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EVALUATION IN DIFFERENT GLADIOLUS (*GLADIOLUS GRANDIFLORUS* L.) VARIETIES FOR SPIKE AND CORM YIELD ENHANCEMENT IN COASTAL TAMIL NADU

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ABSTRACT

Gladiolus is one of the prime cut flower which occupies eight position in global trade among the cut flowers. To bring the gladiolus cultivation under commercial scale in coastal Tamilnadu condition it is imperative to identify suitable varieties. Hence, a field experiment was conducted in Randomized Block Design with two replications in Department of Horticulture, Annamalai University, during 2017-2018 to find out the suitability of twenty five gladiolus varieties for their growth, flowering, spike yield and corm yield characters under coastal region of Tamil Nadu. The results revealed that there were significant difference among the varieties with respect to vegetative parameters, flower and corm yield. Among all varieties, Sarala and White friendship were found performing better with highest growth, flowering and yield parameters. The maximum dry matter production was recorded in Sarala (37.61g plant⁻¹) followed by White friendship (36.48g plant⁻¹) and guvari (36.12g plant⁻¹) and the minimum dry matter production was recorded in Hunting Song (11.60 g plant⁻¹). Significantly highest spike length (95.41cm) and rachis length (54.94cm) were recorded in cultivar 'Sarala' followed by White friendship and Guvari. However, the maximum of one marketable spike yield per plant was observed in the cultivars Sarala, White Prosperity, Guvari and White friendship. The maximum number of (1.50) corms per plant was recorded in 'Sarala' and Guvari while many cultivars viz., Hunting Song, Green Star, Nova Zembla, Purple Flora, Adagio, Karma, Apollo, Morallo and Yellow star have produced only one corm. It could be concluded that the gladiolus varieties Sarala, White friendship and Guvari were found suitable for the coastal region of Tamil Nadu.

Introduction

In India, there has been a vibrant shift from sustenance production to commercial production of flowers with 324000ha of area under floriculture during 2017-18 that led to a production of 1962 Mt of loose flowers and 823 million (numbers) of cut flowers (NHB., 2018). India's total export of floriculture was worth Rs. 507.31 crores during 2017-18. Gladiolus (*Gladiolus grandiflorus* L) is one of the most popular cut flowers that belong to the family Iridaceae and subfamily Ixiodeae. It is commercially grown in India, Russia, China, USA, South America, South Africa, Italy, England, France, Germany, Spain, The Netherlands and Syria. It is available round the year because of its wide adaptability under various agroclimatic zones of the country. It is mainly cultivated in Karnataka, Maharashtra, Punjab, West Bengal, Uttar Pradesh, Haryana, Tamil Nadu, Uttarakhand, Jammu and Kashmir, Himachal Pradesh and Odisha (Singh and Sisodia, 2017). Though there are about 260 species and over 30,000 varieties of gladiolus (Singh, 2014) available and every year a great number of new varieties are being introduced, hence, it becomes difficult for the user to obtain enough information to judge the value of these varieties and their suitability to grow in new regions.

A comparative varietal evaluation of new cultivars along with existing cultivar is necessary to determine the value of these cultivars is essential. Further, to promote

commercial cultivation of this crop in new areas like coastal Tamilnadu region, varietal evaluation need to be done to recommend promising cultivars. Generally, evaluation studies on varieties are aimed to contribute in identifying good varieties for promotion and to avoid least prospective varieties to stop unnecessarily loss of capital by investing in these varieties. Gladiolus is concerned, flowering characters of spike determines greatly for suitability of variety or genotype for production. The performance of any crop or cultivar largely depends on genotypic constituent and effect of environmental condition. As a result, cultivars which perform well in one region may not perform the same in other regions of varying climatic conditions (Panday, 2012). Crop improvement in any flower crop is aimed at developing high yielding variety with quality parameters of consumer preference. Hence, to introduce gladiolus as an alternative commercial flower crop in the coastal Tamilnadu region suitable varieties which can produce salable quality spike and mother corm have to be identified. In light of the above facts, a research work has been carried out in gladiolus to find out the suitability of twenty five gladiolus varieties for their growth, flowering, spike yield and corm yield characters under coastal region of Tamil Nadu.

Materials and Methods

The experiment was carried out in RBD (Randomized block design) during the year 2017-2018 in the floriculture

yard at orchard unit of the Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamil Nadu. Corms of twenty five number of gladiolus varieties viz., White Prosperity, White Friendship, Candyman, Sarala, Guvvari, Hunting Song, Green Star, Nova Zembla, Purple Flora, Adagio, Karma, Peter Pears, Her Majesty, American Beauty, Nova Lux, Eurovision, Sylvia, Jester, Apollo, Pricilla, Summer Sunshine, Red Majesty, Morallo and Charmsflow were collected from commercial floriculture units in Kalimpong, New Delhi, Jammu and Kashmir. These corms were planted in ridges and furrow made at a spacing of 45 cm x 15 cm in a plot size of 1.25m x 1.5 m dimension. The soil of the experiment site is sandy loam having the pH range of 7.0 – 7.5. vermicompost @25t/ha was applied 15 days prior to planting during land preparation. Standard package of practices were adopted throughout the experiment to grow a healthy crop. Observations on various morphological parameters including plant height, number of leaves per plant, leaf length, leaf width, days to spike emergence, spike length, number of floret per spike, flower length, flower diameter, diameter of corm and number of cormels were recorded periodically. The genotype White friendship was considered as standard check. The data were analysed as per the procedure given by the Panse and Sukhatme (1967). Mean and critical difference for each character was computed to derive meaningful conclusion.

Result and Discussion

Growth Parameters

Results revealed significant variation among the twenty five cultivars with respect to all the growth parameters studied (Table 1). The days taken for sprouting was differed between the cultivars from 8.10 days in Candyman to 23.60 days in Nova Zembla. Significantly early sprouting observed in cultivar Candyman is significantly on par with White Prosperity, White Friendship, Sarala and Guvvari. Plant height varied from 108.42cm to 54.20 cm, with cultivar sarala (108.42 cm) recording the tallest plants followed by White friendship (106.67cm) and guvari (100.31cm) and the poorest plant height was recorded in Hunting Song (54.20cm) respectively. Significantly highest leaves length (69.80cm) recorded in ‘Sarala’ was on par with the leaf length of Guvvari (69.72cm), White Friendship (69.42cm) and White Prosperity (69.32cm), whereas the least leaf length (58.42 cm) was recorded in ‘Hunting Song’. The maximum leaf area was found in Sarala (117.42 cm²) and the minimum leaf area was recorded in Hunting Song (95.01 cm²). The maximum dry matter production was recorded in Sarala (37.61g plant⁻¹) followed by White friendship (36.48g plant⁻¹) and guvari (36.12g plant⁻¹) and the minimum dry matter production was recorded in Hunting Song (11.60 g plant⁻¹). The data clearly indicate that the wide variation observed in different growth characters are probably due to genetic nature of the varieties which phenotypically appear when grown under the costal Tamilnadu condition. Morphological variations on number of days to sprouts and size of leaf were observed between different gladiolus varieties by Kadam *et al.* (2014), Sisodia and Singh (2015), Swaroop *et al.* (2017) and Mushtaq *et al.* (2018) Similar finding have been reported by earlier worker Ranjan *et al.* (2010), Shaukat *et al.* (2012), Negi *et al.* (2014) and Chourasia *et al.* (2015). The better performance of growth characters observed in gladiolus cultivars Sarala, White Friendship and Guvvari might be because of early sprouting and higher leaf area which might have increased

photosynthesis leading to the availability of more photosynthates. Hence, the growth performance has reflected in number of days taken for spike emergence. The number of days to spike emergence among the varieties t ranged from a maximum of days 85.14 in ‘Hunting Song’ to the minimum 70.11 days in ‘White Friendship’.

Flowering Parameters

Flowering parameters of different gladiolus varieties differed significantly when grown under coastal Tamil Nadu condition (Table 2). Significantly highest spike length (95.41cm) and rachis length (54.94cm) were recorded in cultivar ‘Sarala’ followed by White friendship with a spike length of 93.87cm and rachis length of 54.12cm and Guvvari with a spike length of 87.38cm and rachis length of 53.71cm. Though the spike length of White Prosperity was 87.54cm the rachis length was only 41.41cm. The least spike length (48.80cm) and rachis length (21.73cm) were recorded in Yellow star. The maximum spike weight was observed in Sarala (95.01 g) followed by White friendship (93.83g) and Guvvari (94.33g). The minimum was recorded in Hunting Song (48.31g). The number of florets per spike was ranged from 5.30 in cultivar Yellow star to 13.40 in cultivar Sarala. The number of florets per spike recoded in cultivars White friendship (13.20) and Guvvari (13.10) were on par with the cultivar Sarala. The floret diameter was ranged between 3.38cm in Hunting Song to 7.88cm in Sarala. It could be noticed that the when the number of florets were more than 10 in a variety the rachis length was more than 40cm. The days taken for first flower opening was found the earliest of 84.60days in Sarala which was on par with Candyman, White Prosperity, Guvvari and White friendship. Spike length, rachis length and number of florets per spike were found to be governed by genetic architecture of the genotype. These results were found in consonance with the earlier findings of Lepcha *et al.* (2007), Punam *et al.* (2009), Ganesh *et al.* (2014) and Naresh *et al.* (2015) with respect to flowering parameters of different gladiolus cultivars. The days taken for first flower opening was very late in Karma (98.70 days) followed by Adagio (87.80 days). Similar variation in days taken for opening of florets was noticed by Aswath and Parthasarathy (1996), Swain et al (2008) Kumar *et al.* (2014) and Singh *et al.* (2017). in gladiolus.

Spike and corm yield Parameters

The number of spikes produced per plant was insignificant among the cultivars as most of the plants produced one spike and very few plants failed to produce spike. However, significant differences were observed in number of marketable spikes produced per plant. The maximum of one marketable spike per plant was produced by the cultivars Sarala, White Prosperity, Guvvari and White friendship. The least number of 0.5 marketable spikes were produced by the cultivars viz., Green Star, Nova Zembla, Purple Flora, Adagio, Karma, Morallo, Charmsflow and Yellow star. As the numbers of florets per spike and rachis length decide the marketability of the spikes, the cultivars viz., Sarala (1.00) White Prosperity (1.00), Guvvari (1.00), White friendship (1.00) Candyman (0.9), Her Majesty (0.9), American Beauty (0.9), Hunting Song (0.8) and Pricilla (0.8) have performed well in producing marketable spikes. Variation in spike yield between different gladiolus cultivar was earlier reported by Aswath and Parthasarathy (1996),

Swain et al (2008) Kumar *et al.* (2014) and Singh *et al.* (2017).

The maximum number of (1.50) corms per plant was recorded in 'Sarala' and Guvvari while many cultivars viz., Hunting Song, Green Star, Nova Zembla, Purple Flora, Adagio, Karma, Apollo, Morallo and Yellow star have produced only one corm. The maximum corm diameter of 2.82 cm recorded in cultivar Sarala was on par with White Prosperity (2.80cm) and the minimum corm diameter was observed in Hunting Song (1.08 cm). Significantly highest numbers of cormels were produced in Sarala (14.38) followed by Guvvari (13.71.00) and White friendship (13.11). However, few cultivars failed to produce cormels include Hunting Song, Green Star, Nova Zembla, Purple Flora, Adagio, Karma, Apollo and Morallo. Variation in corm and

cormel production observed in present study is in consonance with the reports of Singh *et al.* (2013), Kadam *et al.* (2014), Sisodia and Singh (2015) in gladiolus. Similar findings was observed by Poon *et al.* (2010), Shaukat *et al.* (2012), Jana *et al.* (2013), Singh *et al.* (2013a) and Rao *et al.* (2015).

Among the twenty five gladiolus cultivars studied Sarala and White friendship and Guvvari were found superior in terms of growth parameters, floral characters, spike yield and corm yield. Hence, it could be concluded that the gladiolus varieties Sarala, White friendship and Guvvari were found suitable for the coastal region of Tamil Nadu. Further, these varieties need to be evaluated in multi location in coastal Tamilnadu region in large plots to confirm their performance.

Table 1 : Growth Performance of gladiolus varieties in Coastal Tamil Nadu

Varieties	Sprouting	Plant height	Leaf length	Leaf area	Dry matter production (g plant ⁻¹)	Days taken for spike emergence
White Prosperity	8.80	99.48	69.32	117.15	30.64	72.40
Candyman	8.10	97.30	68.33	115.87	34.85	71.30
Sarala	8.80	108.42	69.80	116.67	37.61	72.20
Guvvari	8.30	100.31	69.72	116.67	36.12	73.40
Hunting Song	23.60	54.20	58.42	95.01	11.60	85.10
Green Star	20.30	60.25	63.23	103.43	17.10	80.10
Nova Zembla	23.30	65.38	59.38	98.73	15.35	84.80
Purple Flora	22.70	60.31	60.23	101.68	16.08	83.20
Adagio	18.60	73.91	67.22	113.55	20.34	79.00
Karma	16.10	74.28	68.21	115.33	24.04	78.20
Peter Pears	13.20	80.50	68.71	116.12	30.23	76.00
Her Majesty	11.60	84.27	69.12	116.81	24.72	75.10
American Beauty	10.30	87.18	69.33	117.01	32.07	74.10
Nova Lux	15.20	78.31	68.41	115.81	24.00	77.30
Eurovision	13.30	80.38	68.82	116.20	27.47	76.10
Sylvia	17.40	69.40	67.43	114.62	25.77	79.30
Jester	17.70	78.34	68.11	115.18	28.05	79.60
Apollo	12.30	83.58	69.02	116.42	23.10	76.30
Pricilia	16.30	77.52	68.32	115.53	31.75	78.30
Summer sunshine	14.50	79.23	68.60	116.00	29.11	77.40
Red majesty	19.40	61.28	65.33	110.28	21.07	80.30
Morallo	21.60	55.45	61.81	103.43	17.56	81.30
Charmsflow	18.20	64.23	68.73	112.14	19.97	80.70
White friendship	8.20	106.67	69.42	116.52	36.48	70.10
Yellow star	14.30	60.28	65.38	110.32	13.51	86.60
Mean	15.28	77.58	66.82	112.26	25.14	77.93
SED	0.75	0.33	0.29	0.27	0.10	0.41
CD(0.5%)	1.01	0.67	0.59	0.55	0.21	0.82

Table 2 : Flowering performance of gladiolus varieties in Coastal Tamil Nadu

Varieties	Spike length	Rachis length	Spike weight	No. of florets per spike	Floret diameter	Days taken for first floret open
White Prosperity	87.54	41.41	88.66	10.10	6.66	85.20
Candyman	85.63	46.33	93.42	11.30	6.78	84.50
Sarala	95.41	54.94	95.01	13.40	7.88	84.60
Guvvari	87.38	53.71	94.33	13.10	7.66	85.30
Hunting Song	47.70	25.42	62.51	6.20	3.38	90.30
Green Star	53.02	31.98	78.81	7.80	5.66	93.60
Nova Zembla	57.53	22.14	65.71	5.40	4.22	96.30
Purple Flora	53.07	26.24	68.48	6.40	4.33	95.20
Adagio	65.04	26.65	78.81	6.50	5.11	97.80

Karma	65.37	30.34	81.88	7.40	6.11	98.70
Peter Pears	70.84	35.26	84.43	8.60	6.73	86.90
Her Majesty	74.16	45.10	88.32	11.00	7.10	85.60
American Beauty	76.72	47.56	90.16	11.60	7.22	85.90
Nova Lux	68.91	36.08	82.10	8.80	6.44	86.10
Eurovision	70.73	35.67	85.38	8.70	6.93	85.40
Sylvia	61.07	32.80	79.32	8.00	5.87	89.50
Jester	68.94	31.98	80.88	7.80	6.01	88.40
Apollo	73.55	38.54	86.30	9.40	7.00	85.50
Pricilia	68.22	39.59	81.33	9.90	6.31	86.00
Summer sunshine	69.72	31.16	83.81	7.60	6.62	86.30
Red majesty	53.93	32.39	74.30	7.90	5.31	92.40
Morallo	53.05	27.47	70.51	6.70	5.02	94.20
Charmsflow	56.52	28.29	76.32	6.90	5.44	91.60
White friendship	93.87	54.12	93.83	13.20	7.12	85.90
Yellow star	48.80	21.73	77.33	5.30	4.88	98.70
Mean	68.27	35.92	81.68	8.76	6.07	89.60
SED	0.24	0.16	0.44	0.3	0.18	1.06
CD(0.5%)	0.48	0.33	0.88	0.6	0.37	2.13

Table 3 : Spike and corm yield performance of gladiolus varieties in Coastal Tamil Nadu

Varieties	Spike yield per plant	No. of marketable Spikes per plant	No. of corms per plant	Corm diameter (cm)	Corm weight (g)	No. Of cormels per plant
White Prosperity	1.00	1.00	1.41	2.06	15.60	12.57
Candyman	1.00	0.90	1.50	2.78	22.80	11.68
Sarala	1.00	1.00	1.50	2.81	23.10	14.38
Guvari	1.00	1.00	1.08	2.77	22.70	13.71
Hunting Song	0.90	0.80	1.00	1.08	5.80	0
Green Star	0.90	0.50	1.00	1.78	12.80	0
Nova Zembla	0.80	0.50	1.00	1.51	10.10	0
Purple Flora	0.80	0.50	1.00	1.66	11.60	0
Adagio	0.80	0.50	1.00	2.08	15.80	0
Karma	0.90	0.50	1.00	2.43	19.30	1.81
Peter Pears	0.90	0.60	1.26	2.60	21.00	8.53
Her Majesty	1.00	0.90	1.40	2.38	18.80	2.22
American Beauty	1.00	0.90	1.20	2.68	21.80	9.71
Nova Lux	0.90	0.60	1.33	2.30	18.00	2.62
Eurovision	0.90	0.70	1.30	2.51	20.10	5.38
Sylvia	0.90	0.70	1.35	2.47	19.70	4.51
Jester	0.90	0.60	1.22	2.54	20.40	6.21
Apollo	0.90	0.70	1.00	2.26	17.60	1.11
Pricilia	0.90	0.80	1.37	2.70	22.00	10.11
Summer sunshine	0.90	0.60	1.24	2.57	20.70	7.32
Red majesty	0.90	0.60	1.16	2.16	16.60	1.72
Morallo	0.80	0.50	1.00	1.91	14.10	0
Charmsflow	0.80	0.50	1.18	2.10	16.00	0
White friendship	1.00	1.00	1.43	2.80	23.00	13.11
Yellow star	0.80	0.50	1.00	1.23	7.30	0
Mean	0.90	0.70	1.20	2.25	17.47	5.07
SED	0.01	0.01	0.01	0.02	0.18	0.04
CD(0.5%)	0.03	0.03	0.03	0.05	0.37	0.08

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