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## Performance of gladiolus genotypes under north Bihar Agro climatic conditions

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**Abstract**

Performance of six gladiolus genotypes was evaluated on vegetative as well as floral parameters under north Bihar agro-climatic conditions. The study reveals that Gladiolus genotype, 'Arka Naveen' proved to be better with regard plant height, rachis length, number of spikes and its length, number of florets per spike, florets quality, early flower opening times, shelf life, number of corms and cormels per plant and other vegetative and floral characters followed by genotype 'Arka Manorma'. The other genotypes, Punjab glad - 1, Glad Acc - 7, White prosperity and American beauty were found average on the basis of these vegetative and floral characteristics of market value requisite for the cut flower.

**Keywords:** Gladiolus, genotypes, rachis, spike, florets, bulbous, corms and cormels and evaluation

**Introduction**

Gladiolus (*Gladiolus grandiflora* L.) is one of the important flowering plants which have been cultivated worldwide. It is known as the queen of bulbous flowering plants belongs to the family Iridaceae and sub-family Ixideae. The name of flower is derived from the Latin word, 'gladius' meaning 'sword' on account of the sword like shape of its foliage. It is commonly called as Sword lily. It is believed to be originated from South Africa from where it was introduced in India during seventeenth century by British rulers. Gladiolus flowers not only offer aesthetical beauties, but also have become a commercial object. Its white fragrant floral spikes (single typed) are used as loose flower as well as for making bouquet, flower arrangements and decoration for religious and auspicious purposes while double typed floral spikes are mainly used as cut flowers for various purposes. It has gained popularity all over the world as one of the main decorative flowers. The market value of its cut flower for bouquets and other floral arrangement is increasing day by day due to its long vase-life and economic value (Sharma and Sharga, 1998) [1]. Gladiolus is grown from corms which have one or more buds. Flowering buds emerges into leaves and flowering spikes and during the growth period its leaves and spikes forms a new daughter corm forms at the base of these leaves. The propagating material of gladiolus is known as 'Cormel' which emerges out at the terminating end of stolen sprouted form the base of union of parent and daughter corm (Ram *et al.*, 2005) [2]. Being an important bulbous ornamental plant, it occupies a prime position among commercial flower crops which has high demand in both domestic and international markets. It occupies eighth position in the world cut flower trade and has a global history. The major producing countries are United States (Florida and California), Holland, Italy, France, Bulgaria, India, and Israel (Riaz *et al.* 2007) [3].

In India cultivation of flower crops covered around 278 thousand hectare, with an average production of 2184 thousand MT and average productivity was 8 MT / ha. (Anon., 2015-16) [4]. The commercial cultivation of gladiolus is mainly concentrated in West Bengal, Assam, Karnataka, Tamil Nadu, Kerala, Maharashtra, Uttar Pradesh, Uttaranchal, Punjab, Haryana, Sikkim, Jammu and Kashmir, Gujarat, Himachal Pradesh, Madhya Pradesh and Rajasthan. Bihar state has one of the potential areas for commercial cultivation of gladiolus crops and it has now been gradually gaining importance. There is heavy demand of flowers during marriage ceremonies, festivals and other social function. There is a large gap between supply and demand which the local growers which may utilize their advantage. Gladiolus is one of the dominating flowers in the flower market of Bihar and the state is blessed with many natural advantages like abundant sunshine and favorable temperatures for its growth.

The location specific assessment of gladiolus genotypes will provide opportunities for improvement of quality traits of flower for breeding programmes to improve the yield and quality of the flowers. The present investigation was undertaken to assess the six genotypes and the variability present among them. In the context of agro climatic situation of North Bihar, the available informations are very scanty and not enough on these aspects. Keeping in view the above facts, the present study was undertaken to evaluate the growth performance of different gladiolus cultivars and to identify the best cultivar having good growth, flowering attributes and vase life under humid agro climatic conditions of North Bihar.

### Materials and Methods

The experiment was conducted at research farm, Hi-tech Horticulture of RPCAU, Pusa in RBD design during the years 2016, 2017 and 2018. The experimental site was located at 25.98° N and 85.67° E with an altitude of 52.0 m above mean sea level. The climate of experimental site is sub-tropical characterized with moderate precipitation, hot and dry summer and cold winter with maximum yearly rainfall (about 90%) received due to south-west monsoon during June to October and the months of December to February receiving occasional and light winter showers. April, May and June are the hottest months while December and January are the coldest. The temperature varies between 6°C to 45°C with maximum in May-June and minimum in December -January while the RH ranged from 60 per cent to 93 per cent. Six gladiolus genotypes were evaluated for vegetative growth and flowering and yield in a randomized block design with three replications. Twenty plants per treatment were planted at a spacing of 30 x 30 cm. The observations were taken from five randomly selected plants for recording various vegetative, floral characters, corm and cormel characters viz., plant height (cm), days to flowering, spike length (cm), Rachis length (cm), number of florets open at a time, number of florets per spike, number of spikes per plant, vase life (days), number of corm per plant, diameter of corm (cm), weight of corm (g), number of cormels per plant, weight of cormels per plant (g) and finally the cost benefit ratio was worked out to evaluate these genotypes economically.

### Results and Discussion

The findings of the research work conducted on the basis of three year experimentation during 2015, 2016 and 2017 on the screening of six gladiolus genotypes revealed that the vegetative and floral characters of the plants are greatly influenced due to its genotypes. The gladiolus genotype, Arka Naveen is proved to be the most suitable genotype for agro climatic situation of North Bihar having a lot of vegetative

and floral qualities requisite for a quality flower recording plant height (102.00 cm), days to flowering (71.12), spike length (65.07 cm), Rachis length (47.12 cm), number of florets open at a time (2.75), number of florets per spike (18.66), number of spike per plant (2.32) and vase life (6.98 days) followed by Arka Manorma with plant height (94.15 cm), days to flowering (75.38), spike length (55.33 cm), Rachis length (38.14 cm), number of florets open at a time (2.47), number of florets per spike (16.57), number of spike per plant (2.08) and vase life (6.04 days). The other genotypes White prosperity and American beauty had recorded plant height (90.15, 87.50 cm), days to flowering (80.76, 78.27), spike length (45.27, 42.20 cm), Rachis length (34.60, 33.21 cm), number of florets open at a time (2.04, 2.02), number of florets per spike (13.32, 12.45), number of spike per plant (1.90, 1.54) and vase life (5.68, 5.58 days), respectively (Table-1). The genotype Punjab glad-1 and Glad-Acc-7 had showed significantly inferior suitability for this agro climatic region recording plant height (75.10, 80.24 cm), days to flowering (85.57, 82.82), spike length (36.78, 40.15 cm), Rachis length (28.09, 30.10 cm), number of florets open at a time (1.52, 1.91), number of florets per spike (10.51, 11.36), number of spike per plant (1.26, 1.46) and vase life (4.35, 4.73 days). However the performance of genotypes, White prosperity and American beauty were significantly superior to those of Punjab glad-1 and Glad-Acc-7 but not *at par* with the genotypes, Arka Naveen and Arka Manorma on the basis of these floral and vegetative qualities (Table. 1).

Similarly the genotype, Arka Naveen had superior corm and cormel characters in comparison to other genotypes recording number of corm per plant (3.37), diameter of corm (5.66 cm), weight of corm (44.87 g), number of cormel per plant (17.97) and weight of cormels per plant (14.52 g) followed by the genotype, Arka Manorma recording number of corm per plant (3.03), diameter of corm (4.90 cm), weight of corm (39.43 g), number of cormel per plant (15.85) and weight of cormels per plant (12.44 g) while the genotype, Punjab glad-1 again proved to be the significantly inferior to Arka Naveen and Arka Manorma recording number of corm per plant (1.83), diameter of corm (3.46 cm), weight of corm (21.87 g), number of cormel per plant (11.25) and weight of cormels per plant (8.49 g) followed by those of Glad-Acc-7. The other genotypes, White prosperity and American beauty had little bit superior corm and cormel characters to those of Punjab glad-1 and Glad-Acc-7 but inferior to Arka Naveen and Arka Manorma (Table- 2). The gladiolus genotype, Arka Naveen also proved to be the economically profitable one as compared to other genotypes having maximum Benefit cost ratio (B: C ratio = 3.75), followed by Arka Manorma (2.65) and White prosperity (2.25).

**Table 1:** Performance of six Gladiolus genotypes on vegetative and floral parameters during 2015, 2016 and 2017 (Pooled)

Sl. no	Treatments (Genotypes)	Plant height (cm)	Days to flowering	Spike length (cm)	Rachis length (cm)	No. of florets open at a time	No. of florets / spike	No. of spike / plant	Vase life (days)
1	Arka Naveen	102.75	71.72	65.07	47.12	2.75	18.66	2.32	6.98
2	Arka Manorma	94.15	75.38	55.33	38.14	2.47	16.57	2.08	6.04
3	Punjab glad-1	75.10	85.57	36.78	28.09	1.52	10.51	1.26	4.35
4	Glad- Acc-7	80.24	82.82	40.15	30.10	1.91	11.36	1.46	4.73
5	White prosperity	90.15	80.76	45.27	34.60	2.04	13.32	1.90	5.68
6	American beauty	87.50	78.27	42.20	33.21	2.02	12.45	1.54	5.58
	CD at 0.05	14.20	13.58	8.18	7.80	0.41	2.50	0.31	1.05
	CV %	9.67	10.33	10.34	13.09	11.67	10.86	10.81	11.35

**Table 2:** Performance of six *Gladiolus* genotypes on corm & cormel parameters and B: C ratio during 2015, 2016 and 2017 (Pooled)

Sl. No.	Treatments (Genotypes)	No. of corm/plant	Diameter of corm (cm)	Weight of corm (g)	No. of cormels/plant	Weight of cormels/Plant (g)	B:C ratio
1	Arka Naveen	3.37	5.66	44.87	17.97	14.52	3.75
2	Arka Manorma	3.03	4.90	39.43	15.85	12.44	2.65
3	Punjab glad-1	1.83	3.46	21.87	11.25	8.49	1.75
4	Glad-Acc-7	2.07	3.96	24.57	9.98	9.58	2.00
5	White prosperity	2.85	4.72	33.90	14.61	11.50	2.25
6	American beauty	2.45	4.45	27.53	12.76	10.17	2.10
	CD at 0.05	0.42	0.96	5.62	2.01	1.91	1.02
	CV %	9.20	10.54	9.65	10.82	8.74	9.72

The present findings are almost in close conformity with the reports of earlier workers at different agro climatic locations (Bujimol and Singh, 2002; Hossain *et al.* (2011); Chopde *et al.*, 2012; Chourasia *et al.*, 2015; Momin *et al.*, 2015; Bhat *et al.*, 2017 and Sharma *et al.*, 2018) <sup>[5, 6, 7, 8, 9, 10, 11]</sup>. It is obvious from the study that these genotypes had varied significantly in their vegetative as well as floral characters due to genetic variations under the influence of agro climatic conditions of the region. Almost similar observations were recorded by Chaourasia *et al.*, (2015) <sup>[8]</sup> and Bhat *et al.* (2017) <sup>[10]</sup> and they observed that the variations in plant height, spike length and number of floret, number of florets per spike, Rachis length, climatic conditions of the particular area and genetic makeup in the varieties. Sharma *et al.*, (2018) <sup>[11]</sup> reported that corm weight varied significantly due to available food material for the development of corms, genetic makeup of the different cultivars which may get further development of corm in the particular environmental conditions. The variation in production of cormels per plant is might due to the soil and climatic and genetic composition (Bujimol and Singh, 2002) <sup>[5]</sup>. The corms production per plant is related to number of shoots/ plant and vegetative growth (Hossain *et al.* (2011); Chopde *et al.*, 2012 and Momin *et al.*, 2015 <sup>[6, 7, 9]</sup>. Significant variation was reported in the number of leaves per plant among the different cultivars.

## Conclusion

The research findings on the basis three years experimentation and pooled data (2015, 2016 and 2017) reveal that the different genotypes of *gladiolus* have the potential to influence the vegetative, floral and corm characters of the plant. Among the six genotypes evaluated, 'Arka Naveen' followed by Arka Manorma and White prosperity are suitable for cultivation due to their floral quality as well as shelf life potential over others genotypes under the agro climatic situations of North Bihar. It is obvious from the study that both the genotypes have very good economic potential and it would provide maximum net return to the growers/farmers of the State.

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