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## Performance of new gladiolus cultivars under the Gangetic plateau of West Bengal conditions

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### Abstract

An experiment was conducted to assess the performance of gladiolus cultivars at the Horticultural Research Station, Moundori farm, Bidhan Chandra Krishi Viswavidyalaya, where was nine cultivars tested during two consecutive year 2016-2017 and 2017-2018 under AICRP programme in West Bengal. Among the new cultivars tested, AC.No.7 and Punjab Glad-1 may be recommended for quality spike production along with Pusa Kiran, Pusa Subham, Yellow enterprise and Candy Man.

**Keywords:** Cultivar, flowering duration, gladiolus, spike length, vase life, corms and cormels

### Introduction

Gladiolus has gained much importance as it is the 'Queen of bulbous flowers. The gladiolus has a long and noble history. The latin word 'Gladius' means sword and hence it is often called as 'sword lily' because of the shape of its leaves. Gladiolus was also called 'xiphium' based on the Greek word 'Xiphos' also meaning sword. Gladiolus is grown commercially from corms both for the flowering spikes and for corm production. Gladiolus is very an important cut flower crop and also ideal both for garden display and floral arrangements for table and interior decoration as well as making high quality bouquet. It is a member of family *Iridaceae* and subfamily *Ixioidae*, is one of the most popular ornamental bulbous plants grown commercially for its fascinating flowers in many parts of the world.

Gladiolus is rich in varietal wealth, and every year there is addition of new cultivars. Hence, an evaluation of various cultivars was carried out to assess suitability of growing these in the West Bengal. 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). Hence, the present experiment was conducted to evaluation of gladiolus varieties suitable for growth, corm and cormel production under AICRP programme of Bidhan Chandra Krishi Viswavidyalaya.

### Material and methods

The present investigations were carried out at the Horticultural Research Station, Bidhan Chandra Krishi Viswa vidhyalaya, West Bengal during winter season of 2016-18. The experiment will be laid out in *Randomized Complete Block Design* with 3 replications and 30 corms of each genotype per replication. The healthy corms of 9 varieties (Yellow Emperor, Candy Man, Pusa Kiran, Pusa Subham, American Beauty, AC.No.7, Inter Paid, Yellow Enterprise, Punjab Glad-1) were taken and cleaned by removing the dried husk present on them. Then they were dipped in blitox (0.2%) solution for 20 minutes as preventive measure for *Fusarium* wilt disease. These corms were planted at a spacing of 30 x 20 cm in each row along the sides of the ridges at a depth of 5-6 cm. Light irrigation was given immediately after planting. All cultural operations were uniformly done for all the cultivars prescribed the university. Observations were recorded on various plant growth, flowering, corm and cormel attributes and data were analyzed statistically.

### Results and Discussion

The performance in terms of growth, yield and quality parameters in any crop species including ornamentals are known to be influenced by various factors like variety used, season of planting, cultural practices adopted, environment, incidence of pest and diseases etc. Among various factors, selection of suitable variety is most important and vital aspect which self contributes much to the performance of any flower crop.

However, the performance of cultivars of any crop species differs from one region to another region under a given set of agro-climatic conditions. Considering these points, the new elite gladiolus hybrids were evaluated under gang tic conditions of west Bengal. Various growth parameters were influenced significantly due to response of varieties.

Plant height varied from 50.4 to 77.45 cm, with cultivar Candy Man recorded the tallest plants, while, cv. Inter Paid had the shortest plants. The plant height was highest in the variety Candy Man (77.45 cm) followed by Punjab Glad -1, Yellow Enterprise and low in Inter Paid (50.4 cm) variety. The variation in plant height in different varieties may be due to genetic and environmental factors. It is clearly indicated from the data that there is wide variation in different plant height, which is probably due to genetic nature of the varieties which phenotypically appear. The variation in plant height among the various varieties might be due to genotypic differences in phenotypic expression of plant height and variations in different genotype-environmental interaction effects on plant height. It could have also been influenced by other plant characters viz., corm size, planting distance, etc. The results find support from reports of Saifullah and Ahmed (2001) <sup>[12]</sup>, Nagaraju and Parthasarthy (2001) <sup>[7]</sup>, Nair and Shiva (2003) <sup>[8]</sup>, Kumar and Yadav (2005) <sup>[5]</sup> and Swain *et al.* (2008) <sup>[15]</sup>.

Spike characters are important with regard to cut flower production in gladiolus especially when we consider quality. The hybrids under study have shown significant differences with respect to spike length, spike girth, rachis length and weight of the spike. Spike girth is a crucial character since it determines the sturdiness of cut flower. Malik (1968) <sup>[6]</sup> recognized sturdiness of cut flower as one of the important character. Spike girth should be more to have sturdy cut flower in vases otherwise the weak and thin spikes may bend after some time in vases. Punjab Glad-1 recorded maximum spike length (129.3 cm) followed by Candy Man (117.17 cm). The varieties A.C...No.7, Yellow Enterprise, Pusa Kiran, Pusa Subham recorded tall spike length 117.17 cm, 117.00 cm, 104.50 cm, 104.33 cm respectively where as Inter Paid recorded significantly shortest (74.34 cm) spike length.

Both Punjab Glad-1 and AC.No.7 recorded maximum rachis length (67cm) which was at par with Yellow Enterprise (66 cm). The variety Inter Paid showed minimum rachis length (40.17 cm). This data indicated that those varieties having tall spike recorded maximum rachis length and shortest spike length varieties show small rachis.

Flower characters are also important for a cut flower genotype as it will decide the attractiveness of the spike. The variety Pusa Kiran (19) produced maximum number of florets per spike and lowest was in Inter Paid.

Flower size in terms of diameter of spike was maximum in Yellow Enterprise (12.38cm). Maximum number of florets per spike was noticed in Pusa Kiran (19) which was followed by Pusa Subham (17).

Cultivar A.C...No.7 has taken significantly lowest number of days (74.50) for flowering followed by American Beauty (78.67) days. However, cultivar Pusa Subham has taken significantly higher number of days (95.34) to flower when compared with all other cultivars. Pusa Kiran and Punjab

Glad-1 were at par with Pusa Subham. From the data it is evident that time taken for flowering varied significantly among the cultivars. The dark coloured varieties have taken maximum number of days for flowering than the light coloured varieties.

For a good cut flower, vase life is another important factor. The preference of consumers depends on the vase life of the cut spikes along with other good qualities of spikes as colour of florets, spike length and number of florets per spike *etc.* In the present investigations, genotypes have shown significant differences for vase life period. The maximum vase life period was observed in Pusa Kiran and minimum in Punjab Glad-1. It may be due to genetic makeup of the hybrids (Singh *et al.*, 2000) <sup>[14]</sup>.

Varietal differences existed with regard to production of marketable spikes per plant. Number of marketable spikes per plant is very much important as it decides the spike yield per unit area. The variety Candy Man recorded the maximum number of spikes per plant.

The Yellow Enterprise recorded maximum (12.38 cm) diameter of floret and the least was observed in case of Yellow Emperor (10.17 cm). Hegde (1994) <sup>[3]</sup>, Pasannavar (1994) <sup>[10]</sup>, Kamble (2001) <sup>[4]</sup> also observed variation for the above parameters in different genotypes.

### Corm characters

The results showed highly significant differences in corm characters among the varieties. The maximum diameter of corm (6.88 cm) in A.C...No.7 followed by Yellow Enterprise and Yellow Emperor (6.64 cm, 6.48 cm) respectively. The minimum (3.89 cm) in Pusa Subham. Size of corm might be mainly governed by the genotypic makeup of the varieties determining the number of corms produced per plant, as the number of corms produced per plant appeared to be negatively correlated to corm diameter. It might be due to partitioning of the food material and its less availability for accumulation into individual corm. Similar, results on corm diameter have been reported by Kumar and Yadav (2005) <sup>[5]</sup>.

The maximum weight of corm (64.00 g) was noted in Yellow Enterprise whereas the minimum (26.67g) was recorded in Pusa Subham. The varieties American Beauty and Yellow Emperor are on par with each other (63.33 g and 63.17 g) in case of weight of corm. Whereas the maximum number of 10.50 cormels per plant was recorded in Yellow Enterprise followed by Inter Paid, A.C...No.7 (9.00, 8.50) respectively, while the minimum number of 3.67 cormels per plant was observed in Pusa Subham. The weight of corm and cormels per plants appeared to be associated with diameter of corm as evident from the results. It could be due to the fact that larger corms might have deposited more food resulting into their correspondingly heavier weight and vice versa. The results are in accordance with the finding of Kumar and Yadav (2005) <sup>[5]</sup>, Ram *et al.* (2005) and Bhujbal *et al.* (2013) <sup>[2]</sup>. The maximum weight of cormels produced per plant (28.67 g) in Yellow Enterprise and the minimum (8.34 g) in Pusa Subham. The weight of cormels produced per plant in various varieties was closely associated with the number of cormels produced per plant.

**Table 1:** Agromorphic traits of new genotypes of gladiolus

Name of the genotypes	Plant height (cm)			Days taken flower emergence			Days to flowering			Shape of floret (open/ hooded)	Colour of florets
	2016-17	2017-18	Mean	2016-17	2017-18	Mean	2016-17	2017-18	Mean		
Yellow Emperor	53.33	50.00	51.67	78.33	73.67	76.00	86.67	84.00	85.34	Open	Yellow
Candy Man	75.90	79.00	77.45	73.67	72.00	72.84	85.00	82.00	83.50	Open	Red
Pusa Kiran	65.87	70.00	67.94	82.33	80.67	81.50	94.00	92.33	93.17	Open	White
Pusa Subham	64.17	66.00	65.09	84.67	83.00	83.84	96.67	94.00	95.34	Open	White
American Beauty	60.13	60.13	60.13	68.33	64.00	66.17	80.00	77.33	78.67	Open	Pink
A.C...No.7	70.97	65.33	68.15	65.00	63.00	64.00	75.33	73.67	74.50	Open	Creamy
Inter Paid	50.07	50.00	50.04	72.67	70.00	71.34	85.67	84.00	84.84	Open	Brick red
Yellow Enterprise	71.40	73.00	72.20	79.67	77.67	78.67	88.00	85.67	86.84	Open	Yellow
Punjab Glad-1	72.13	72.67	72.40	81.00	78.33	79.67	91.33	89.67	90.50	Open	Brick org.
SE(±)	0.87	1.77		1.53	1.6		0.91	1.04			
CD at5%	2.33	5.26		4.54	4.75		2.71	3.08			
CV (%)	13.61	4.71		3.48	3.77		1.81	2.12			

**Table 2:** Agromorphic traits of new genotypes of gladiolus

Name of the genotypes	Spike length (cm)			Rachis length (cm)			Diameter of second florets(cm)			No. of florets remained open at a time		
	2016-17	2017-18	Mean	2016-17	2017-18	Mean	2016-17	2017-18	Mean	2016-17	2017-18	Mean
Yellow Emperor	95.00	92.00	93.50	63.33	60.33	61.83	10.13	10.20	10.17	7.00	6.33	6.67
Candy Man	119.00	115.67	117.34	63.67	63.67	63.67	11.03	10.67	10.85	6.00	5.67	5.84
Pusa Kiran	107.67	101.33	104.50	63.33	61.33	62.33	11.60	11.33	11.47	5.00	5.00	5.00
Pusa Subham	106.33	102.33	104.33	64.00	60.67	62.34	11.40	11.33	11.37	5.00	5.00	5.00
American Beauty	87.33	85.67	86.50	47.33	46.67	47.00	11.17	11.20	11.19	5.00	4.67	4.84
A.C...No.7	118.00	116.33	117.17	68.00	65.33	66.67	10.67	10.93	10.80	5.00	5.00	5.00
Inter Paid	75.00	73.67	74.34	39.00	41.33	40.17	11.50	11.70	11.60	4.00	4.00	4.00
Yellow Enterprise	118.67	115.33	117.00	66.33	65.67	66.00	12.73	12.03	12.38	5.00	5.00	5.00
Punjab Glad-1	130.67	128.00	129.34	66.33	67.67	67.00	10.60	12.00	11.30	5.00	5.33	5.17
SE(±)	1.10	1.79		0.90	1.41		0.21	0.32		0.40	0.20	
CD at5%	3.26	5.31		2.68	4.18		0.62	0.95		1.20	0.61	
CV (%)	1.78	2.99		2.60	4.12		3.23	4.91		5.52	6.92	

**Table 3:** Agromorphic traits of new genotypes of gladiolus

Name of the genotypes	No. of florets /spike			Vase life (days)			No. of spikes /plant			Reaction to pest and diseases
	2016-17	2017-18	Mean	2016-17	2017-18	Mean	2016-17	2017-18	Mean	
Yellow Emperor	15.33	15.67	15.50	9.00	9.33	9.17	1.00	1.00	1.00	Minimum
Candy Man	15.67	16.00	15.84	10.33	10.67	10.50	1.13	1.20	1.17	Minimum
Pusa Kiran	20.33	17.67	19.00	13.00	12.00	12.50	1.00	1.00	1.00	Minimum
Pusa Subham	19.33	16.33	17.83	12.00	11.00	11.50	1.00	1.00	1.00	Minimum
American Beauty	14.00	14.33	14.17	9.00	9.33	9.17	1.00	1.00	1.00	Minimum
A.C...No.7	17.33	17.00	17.17	10.33	9.67	10.00	1.00	1.00	1.00	Minimum
Inter Paid	13.33	14.00	13.67	8.00	8.33	8.17	1.13	1.20	1.17	Minimum
Yellow Enterprise	16.00	15.67	15.84	8.67	9.00	8.84	1.00	1.00	1.00	Minimum
Punjab Glad-1	16.00	16.33	16.17	7.33	8.33	7.83	1.07	1.07	1.07	Minimum
SE(±)	0.50	0.45		0.63	0.42		0.04	0.20		
CD at5%	1.48	1.34		1.87	1.26		0.11	0.70		
CV (%)	5.27	4.92		11.20	7.52		6.29	3.66		

**Table 4:** Corm production features disease reaction of new genotypes of gladiolus

Name of the genotypes	Corm Weight (gm)			Diameter of corm (cm)			No. of cormels /plant			Fresh weight of cormels /plant(gm)			Reaction to pest and diseases of corm
	2016-17	2017-18	Mean	2016-17	2017-18	Mean	2016-17	2017-18	Mean	2016-17	2017-18	Mean	
Yellow Emperor	65.00	61.33	63.17	6.63	6.33	6.48	5.00	5.33	5.17	14.00	15.00	14.50	Minimum
Candy Man	38.00	40.67	39.34	4.70	5.00	4.85	6.33	6.67	6.50	16.33	16.00	16.17	Minimum
Pusa Kiran	40.67	42.00	41.34	4.00	4.00	4.00	7.33	7.67	7.50	20.00	18.67	19.34	Minimum
Pusa Subham	26.00	27.33	26.67	3.77	4.00	3.89	3.33	4.00	3.67	8.00	8.67	8.34	Minimum
American Beauty	64.33	62.33	63.33	5.47	5.30	5.39	5.00	5.67	5.34	16.33	15.00	15.67	Minimum
A.C...No.7	49.00	47.67	48.34	6.83	6.93	6.88	8.33	8.67	8.50	21.33	20.00	20.67	Minimum
Inter Paid	58.70	56.33	57.52	4.77	5.00	4.89	8.67	9.33	9.00	25.33	23.67	24.50	Minimum
Yellow Enterprise	65.67	62.33	64.00	6.80	6.47	6.64	10.33	10.67	10.50	29.00	28.33	28.67	Minimum
Punjab Glad-1	36.67	40.67	38.67	4.83	5.00	4.92	3.33	4.33	3.83	7.67	8.33	8.00	Minimum
SE(±)	1.76	1.71		0.19	0.16		0.73	0.44		0.69	1.51		
CD at5%	5.24	5.08		0.55	0.48		2.17	1.30		2.05	3.41		
CV (%)	6.47	6.71		6.06	5.29		19.78	10.98		6.85	11.65		

## Conclusion

The present study revealed that the improvement in gladiolus for qualitative and quantitative characters can be done by direct selection for desired characters like plant height, number of florets per spike, marketable spike per plant, number and number of days taken for flowering. Overall, AC.No.7 and Punjab Glad-1 may be recommended for quality spike production along with Pusa Kiran, Pusa Subham, Yellow enterprise and Candyman.

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