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## Varietal evaluation of *Lisianthus (Eustoma grandiflorum Shinn.)* for morphological parameters under protected cultivation

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### Abstract

An investigation on evaluation of *Lisianthus* varieties for morphological traits under protected cultivation was carried out in randomized complete block design in the experimental block of department of Floriculture and Landscape Architecture, College of Horticulture, Mudigere under Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, during 2020-21. Fifteen varieties were used in the investigation viz., Echo Lavender, Echo Light Pink, Rosita 2 Pink Picotee, Echo Purple, Echo Blue, Echo Yellow, Robella 2 Pure White, Rosita 2 Blue Picotee, Echo Pure White, Robella 3 Clear Pink, Rosita 3 Green, Rosita 3 Blue Imp, Rosita 4 Yellow, Rosita 3 Pink Imp, Rosita 3 Pure White. The results revealed that Echo Purple recorded maximum plant height (94.02 cm) and internodal length (8.05 cm), Echo Lavender recorded maximum number of leaves (44.48), leaf area (41.05 cm<sup>2</sup>), leaf area index (4.56). Based on the findings of the experiment it is concluded that the genotype Echo Lavender followed by Echo Purple, Echo Blue found to be superior with regard to most of as morphological parameters.

**Keywords:** Varietal, evaluation, *Lisianthus*, morphological, *Eustoma grandiflorum* Shinn.

### Introduction

*Eustoma grandiflorum* Shinn. Syn. *Lisianthus russelianus* Hook., (2n=36) belongs to family Gentianaceae. *Lisianthus* is also known as 'Texas Blue Bell' and Prairie Gentian (Halevy and Kofranek, 1984). *Eustoma* is named after the two Greek words Eu (beautiful, good, well), and stoma (mouth). Although delicate and soft-hued in style, *Lisianthus* flowers boast powerful symbolism. This floral species represents charisma, appreciation, and gratitude. It mainly used for beautification, bouquets, showy purposes and decorating walls, fences, gates, hedges. It is not only popular as a cut flower but also a bedding plant and a pot plant in the market (Grueber *et al.*, 1985 and Harbaugh, 2007) [7, 10].

*Lisianthus*, herbaceous annual growing to 15 to 60 cm tall, with bluish green, slightly succulent leaves. These are having large funnel-shaped flowers growing on long straight stems, sometimes erect single stems, other times growing on branching stems that can rise to be eighteen feet tall. The flowers can grow up to two inches across and can be found in a variety of colors. *Lisianthus* are long-stemmed flowers in cymes, with often only a few openings at a time. Sepals on *Lisianthus* are only fused close to the base and are much smaller than petals. As the performance of cultivars varies with region, season and genotypes, testing of performance of the available genotypes for suitability and adaptability with respect to flowering, flower quality and yield parameters takes prime importance.

### Material and Methods

The present investigation was carried out in College of Horticulture, Mudigere (under Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga) under protected condition, in the year 2020-2021. The experiment was laid out in Randomized Complete Block Design (RCBD) which had fifteen treatments with three replication each with the spacing 20 x 20 cm. Fifteen *Lisianthus* genotypes were procured from Sakata ornamentals, Bengaluru viz., T<sub>1</sub> – Echo Lavender, T<sub>2</sub> – Echo Light Pink, T<sub>3</sub> – Rosita 2 Pink Picotee, T<sub>4</sub> – Echo Purple, T<sub>5</sub> – Echo Blue, T<sub>6</sub> – Echo Yellow, T<sub>7</sub> – Robella 2 Pure White, T<sub>8</sub> – Rosita 2 Blue Picotee, T<sub>9</sub> – Echo Pure White, T<sub>10</sub> – Robella 3 Clear Pink, T<sub>11</sub> – Rosita 3 Green, T<sub>12</sub> – Rosita 3 Blue Imp, T<sub>13</sub> – Rosita 4 Yellow, T<sub>14</sub> – Rosita 3 Pink Imp, T<sub>15</sub> – Rosita 3 Pure White.

About 90 days old seedlings were transplanted (4<sup>th</sup> leaf stage) were transplanted in raised beds of 1 m and convenient length and irrigated as required. Fertilizers were given as per the recommended dose. Plant protection measures were undertaken based on the need. The data were recorded on various growth, flowering and flower quality parameters from five randomly tagged plants in each plot.

## Results and Discussion

The data pertaining to morphological characters are furnished in Table 1. Among fifteen genotypes of Lisianthus, significantly maximum plant height was recorded with the genotype Echo Purple (94.02 cm) while, the minimum plant height was recorded in Rosita Blue Picotee (54.73 cm). Genetic factors play an important role to regulate plant height along with its overall performances. Similar findings were reported in Bhargav *et al.* (2020) [5], Uddin *et al.* (2013) [22] and Ahmad *et al.* (2017) [1] in Lisianthus. The maximum number of leaves (44.48), leaf area (41.05 cm<sup>2</sup>), leaf area index (4.56) was recorded with the genotype Echo Lavender. The leaves are the functional unit of photosynthesis, which greatly influenced the growth and flower yield of the crop. These results are in accordance with the findings of Anitha *et al.* (2016) [4] in Lisianthus and Karrow and Sharma (2008) [12] in Carnation, Bhat *et al.* (2016) [6] and Nataraj *et al.* (2014) [16] in Asiatic Lily and Sandesh (2019) [7] in Liliums.

The plant spread varied significantly in East-West and North-South direction, respectively (Table 1), the maximum plant spread was observed in the genotype Echo Lavender (21.38 cm) whereas, the minimum plant spread observed in Rosita 3

Pure White (14.47 cm) in East-West direction. The maximum plant spread was observed in Echo Lavender (21.88 cm) while, the minimum plant spread observed in Rosita 3 Pure White (15.20 cm). Different genotypes have a significant impact on plant spread or canopy spread, which is regarded a crucial factor that indicates the rate of vegetative growth. It helps to utilize sunlight to maximum extent. Variations due to varieties has been reported by Shivaprasad *et al.* (2016) [19] in Rose, Amreen (2012) [2] in Gerbera, Aditya *et al.* (2019) Manjula and Nataraj (2017) [13] in Dahlia and Sarkar *et al.* (2020) in China aster.

The maximum number of branches per plant (5.94) was recorded with the genotype Echo Lavender while, the minimum number of branches per plant recorded in the genotype Rosita 3 Pure White (2.21). Variation for this character may be genetic behaviour of the genotype. Increased number of branches leads to production of more number of leaves in turn it will enhance the yield of flowers. The results are in confirmation with that of Uddin *et al.* (2013) [22] and Ahmad *et al.* (2017) [1] in Lisianthus, Manjula and Nataraj (2017) [13] in Dahlia and Tarannum and Naik (2012) in Carnation. The maximum internodal length was recorded in the genotype Echo Purple (8.05 cm) whereas, minimum internodal length recorded in the genotype Echo Yellow (4.85 cm). The variation in the internodal length among the genotypes may be genetic control. In addition to this, higher the internodal length more will be the plant height. Anitha *et al.* (2013) [3] Lisianthus and Mukund *et al.* (2004) [15] in Carnation reported similar results.

**Table 1:** Growth traits of different Lisianthus genotypes under protected cultivation

Genotypes	Plant height (cm)	Number of leaves	Leaf area (cm <sup>2</sup> )	Leaf area index	Plant spread (cm)		Number of branches per plant	Internodal length (cm)	Chlorophyll (mg/g) of fresh weight		
					E-W	N-S			Chl 'A'	Chl 'B'	Total Chl
T <sub>1</sub> - Echo Lavender	84.00	44.48	41.05	4.56	21.38	21.88	5.94	7.83	1.46	0.51	1.97
T <sub>2</sub> - Echo Light Pink	69.59	37.35	26.40	2.46	17.46	17.53	3.07	7.32	1.54	0.62	1.53
T <sub>3</sub> - Rosita 2 Pink Picotee	74.26	35.48	21.38	1.89	15.23	15.92	4.10	7.16	1.53	0.61	2.15
T <sub>4</sub> - Echo Purple	94.02	42.05	35.44	3.72	18.85	19.69	5.07	8.05	1.42	0.49	1.86
T <sub>5</sub> - Echo Blue	90.95	41.71	31.84	3.32	18.20	18.65	5.52	7.49	1.75	0.71	2.44
T <sub>6</sub> - Echo Yellow	58.45	33.07	24.43	2.01	16.56	17.41	2.47	4.85	1.38	0.41	1.78
T <sub>7</sub> - Robella 2 Pure White	77.98	38.98	25.86	2.52	17.13	17.97	3.33	6.46	1.29	0.38	1.64
T <sub>8</sub> - Rosita Blue Picotee	54.73	32.45	25.40	2.06	16.10	17.17	2.77	6.93	1.48	0.51	1.46
T <sub>9</sub> - Echo Pure White	70.25	37.10	26.51	2.45	16.89	17.08	2.60	6.24	1.35	0.47	1.80
T <sub>10</sub> - Robella 3 Clear Pink	88.07	41.77	37.21	3.88	19.51	20.05	4.12	7.72	1.87	0.75	2.46
T <sub>11</sub> - Rosita 3 Green	72.63	38.74	22.87	2.21	15.32	16.13	3.92	6.88	1.28	0.48	1.71
T <sub>12</sub> - Rosita 3 Blue Imp	66.26	37.68	25.28	2.38	15.96	16.55	2.82	6.59	1.14	0.39	1.58
T <sub>13</sub> - Rosita 4 Yellow	67.07	37.85	24.09	2.27	14.76	15.64	3.13	6.54	1.03	0.36	1.27
T <sub>14</sub> - Rosita 3 Pink Imp	75.77	38.26	24.29	2.32	16.10	16.78	3.17	6.98	1.31	0.42	1.75
T <sub>15</sub> - Rosita 3 Pure White	59.76	34.71	19.94	1.73	14.47	15.20	2.21	6.00	1.25	0.46	1.37
S. Em ±	1.29	0.97	2.28	0.45	0.79	0.77	0.37	0.11	0.03	0.01	0.05
CD @ 5%	3.74	2.82	6.61	1.33	2.29	2.22	1.07	0.31	0.10	0.04	0.13

The chlorophyll content in leaf enhanced photosynthetic activity, which produce carbohydrates, carbohydrates serves as energy source for growing bud, flower opening and longevity. The chlorophyll content varied significantly among the genotype of Lisianthus (Table 1). Chlorophyll 'a' content was significantly maximum in genotype Robella 3 Clear pink (1.87 mg/g) and minimum in Rosita 4 Yellow (1.03 mg/g). The Chlorophyll 'b' content was significantly maximum in genotype Robella 3 Clear pink (0.75 mg/g) and minimum in Rosita 4 Yellow (0.36 mg/g). The total chlorophyll content was significantly maximum in genotype Robella 3 Clear pink (2.46 mg/g) and minimum in Rosita 4 Yellow (1.27 mg/g).

The leaf chlorophyll content is a genetic character that differs according to the genotype. The variation in chlorophyll content was previously observed in Uddin *et al.* (2013) [22] and Ahmad *et al.* (2017) [1] in Lisianthus, Soujanya *et al.* (2018) [20] in Rose and Tarannum and Naik (2012) [21] in Carnation.

Performance of any cultivar is determined by its genetic makeup and environmental conditions. The variation in plant vigour among cultivars could be attributed to genetic variations. Variations among cultivars are observed because these characteristics are genetically controlled. As a result, the vigorous growing genotypes outperformed other genotypes in

some or all vegetative characteristics such as plant height, number of branches, leaf area, number of leaves, internodal length, chlorophyll content, and so on, some of which are interdependent.

### Conclusion

Significant differences among the fifteen Lisianthus cultivars were found in respect of all of the attributes evaluated. Results of the experiment clearly confirmed that, the genotype Echo Lavender followed by Echo Purple, Echo Blue found to be superior with regard to most of the morphological parameters.

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