night and 20 to 25°C during the day for healthy plant growth and high-quality flower production. Because of the greater warmth, the crop becomes dwarf and has fewer flower buds per stem. There are several ways to multiply Asiatic hybrid lilies: seeds, bulb scales, bulb division, stem bulblets, and stem bulbils. It can be propagated by bulb divisions and stem bulblets. The

growth of lily plants determines the quantity and size of bulbs and bulblets. For plants to develop and thrive properly, the ideal bulb size, growing environment, and planting depth must be met (Kumar *et al.*, 2018).

### Materials and Methods

The experiment was conducted in 2023 and 2024 under shade net house in Hi tech Nursery, College of Horticulture, Department of Floriculture and Landscape Architecture, Banda University of Agriculture and Technology Banda 210001. Beds measuring 1.95 x 1.80 meters were set up. In November 2023, healthy, uniformly sized bulbs (12/14 and 14/16 cm) were planted in a randomized block design with three replications at a depth of 12–15 cm and 45 cm x 30 cm. Breakout, Albufeira, Colares, Brindisi, Nashville, Tresor, Pavia, Paranno, Lentella, and Brunello were the ten Asiatic lily cultivars that were used in the experiment. During the cropping season, customary cultural customs were observed. Five randomly chosen plants from each variety in each replication were used to record the data. As recommended by Cochran and Cox (1959), statistical analysis was performed on the data. In order to compare the variations, the data were interpreted based on the crucial difference at 5% probability.



**Plate 1:** Asiatic lily varieties under Poly House Condition





Albufeira



Nashville



Colares



Brunello



Paranno



Pavia



Tresor



Brindisi



Lentella



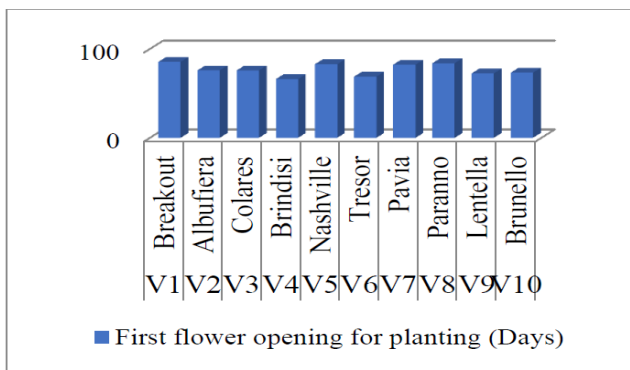
Breakout

**Plate 2:** Asiatic Lily varieties under study

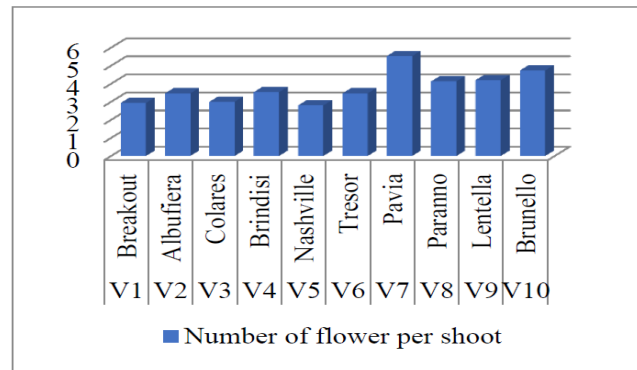
## Result and Discussion

Study of the data presented in Table 1 and Fig. 1 revealed that minimum days to first flower opening after planting of bulbs at days (66.00 days) was recorded in V<sub>4</sub> - Brindisi which was followed by V<sub>6</sub> - Tresor (68.80 days). On the other hand, maximum days to first flower opening after planting of bulbs was

recorded with V<sub>1</sub> - Breakout (85.40 days). The difference in first flower opening among the varieties might be due to the inherent character and their response to the prevailing weather conditions as the earliness or lateness in flowering in a variety is also governed by the genetic constitution of the variety.



**Fig. 1:** Varietal performance of Asiatic lily on first flower opening after planting



**Fig. 2:** Varietal performance of Asiatic lily on number of flowers per shoot

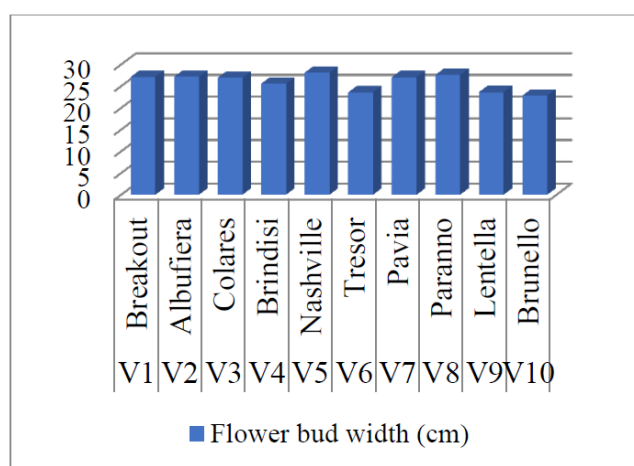
Perusal of data presented in Table 1 and Fig. 2 showed the maximum number of flowers bud per plant (5.53) was recorded in V<sub>3</sub> - Colares which was followed by V<sub>10</sub> - Brunello (4.73). On the other hand, minimum number of flower bud per plant was recorded with V<sub>5</sub> - Nashville (2.80). The greater number of flowers per plant of Asiatic lily was due to inherent characteristics, better adaptability for the shade net conditions Pillai *et al* (2022).

Study the data present in table 1 and Fig. 3 revealed that maximum flower bud width (28.10 cm) was recorded in V<sub>5</sub> -Nashville which was at par with V<sub>1</sub> -

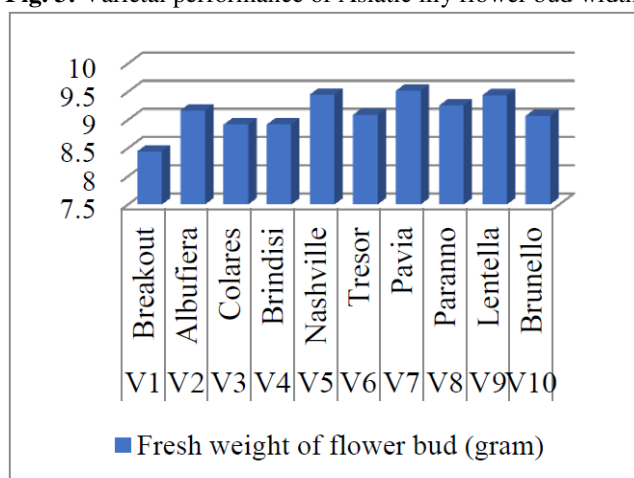
Breakout (27.10 cm), V<sub>2</sub> - Albufeira (27.15 cm), V<sub>3</sub> - Colares (26.91 cm), V<sub>7</sub> - Pavia (27.05) and V<sub>8</sub> - Paranno (27.57). On the other hand, minimum flower bud width was recorded with V<sub>10</sub> - Brunello (22.83 cm). The difference in flower bud width may be attributed to the inherent character and genetic makeup of the varieties and environmental conditions prevailing during the course of research. Similar results found on lily have also been reported by Pillai *et al.* (2022), Bhat *et al.* (2016), Barik and Mohanty (2015) and Kumar *et al.* (2011).

**Table 1:** Performance of Asiatic lily varieties with respect to Days to first flower opening after planting of bulbs, Number of flower bud per plant, Flower bud width (cm), Fresh weight of flower bud (g), Length of flower (cm), Day to first harvest, Flower yield per plant (g), Weight of bulb per plant (g), Water uptake (ml), Vase life (days), Flower stalk length (cm).

Treatment	Days to first flower opening after planting of bulbs	Number of flower bud per plant	Flower bud width (cm)	Fresh weight of flower bud (g)	Length of flower (cm)	Day to first harvest	Flower yield per plant (g)	Weight of bulb per plant (g)	Water uptake (ml)	Vase life (days)	Flower stalk length (cm)
V <sup>1</sup>	85.40	2.93	27.10	8.44	10.10	83.67	27.54	54.80	50.00	15.00	7.37
V <sup>2</sup>	75.87	3.47	27.15	9.17	10.18	73.33	40.47	57.50	56.67	15.00	6.02
V <sup>3</sup>	75.80	5.53	26.91	8.92	11.53	72.33	41.91	41.36	78.33	15.00	7.82
V <sup>4</sup>	66.00	3.53	25.55	8.92	10.75	64.33	43.48	44.75	63.33	14.67	6.34
V <sup>5</sup>	82.80	2.80	28.10	9.45	9.90	80.67	29.64	42.80	63.33	15.33	7.22
V <sup>6</sup>	68.80	3.47	23.57	9.09	9.99	67.67	38.76	39.00	45.00	15.33	6.70
V <sup>7</sup>	82.33	3.00	27.05	9.52	9.93	81.00	67.31	35.80	55.00	14.67	6.23
V <sup>8</sup>	83.93	4.13	27.57	9.26	10.36	81.67	44.44	28.06	64.33	14.67	4.83
V <sup>9</sup>	72.40	4.20	23.60	9.44	9.74	70.33	40.90	31.11	46.67	15.67	6.76
V <sup>10</sup>	73.27	4.73	22.83	9.07	9.38	71.33	49.77	38.69	55.00	16.00	6.95
SE(m)±	0.67	0.27	0.52	0.26	0.05	0.50	2.59	0.99	8.64	0.24	0.31
C.D. @5%	2.00	0.80	1.55	N/A	0.16	1.49	7.69	2.97	N/A	0.72	0.92



**Fig. 3:** Varietal performance of Asiatic lily flower bud width

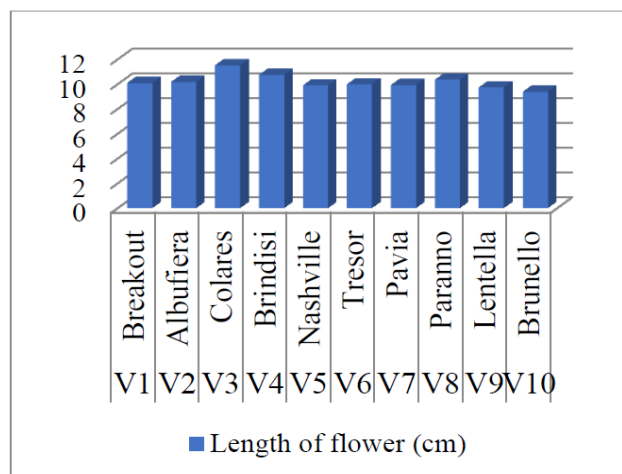


**Fig. 4:** Varietal performance of Asiatic lily fresh weight of flower bud

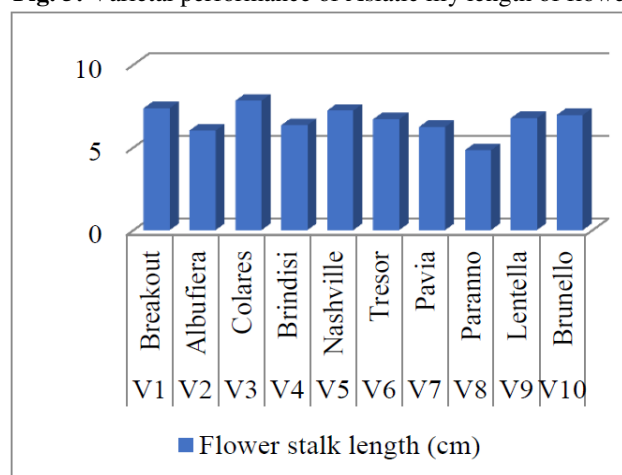
It was also revealed from Table-1 and Fig.- 4 that maximum fresh weight of flower bud (9.52 g) was recorded in V<sub>7</sub> - Pavia which followed by V<sub>5</sub> - Nashville (9.45 g), V<sub>9</sub> - Lentella (9.44) On the other hand, minimum fresh weight of flower bud was recorded with V<sub>1</sub> - Breakout (8.44 g). The differences in the weight of the fresh flower bud may be due to the genetic constitution which affects the overall growth of the plant, floral characters and eventually the weight of the flower bud. The environmental factor might have also triggered rate of photosynthesis, nutrient uptake and overall plant metabolism which resulted in the increased weight of flower bud.

Perusal of data presented in Table-1 and Fig.- 5 also showed that the maximum length of flower (11.53 cm) was recorded in V<sub>3</sub> -Colares which was at par with V<sub>8</sub> - Paranno (10.36 cm), V<sub>1</sub> - Breakout (10.10 cm), V<sub>2</sub> - Albufeira (10.18 cm), V<sub>4</sub> - Brindisi (10.75 cm), V<sub>6</sub> - Tresor (9.99 cm) and V<sub>7</sub> - Pavia (9.93 cm). On the other hand, minimum length of flower was recorded with V<sub>10</sub> - Brunello (9.38 cm). The genetic constitution

of the varieties influences the floral characters of the liliun flower. The difference in flower length might have been affected by the genetic variation. Besides, the environmental factors such as light, temperature, humidity could also be the probable reason for the variation in flower shape and size of Asiatic lily varieties under investigation (Negi *et al.*, 2016).



**Fig. 5:** Varietal performance of Asiatic lily length of flower



**Fig. 6:** Varietal performance of Asiatic lily flower stalk length

Study of data presented in Table- 1 and Fig.- 6 revealed that maximum flower stalk length (7.82 cm) was recorded in V<sub>3</sub> -Colares which was at par with V<sub>1</sub> - Breakout (7.37 cm) and V<sub>5</sub> - Nashville (7.22 cm). On the other hand, minimum flower stalk length was recorded with V<sub>8</sub> - Paranno (4.83 cm). The genetic constitution of the varieties influences the floral characters of the liliun flower. The difference in flower stalk length might have been affected by the genetic variation. Besides, the environmental factors such as light, temperature, humidity could also be the probable reason for the variation in flower shape and size of Asiatic lily varieties under investigation (Negi *et al.*, 2016).

Study of data presented in Table-1 and Fig.- 7 revealed that minimum day to first harvest at days (64.33 days) was recorded in V<sub>4</sub> - Brindisi which was followed by V<sub>6</sub> - Tresor (67.67 days) on the other hand, maximum day to first harvest was recorded with V<sub>8</sub> - Breakout (83.67 days). Generally, early or late flowering behaviour is a varietal characteristic and is affected by the genetic constitution of that variety. Further, the response of the variety to different climatic conditions viz. light intensity, temperature, humidity can also affect the growth and the time taken to reach maturity and flowering. Similar result found on liliium has also been reported by Ranpise *et al.*, (2014).

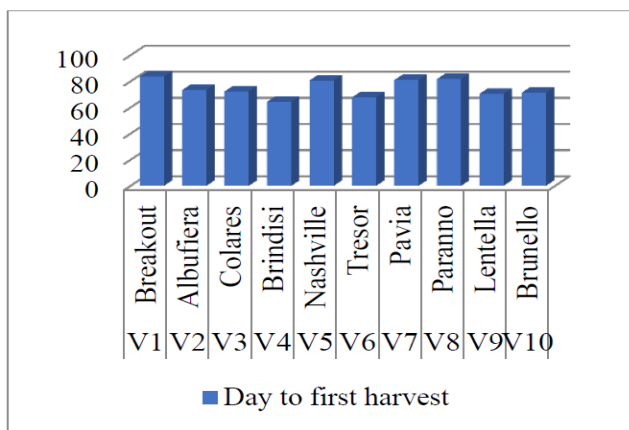


Fig. 7: Varietal performance of Asiatic lily day to first harvest

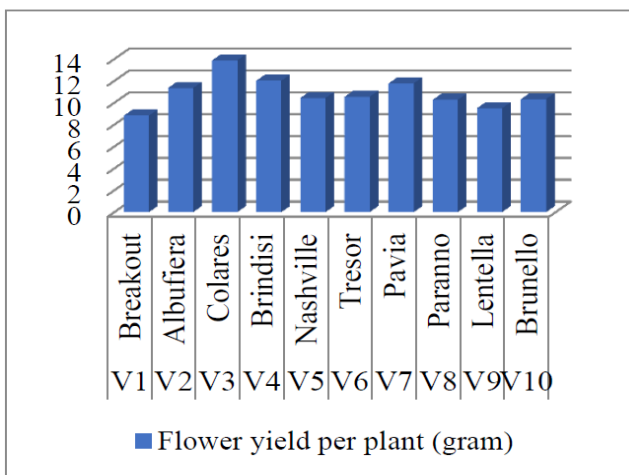


Fig. 8: Varietal performance of Asiatic lily flower yield per plant

It was also revealed from table-1 and Fig.-8 that maximum flower yield per plant (67.31 g) was recorded in V<sub>7</sub> -Pavia which was followed by V<sub>10</sub> - Brunello (49.77 g) and V<sub>8</sub> - Paranno (44.44 g). On the other hand, minimum flower yield per plant was recorded with V<sub>1</sub> - Breakout (27.54 g). The increased yield might be due to its capacity to produce maximum

number of spike/plants which is a genetic makeup of the genotype by Rachana *et al.*, (2013).

Study of data presented in Table-1 and Fig.-9 revealed that maximum weight of bulb per plant (57.50 g) was recorded in V<sub>2</sub> -Albufeira which was at par with V<sub>1</sub> - Breakout (54.80 g). On the other hand, minimum weight of bulb per plant was recorded with V<sub>8</sub> - Paranno (28.06 g). The differences in the weight of bulbs, may be attributed to the varying genetic traits which affect the bulb and bulblet characters of the liliium plants. Moreover, the varying response of these varieties to the soil type, soil moisture condition and temperature may also be the major factors that directly had an impact on the difference in the bulb characters of the Asiatic lily. Singh *et al.*, (2016).

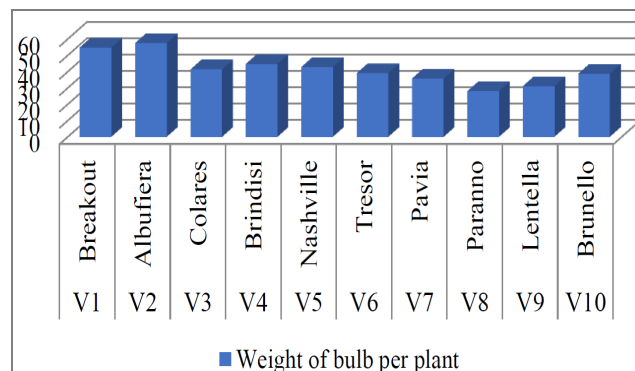


Fig. 9: Varietal performance of Asiatic lily weight of bulb per plant

Perusal of data presented in Table-1 and Fig.-10 showed that maximum water uptake (78.33 ml) was recorded in V<sub>3</sub> - Colares which followed by V<sub>8</sub> - Paranno (64.33 ml), V<sub>4</sub> - Brindisi (63.33 ml). On the other hand, minimum water uptake was recorded with V<sub>6</sub> - Tresor (45.00 ml). The size of the stem/shoot is correlated with the water uptake during vase life as the thicker stem or enhanced vascular system allows better water uptake which leads to increase in the vase life of the spike. The differences in the vascular system might be due to the genetic makeup of the variety. The results are in line with findings of Asrar (2012) in snapdragon.

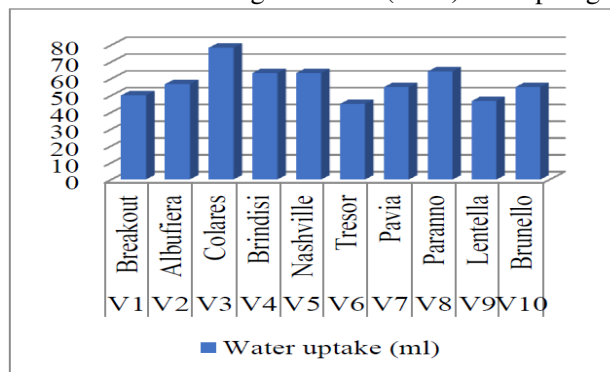
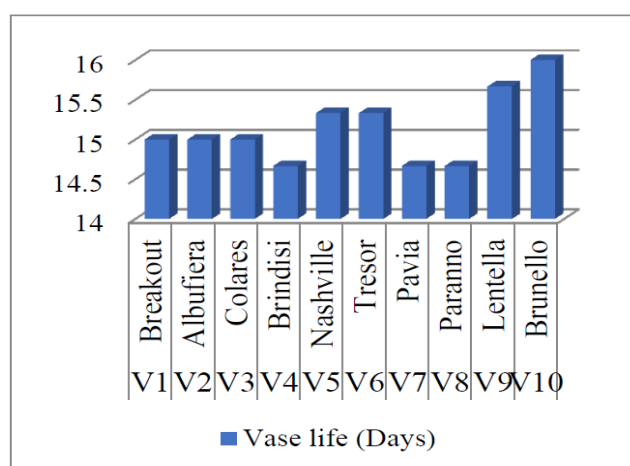


Fig. 10: Varietal performance of Asiatic lily water uptake





**Fig. 11:** Varietal performance of Asiatic lily vase life

It was also revealed from Table-1 and Fig.- 11 that maximum vase life (16.00 days) was recorded in V<sub>10</sub> - Brunello which was at par with and followed by V<sub>9</sub> - Lentella (15.67 days), V<sub>5</sub> - Nashville (15.33), V<sub>6</sub> - Tresor (15.33). On the other hand, minimum vase life was recorded with V<sub>4</sub> - Brindisi (14.67 days). Varieties with developed vascular system have the ability of efficient water uptake which helps in maintaining flower turgidity and prolongs vase life. Besides, varietal response to transpiration rates, water loss from flowers might have affected the vase life of flower. Safeena *et al.*, (2019), Momin *et al.*, (2015).

### Conclusion

Based on the results of the study it was demonstrated that the development of bulblets of plant during scale propagation were greatly affected by genetic and environmental interaction. It can be concluded that out of planting time, Asiatic lily planted on first week of November perform better resulting under Banda districts of Bundelkhand condition with proper management practices the Colares (V<sub>3</sub>) cultivar showed better result in term of flowering parameter, as well as evidenced maximum number of flowers per plant, length of flower, flower stalk length, water uptake. Whereas, the performance of variety Brindisi (V<sub>4</sub>) day to first flower opening after planting of bulbs and day to first harvest. Whereas, the performance of variety Pavia (V<sub>7</sub>) flower yield per plant and fresh weight of flower bud. And better performance of vase life variety Brunello (V<sub>10</sub>).

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