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Evaluation of Different Cultivars of Asiatic Lily in the Terai Region of West Bengal

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ABSTRACT

A varietal evaluation study on Asiatic lily was conducted under open field condition in the Terai region of West Bengal to assess the performance of eight different cultivars in respect of various morpho-phenological parameters. The results revealed significant differences in sprouting time, vegetative growth and floral attributes among the cultivars. Variety Salmon Classic exhibited the earliest bulb sprouting, earliest flowering and superior floral traits, including a longer field-life and maximum flower spread. Cultivar Cilesta obtained the highest plant height, number of leaves and structural robustness with the thickest stem girth, while, chlorophyll content and shoot production were statistically non-significant across the cultivars. Floral characteristics, such as - petal dimensions, stigma and anther lengths and ovary size varied significantly. Six cultivars produced flowers successfully, whereas, cv. Eyeliner and cv. Ercolano failed to produce any flower in the Terai plains of West Bengal under open field cultivation. Among the six flower producing cultivars, cv. Salmon Classic, cv. Biogella and cv. Ceb Dazzle were found superior regarding flowering. The study identified cv. Salmon Classic and cv. Cilesta as promising cultivars for commercial cultivation of Asiatic Lily under open field condition in the Terai region of West Bengal.

Keywords : Asiatic Lily, Varietal evaluation, Cultivar, Terai region, Floriculture.

Introduction

Bulbous ornamentals, also called as ornamental geophytes, dominates the floriculture industry over the decades due to their low maintenance, adaptability to various agroclimatic conditions and their unique flower shapes and brilliant colours (Borysiak *et al.*, 2017). Over the past decades, the export of ornamental geophytes showed an exponential growth and among the different countries, the Netherlands tops the list with a share of ~•500million (Gul *et al.*, 2020). Among the various bulbous ornamentals, Asiatic Lilies hold a significant place in the cut flower industry. Asiatic Lilies (*Lilium asiaticum*) are native to temperate regions of Asia - Eastern Asia in particular and belongs to

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the plant family Liliaceae (Pillai *et al.*, 2022). Asiatic Lily is used mostly as cut flower as well as in gardening and it ranked fourth position in the cut flower industry upto 2005, due to its large, attractive florets that possess the ability to rehydrate even after long time transportation. In India, it is mostly grown in cooler places like Nilgiri Hills, Uttarakhand, Himachal Pradesh and Jammu and Kashmir (Chahal *et al.*, 2022). These hardy perennials thrive best in loamy soils with pH of 6.5 to 7, day temperature of 18-25^{0}C and night temperature of 10-15^{0}C with relative humidity of 50-70% along with 6-8 hours of direct sunlight for optimal flower induction (Samantaray *et al.*, 2024). The Terai region of West Bengal is characterized by subtropical humid climate with abundant rainfall and well drained soils and Asiatic Lily can be successfully grown as winter crop in this region. Among the several factors influencing the growth and yield, local agroclimatic condition, genotype and their interaction plays important role (Adham *et al.*, 2022). The performance of one genotype in a region may not be the same in the other region and this is mainly due to genotype - environment interaction and it is essential to evaluate the performance of different varietiesin a specific region (Basford and Cooper, 1998). However, information regarding the cultivation of Asiatic Lily in the Terai region is still lacking and there is necessity to evaluate the different genotypes of Asiatic Lily available in the Terai region of West Bengal.

Materials and Methods

The present experiment was conducted at the Instructional Farm of Department of Floriculture, Medicinal and Aromatic Plants, Faculty of Horticulture, Uttar Banga Krishi Viswavidyalaya, Pundibari, CoochBehar, West Bengal. The bulbs of different varieties, namely: V_1 – Cilesta, V_2 - Salmon Classic, V_3 – Eyeliner, V_4 – Biogella, V_5 - Ceb Dazzle, V_6 – Pavia, V_7 – Tresor and V_8 – Ercolano were collected from ICAR-IARI Regional Station at Katrain, Himachal Pradesh and treated with SAAF@ 2g/litre of water for 30 minutes before planting. The experiment was laid out following Randomized Block Design, where each variety was replicated for four times and randomly allocated in plots of 1m^2 area accommodating 16 plants per plot at a spacing of 25cm × 25cm. Different vegetative and floral characters were studied and the obtained data was statistically analysed.

Results and Discussion

All the eight cultivars were sprouted in the open field condition at the Terai region of West Bengal approximately at the same time; however, the cultivar Salmon Classic exhibited the earliest sprouting of bulbs (36.040 days after planting). Cultivars demonstrated significant differences in initial plant height and leaf production, with the cultivar Cilesta generating greater plant height after 15 days of sprouting (19.863 cm) and number of leaves (26.715) per plant. The number of shoots per plant was found to be statistically non-significant. Leaf chlorophyll content was measured using a SPAD Meter and the varietal difference was found to be statistically non-significant (Table 1).

Table 1 : Comparative performance of eight different Asiatic Lily cultivars under open field condition in the Terai region of West Bengal

Varieties	Days required for sprouting (days)	Plant height at 15 days after sprouting (cm)	Number of leaves per plant	No. of shoots per plant/ bulb	Leaf Chlorophyll content (SPAD)	Stem girth (cm)
V_1	37.145	19.863	26.715	1.495	59.728	0.428
V_2	36.040	14.350	24.025	3.040	56.655	0.338
V_3	38.665	8.938	18.803	1.000	66.378	0.258
V_4	38.415	9.125	17.490	1.125	68.665	0.340
V_5	38.458	9.310	11.458	1.375	64.453	0.225
V_6	39.415	11.103	23.500	1.125	63.358	0.300
V_7	38.938	7.415	12.445	1.000	63.163	0.228
V_8	38.790	8.458	11.790	1.250	65.825	0.303
SEm(±)	*1.3040*	*1.5122*	*1.6488*	*0.5905*	*3.9792*	*0.0412*
CD at 5%	**NS**	**4.4474**	**4.8490**	**NS**	**NS**	**0.1213**

The range varied from 56.655 to 68.665 SPAD. Cultivar Cilesta recorded the maximum stem girth (0.428 cm). Cultivars Ceb Dazzle and Tresor produced the thinnest stems (0.225 cm and 0.228 cm respectively). Varieties exhibited relatively similar results with respect to internodal length, leaf length and leaf width (Table 2).

Table 2: Comparative performance of Asiatic Lily cultivars in respects of internodal length, leaf length and width and days to FBI, colour showing and full bloom stages in the Terai region of West Bengal

Varieties	Internodal length (cm)	Leaf length (cm)	Leaf width (cm)	Days required for FBI (days)	Colour showing stage (days)	Opening of flower (days)
V_1	2.240	6.535	0.660	89.075	107.450	114.45
V_2	2.305	6.328	0.688	85.500	105.000	109.25

Varieties	**Internodal length**	**Leaf length (cm)**	**Leaf width (cm)**	**Days required for FBI (days)**	**Colour showing stage (days)**	**Opening of flower (days)**
V_3	2.445	6.315	0.625	0.000	0.000	0.00
V_4	2.120	7.008	0.663	87.000	104.500	109.00
V_5	2.423	7.010	0.703	87.425	98.275	109.75
V_6	2.530	6.490	0.605	87.500	106.000	124.00
V_7	2.323	7.068	0.610	89.500	107.500	112.25
V_8	2.340	6.338	0.648	0.000	0.000	0.00
SEm(±)	*0.1547*	*0.4321*	*0.0497*	*0.9862*	*1.7816*	*1.3289*
CD at 5%	**NS**	**NS**	**NS**	**2.9004**	**5.2397**	**3.9084**

Out of the eight different cultivars, only six progressed to the flowering stage, while the cultivars Eyeliner and Ercolano did not reach the flowering stage under open field condition in the Terai region of West Bengal (Table 2). The earliest flowering was observed in the cultivar Salmon Classic (initiated flower buds at 85.50 days after sprouting). Regarding total flower opening, cultivars - Salmon Classic, Biogella and Ceb Dazzle demonstrated favourable results (Table 2). Cultivar Salmon Classic (Table 3) exhibited a longer field-life of flowers (6.850 days).

Table 3 : Comparative performance of cultivars of Asiatic Lily in respects of bud, petiole and petal length, bud diameter and field-life of flowers in the Terai region of West Bengal

Varieties	**Field-life of flowers (days)**	**Bud length (cm)**	**Bud diameter (mm)**	**Petiole length (cm)**	**Petal length (cm)**
V_1	5.950	9.950	21.905	3.800	10.300
V_2	6.850	9.800	23.658	3.175	10.600
V_3	0.000	0.000	0.000	0.000	0.000
V_4	5.575	9.950	23.928	3.400	10.900
V_5	5.250	9.425	22.245	3.325	10.875

Varieties	**Field-life of flowers (days)**	**Bud length (cm)**	**Bud diameter (mm)**	**Petiole length (cm)**	**Petal length (cm)**
V_6	5.500	9.100	23.238	3.900	10.725
V_7	6.000	10.025	22.585	3.125	10.625
V_8	0.000	0.000	0.000	0.000	0.000
SEm(±)	*0.1741*	*0.1395*	*0.2738*	*0.1417*	*0.3845*
CD at 5%	**0.5121**	**0.4102**	**0.8051**	**0.4167**	**1.1310**

Concerning other floral characteristics, greater flower bud length was observed in cultivars Cilesta and Biogella (9.950 cm for both) but cv. Tresor showed the highest (10.025 cm), while maximum bud diameter (23.928 mm), petal length (10.90 cm) and petal width (5.150 cm) were observed in cultivar Biogella (Table 3 and 4). Maximum petiole length (3.90 cm) was observed in cultivar Pavia (Table 3). The length of stigma (7.468 cm) and anther (9.80 cm) was found to be highest in cultivar Cilesta (Table 4). Ovary length (2.650 cm) was found to be greater in cultivar Tresor, while flower spread was observed to be maximum (Table 4) in cultivar Salmon Classic (14.675 cm).

Table 4 : Comparative performance of cultivars of Asiatic Lily in respects of stigma, anther and ovary length, petal width and spread of flowers in the Terai region of West Bengal

Varieties	**Petal width (cm)**	**Stigma length (cm)**	**Anther length (cm)**	**Ovary length (cm)**	**Flower spread (cm)**
V_1	4.800	7.468	9.800	2.550	13.720
V_2	4.500	7.200	9.400	2.525	14.675
V_3	0.000	0.000	0.000	0.000	0.000
V_4	5.150	7.375	9.225	2.100	14.130
V_5	4.950	7.025	8.500	2.175	14.493
V_6	4.525	6.900	9.375	2.550	14.048
V_7	4.925	7.300	9.175	2.650	14.013

Varieties	Petal width (cm)	Stigma length (cm)	Anther length (cm)	Ovary length (cm)	Flower spread (cm)
V_8	0.000	0.000	0.000	0.000	0.000
SEm(±)	*0.0825*	*0.1690*	*0.1615*	*0.1465*	*0.2998*
CD at 5%	**0.2425**	**0.4971**	**0.4750**	**0.4310**	**0.8818**

The earliest sprouting, observed in cultivar Salmon Classic, suggests its genetic tendency to vigorous early growth and adaptability to the Terai climatic conditions. Early sprouted cultivars often deserve a benefit from an extended vegetative phase, allowing enhanced resource allocation for subsequent development (Ramzan *et al.*, 2014). The variations in initial plant height and leaf production among cultivars was highlighting the influence of genetic potential and environmental interactions. Cultivar Cilesta, which exhibited the greatest plant height and number of leaves per plant after 15 days of sprouting, reflected its superior vegetative vigour and efficient nutrient uptake under the region's conditions, which was conforming the observations of Kumari *et al.* (2022). These traits are advantageous for sustaining robust growth, crucial for ornamental plant production. On the other hand, the non-significant differences in the number of shoots per plant indicated that this trait might be less influenced by genetic diversity and more by environmental stability. The chlorophyll content was statistically non-significant across the cultivars and suggested that all cultivars maintained comparable photosynthetic efficiency under the prevailing environmental conditions, reflecting their general suitability for cultivation in this region (Kamalashree, 2023). However, the maximum stem girth recorded in Cilesta, indicates its structural robustness and potential for enhanced nutrient and water transport.

The flowering performance revealed notable differences in adaptability among the cultivars. The early flowering was observed in cv. Salmon Classic can potentially be linked to its inherent genetic makeup, which facilitates advanced floral development when exposed to conducive environmental stimuli (Bachmann, 1983). Among the eight cultivars, only six reached the flowering stage, with cv. Eyeliner and cv. Ercolano failed to produce flower. This could be due to a mismatch between their specific temperature or light requirements and the environmental conditions of the Terai plains of West Bengal. The overall flowering quality along with floret opening was found superior in cultivars Salmon Classic, Biogella, and Ceb Dazzle.

Conclusion

The study demonstrated that the Terai region of West Bengal offers a congenial environmental condition for the cultivation of Asiatic Lily. Among the different genotypes studied, Salmon Classic proved to be the most promising one, excelling in early sprouting, flowering performance, floral quality and field-

life, making it suitable for commercial cultivation in Terai region of West Bengal. Cultivar Cilesta with superior vegetative growth and reproductive traits stands as another valuable option for cultivation and plant breeding. These findings provide a scientific basis for optimizing productivity and profitability of Asiatic Lily growers in the Terai region of West Bengal.

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