

## Effect of different planting time on vegetative and flowering on five cultivar of gladiolus (*Gladiolus grandiflorus* L.)

Rakesh Kumar<sup>1</sup>, Devi Singh<sup>1</sup> and Sunita Kumari<sup>2</sup>

1. Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj–211 007, U.P., India

2. Department of Horticulture, G.B. Pant Univ. of Agric. and Tech., Pantnagar, Utrakhand–263 145, U.P., India

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**ABSTRACT :** The present study investigated that the effect of three dates of planting date 5<sup>th</sup> October, 20<sup>th</sup> October, 5<sup>th</sup> November and cultivars Nova Lux, White Prosperity, Rose Supreme, American Beauty and Big Time Supreme effect on *Gladiolus hybrid* characters like minimum days taken to sprouting of corms (9.65 days), maximum plant height (77.84 cm), number of leaves (8.70/plant) were stimulated under 5<sup>th</sup> November, while the characters minimum days taken to spike emergence (68.48 days) and basal florets opening (79.04 days) and maximum length of spike (64.02 cm), number of florets (13.42) per spike, length of florets (11.04), maximum vase life (8.25 days) were stimulated planting on 20<sup>th</sup> October but maximum duration of spike under field was stimulated planting date 5<sup>th</sup> October. Among the varieties earliest corm sprouting (10.33 days) and highest vase life (7.87 days) were recorded in cv. Rose Supreme while cv. American Beauty having largest plant height (84.96 cm), leaves (9.24/plant), length of spike (74.33), minimum days to basal florets opening (71.07 days), length of florets (11.11 cm) and maximum vase life of spike (9.91 days) were recorded but maximum days required to spike emergence in cv. White Prosperity. Finally, concluded that the planting date from 20<sup>th</sup> October to 5<sup>th</sup> November gave better results with respect to vegetative and flowering characters.

**Key Words:** Gladiolus hybrid (*Gladiolus grandiflorus* L.), cultivars, planting dates, vegetative growth, flowering parameters.

Gladiolus is a flower of glamour and perfection which is known as the queen of bulbous flowers due to its flower spikes with florets of massive form, brilliant colors, attractive shapes, varying size and excellent shelf life. The modern hybrids are botanically known as *Gladiolus grandiflorus* belonging to the family Iridaceae. Gladiolus is grown as flower bed in gardens and used in floral arrangements for interior decoration as well as making high quality bouquets (Bose *et al.*, 2003). Gladiolus are grown an area of 9.37 thousand hectare with a production of 707 million spikes in India (NHB, 2013). The major gladiolus growing areas are Kalimpong (West Bengal), New Delhi, Srinagar (Jammu and Kashmir) and Nainital (Uttar Pradesh).

Date of planting plays an important role in regulating growth and quality of gladiolus (Khan *et al.*, 2008). Vegetative growth and quality of gladiolus is improved by proper planting times which also satisfies the consumer's demands (Zubair *et al.*, 2006). The Planting schedule of gladiolus varies because of differences in photoperiods, temperatures and light intensity and relative humidity. Maximum spikes per plant were obtained from April to May plantings while highest number of corms per plant in tuberoses was obtained from March and April plantings (Mukhopadhyay and Banker, 1981). Growth and yield of gladiolus, like other plants, depend on proper planting time. Akpinar

and Bulut (2011) reported that the planting time 20<sup>th</sup> June was found to be the most suitable plantation time when considered sprouting and spiking time and White Prosperity is the best varieties. The present study investigated that the best planting time of different gladiolus cultivar under environmental conditions.

### Materials and Methods

The experiment was carried out during winter season of 2016-17 at the Research Farm of the Department of Horticulture, Allahabad School of Agriculture, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad (UP.).

The experimental material comprised of 5 gladiolus genotypes *viz.* Nova Lux, White Prosperity, Rose Supreme, American Beauty and Big Time Supreme planted under three different planting times i.e. 5<sup>th</sup> October, 20<sup>th</sup> October, 5<sup>th</sup> November, 2017. The genotypes were sown as Factorial Randomized Block Design (FRBD) with fifteen treatments and three replications. The treatments are Nova Lux + 5<sup>th</sup> October, Nova Lux + 20<sup>th</sup> October, Nova Lux + 5<sup>th</sup> November, White Prosperity + 5<sup>th</sup> October, White Prosperity + 20<sup>th</sup> October, White Prosperity + 5<sup>th</sup> November, Rose Supreme + 5<sup>th</sup> October, Rose Supreme + 20<sup>th</sup> October, Rose Supreme + 5<sup>th</sup> November, American Beauty + 5<sup>th</sup> October, American Beauty + 20<sup>th</sup> October, American Beauty + 5<sup>th</sup> November, Big Time

Supreme + 5<sup>th</sup> October, Big Time supreme + 20<sup>th</sup> October and Big time supreme + 5<sup>th</sup> November. Corms were planted at spacing of 30 x 20 cm and standard package were followed to raise the crop. For morphological analysis the genotypes were evaluated for days taken to sprouting of corms, plant height, number of leaves, days taken to flowering, spike length, number of florets per spike and floret size.

## Results and Discussion

The experimental data were analyzed statistically. Mean tables are briefed for interpreting the results regarding days taken to sprouting of corms, plant height, number of leaves, days taken to flowering, spike length, number of florets per spike and floret size of *Gladiolus grandiflorus*.

### Days to Plant Sprouting

The results showed that the genotypes took more time to sprout as the planting time was earlier. The days taken to sprouting of corms ranged from 9.65 to 12.54 days. The minimum time of 9.65 days was recorded in 5<sup>th</sup> November planting while maximum time of 12.54 days was recorded in 5<sup>th</sup> October planting. These results are in close conformity with the findings of Saini *et al.* (1988) in which late sprouting was observed under delayed planting (Table-1).

The time taken to sprouting of corms by five different genotypes in three environment ranges from 8.50 to 13.80 days. The minimum time was taken by cv. American Beauty 8.50 days under 5<sup>th</sup> November planting. Cultivar Nova Lux took the maximum time to sprouts 13.80 days under 5<sup>th</sup> October planting. The sprouting of corms presents significant variation due to genotype and planting time. Rose Supreme was earliest to sprout irrespective of planting dates as compared to other varieties. The variety Rose Supreme took minimum time to sprout in 5<sup>th</sup> November and also 5<sup>th</sup> October. This indicated that sprouting of corms is affected by prevailing temperature at time of planting. It is pertinent to mention here that during October to November the average temperature ranged between 24.8-19.4°C, respectively which was optimum for corm sprouting (Arora and Sandhu, 1987). The results also showed that varieties CPG and Punjab Flame were comparatively late under all plantings, which might be due to individual genetic makeup of the varieties. These results justify the findings of Sidhu (1989) in gladiolus, Tamberg and Chýrva (1980) in gladiolus and Kabacaođlu (1988) in gladiolus.

### Plant height

The mean values regarding plant height reveals that different planting dates significantly affected plant

height given in Table-1. the mean values of different planting dates, maximum plant height was observed in cormels planted on 5<sup>th</sup> November 77.84 cm, traced by 20<sup>th</sup> October plantation 77.17 cm, while minimum plant height was observed in those planted on 5<sup>th</sup> October 74.41 cm. Maximum plant height was observed in cv. American Beauty 86.16 cm under 5<sup>th</sup> October planting and minimum plant height was observed in cv. White Prosperity 65.20cm under first planting. Regarding the maximum plant height on 5<sup>th</sup> November might be the result of ideal condition for photosynthesis is through which the plants acquired well developed structure and height. Almost similar results Khan *et al.* (2008) also stated that, planting time significantly influenced the vegetative growth of Tulip.

### Number of leaves

The mean values regarding number of leaves plant per plant are given in Table-1. Various planting dates significantly affected number of leaves plant per plant. Maximum number of leaves was observed in cv. Big Time Supreme (9.26) on 5<sup>th</sup> October planting. While minimum number of leaves was observed in cv. White Prosperity (8.13) on 5<sup>th</sup> November planting date. The mean values of different planting dates showed that maximum number 8.78 leaves per plant were produced by corms planted on 20<sup>th</sup> October, traced by plantation done on 5<sup>th</sup> November (8.43), while minimum number 8.32 leaves per plant were observed in corms planted on 5<sup>th</sup> November. The similar finding, maximum number of leaves plant per plant on 20 October was due to the plants has maximum efficiency for development in ideal environmental condition. Ko *et al.* (1994) also found that earlier planting produced the well developed plants of gladiolus.

### Flowering parameters

#### Days taken to spike emergence (days)

The present study indicates that in 20<sup>th</sup> October planting, cv. White Prosperity took the minimum time to spike emergence (62.33 days) while in maximum time to spike emergence (87.30 days) on planting 5<sup>th</sup> October. The mean values of different planting dates showed that minimum days of spike emergence under 20<sup>th</sup> October planting date (68.48 days) followed 5<sup>th</sup> November (75.12 days) and maximum days of spike emergence under 5<sup>th</sup> October (75.68 days). Among five varieties Big Time Supreme had taken maximum days of spike emergence (79.30 days) and minimum days of spike emergence taken cv. White Prosperity.

#### Days to first flowering opening (days)

The present study indicated that in 5<sup>th</sup> October planting, cv. American Beauty took the minimum time

**Table-1:** Effect of different planting date on different cultivar on vegetative parameters of gladiolus on days taken sprouting of corms, planting height (cm) and total number of leaves (number).

Varieties (V)	Days taken sprouting of corms			Plant height (cm)			Total no of leaves		
	Different planting date (D) 5 <sup>th</sup> Oct. 20 <sup>th</sup> Oct. 5 <sup>th</sup> Nov	Mean (V)	CD at 5%	Different planting date (D) 20 <sup>th</sup> Oct. 5 <sup>th</sup> Nov.	Mean (V)	CD at 5%	Different planting date (D) 5 <sup>th</sup> Oct. 20 <sup>th</sup> Oct. 5 <sup>th</sup> Nov.	Mean (V)	CD at 5%
Nova Lux	13.80	10.43	0.66	11.63	72.66	71.40	7.30	8.50	8.01
White Prosperity	12.66	10.36	10.16	11.06	68.46	67.17	8.30	8.43	8.28
Rose Supreme	12.13	9.36	9.50	10.33	76.50	75.60	8.30	8.50	8.32
American Beauty	11.46	10.20	8.50	10.56	84.96	85.44	8.46	9.80	9.24
Big Time Supreme	12.63	9.30	9.43	10.45	83.46	82.77	9.26	8.66	8.70
Mean (D)	12.54	9.93	9.65	74.41	77.84		8.32	8.78	8.43
	CD.at 5% Varieties -	0.47	CD at 5% Varieties -	3.23	CD.at 5% Varieties -	0.26			
	Planting Date -	0.36	Planting Date -	2.50	Planting Date -	0.20			
	Interaction (V X D) -	0.82	Interaction (V X D) -	5.59	Interaction (V X D) -	0.46			

**Table-2:** Effect of different planting date on different cultivars on flowering parameters of gladiolus on days taken to spike emergence, days taken to basal floret opening and length of spike (cm).

Varieties (V)	Days taken to spike emergence			Days taken to basal floret opening			Length of spike (cm)		
	Different planting date (D) 5 <sup>th</sup> Oct. 20 <sup>th</sup> Oct. 5 <sup>th</sup> Nov	Mean (V)	CD at 5%	Different planting date (D) 20 <sup>th</sup> Oct. 5 <sup>th</sup> Nov.	Mean (V)	CD at 5%	Different planting date (D) 5 <sup>th</sup> Oct. 20 <sup>th</sup> Oct. 5 <sup>th</sup> Nov.	Mean (V)	CD at 5%
Nova Lux	87.30	72.00	72.80	77.36	95.80	91.33	52.83	61.23	54.97
White Prosperity	62.33	62.70	73.50	66.17	80.66	81.96	71.73	74.43	72.82
Rose Supreme	71.70	71.30	72.00	71.66	84.13	82.73	41.66	41.03	41.00
American Beauty	80.00	63.06	71.83	71.63	69.26	70.93	74.76	75.36	74.35
Big Time Supreme	77.06	73.36	85.46	78.63	83.26	80.83	68.26	68.06	67.84
Mean (D)	75.68	68.48	75.12	82.62	79.04	82.59	61.85	64.02	60.72
	Varieties -	3.58	CD at 5% Varieties -	1.04	CD at 5% Varieties -	1.16			
	Planting Date -	2.77	Planting Date -	0.81	Planting Date -	0.90			
	Interaction(V X D) -	6.21	Interaction (V X D) -	1.81	Interaction (V X D) -	2.01			

**Table-3:** Effect of different planting date on different cultivars on flowering parameters of gladiolus on number of florets per spike, length of florets (cm) and duration of spike under field condition.

Varieties (V)	Number of florets per spike			Length of florets (cm)			Duration of spike under field condition (days)			
	Different planting date (D)		Mean (V)	Different planting date (D)		Mean (V)	Different planting date (D)		Mean (V)	
	5 <sup>th</sup> Oct.	20 <sup>th</sup> Oct.		5 <sup>th</sup> Nov.	20 <sup>th</sup> Oct.		5 <sup>th</sup> Nov.	5 <sup>th</sup> Oct.		20 <sup>th</sup> Oct.
Nova Lux	15.53	14.54	14.42	10.30	10.86	10.48	9.53	9.60	9.88	9.67
White Prosperity	13.23	15.36	14.09	10.46	10.53	10.20	11.08	11.11	10.91	11.03
Rose Supreme	10.56	10.44	10.29	10.50	10.60	10.50	8.14	8.15	8.07	8.12
American Beauty	14.16	14.63	14.10	11.30	11.56	11.66	10.26	9.28	10.18	9.91
Big Time Supreme	11.73	12.13	11.37	11.66	11.66	11.11	7.88	7.75	7.83	7.82
Mean (D)	13.04	13.42	12.10	10.84	11.04	10.79	9.38	9.18	9.37	
	C.D. at 5%			C.D. at 5%			C.D. at 5%			
	Varieties -		0.41	Varieties -		0.20	Varieties -		0.18	
	Planting Date -		0.32	Planting Date -		0.15	Planting Date -		0.14	
	Interaction (V X D)-			Interaction (V X D)-			Interaction (V X D) -			0.31

**Table-4:** Effect of different planting date on different cultivars on flowering parameters of gladiolus on vase life of spike.

Varieties (V)	Vase life of spike (days)			Mean (V)
	Different planting date (D)			
	5 <sup>th</sup> October	20 <sup>th</sup> October	5 <sup>th</sup> November	
Nova Lux	8.23	8.25	8.36	8.28
White Prosperity	8.40	8.63	8.83	8.62
Rose Supreme	7.85	7.90	7.86	7.87
American Beauty	8.08	8.55	8.03	8.22
Big Time Supreme	7.73	7.93	7.36	7.67
Mean (D)	8.06	8.25	8.09	
C.D. at 5%				
Varieties –			0.17	
Planting Date –			0.13	
Interaction (V×D) –			0.30	

to flowering opening (69.26 days) while in maximum time to flower opening (95.80 days) under planting 5<sup>th</sup> October. The days take to flower opening ranges from 69.26 to 95.80 days in five gladiolus genotypes. The mean values of different planting dates showed that minimum days of first flower opening under 20<sup>th</sup> October planting date (79.04) followed 5<sup>th</sup> November (82.59) and maximum days of flower opening under 5<sup>th</sup> October (82.62). Among five varieties Nova Lux had taken maximum days of first flower opening (91.61) and minimum days of first flower opening taken cv. American Beauty (71.07). The earliest flowering was reported in 20<sup>th</sup> October planting which took 79.04 days followed by 5<sup>th</sup> November planting. The genotypes took maximum time to flower under 5<sup>th</sup> October planting (82.62). Dod *et al.* (1989) reported that under late planting emergence of spike was observed earlier. The earliest flowering was reported in cv. American Beauty (71.07 days) followed by White Prosperity (78.54 days).

#### Spike length (cm)

Data embodied in Table-2 indicated that there was significant effect of genotypes, environments and genotype environments interaction on spike length. Cultivar Rose Supreme recorded the minimum spike length (41.00 cm) under all plantings ranging from 40.30 to 75.36 cm. The maximum was recorded in cv. White Prosperity (72.82 cm). The longest spike was recorded under 20<sup>th</sup> October planting (64.02 cm) and the spike length reduced as planting time was delayed. The minimum length was recorded under 5<sup>th</sup> November planting

(61.85 cm). Nijasure and Ranpise (2005) also reported that planting of gladiolus corms on 15<sup>th</sup> October was ideal for better flower in terms of spike length. The plant develops better root system and luxuriant growth by quantities of photosynthates under favorable climatic conditions whereas, in late planting, plant establishment and growth is poor due to low temperature in November. However, the present experiment also presents a wide range of variation for spike length among the varieties. Such a wide variation for this character is mainly due to genetic nature confirming the earlier reports in gladiolus (Singh *et al.*, 2000).

#### Number of florets per spike

The results showed that the cv. Nova Lux produced the maximum number of florets per spike (15.53) on 5<sup>th</sup> October and minimum number of florets per spike in cv. Rose Supreme (9.86) on 5<sup>th</sup> November planting. The maximum number of florets per spike was recorded under 20<sup>th</sup> October planting (13.42) which differs significantly from 5<sup>th</sup> October planting (13.04). Minimum number of florets per (12.10) was found on 5<sup>th</sup> November planting. According to Arora and Sandhu (1987) more number of florets per spike in early planting as compare to late planting of corms. Among all five varieties cv. Nova Lux (14.42) was observed maximum number of floret per spike and cv. Rose Supreme (10.29) minimum number of florets per spike (Table-3).

#### Floret length (cm)

The results indicated that under first planting the maximum floret size was recorded in cv. Big Time Su-

preme (11.66 cm). Cultivar Big Time Supreme (11.66 cm) produced the biggest florets under second planting followed by cv. American Beauty (11.56 cm). Cultivar American Beauty produced the biggest florets under November planting. The smallest florets were produced by cv. American Beauty under November planting. Among three date of planting on 20<sup>th</sup> October planting date were recorded maximum sizes of florets (11.04 cm). While smallest sizes of floret were recorded under earlier planting date on 5<sup>th</sup> October. Among five genotype of gladiolus cultivar cv. American Beauty were recorded biggest size of floret (11.51 cm) and White Prosperity was observed minimum size of floret (10.40 cm). This variation of size in different varieties might be due to genetic contribution of varieties under observation.

#### Vase life (days)

The maximum vase life of spikes was found more in later planting compare to early plantings. The plants with maximum vase life (8.25 days) were produced when planting was accomplished on 20<sup>th</sup> October followed by 5<sup>th</sup> November (8.09 days) while minimum days number of vase life on 5<sup>th</sup> October (8.06 days) were recorded. Among five cultivars of gladiolus White Prosperity (8.62 days) and minimum number of vase life in cv. Big Time Supreme (7.67days).

Finally, concluded that among five varieties and the three planting dates, 20<sup>th</sup> October to 5<sup>th</sup> November proved favorable for vegetative as well as flowering characters. American Beauty, White Prosperity and Nova Lux had the best result in all growth and flowering.

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