Studies on effect of genotypes and planting time on growth and corm characters of Gladiolus

ABSTRACT

Gladiolus is an important cut flower crop, grown commercially in many parts of the globe. This flower has gained popularity owing to its incomparable beauty, attractive colours, various sizes and shapes of florets, variable spike length and long vase life. Gladiolus produces beautiful spikes from December to March in the plains and from June to September in the hills of India.Gladiolus is very rich in its varietal wealth therefore, varietal evaluation in a particular growing condition becomes necessity of time to find out suitable variety for a particular region. Improvement of any crop is a continuous process and long process as well and, in this crop, tremendous scopeis available to improve the existing cultivars, besides, other economical plants, the growth and development of gladiolus is governed by its genetic makeup and environmental factors of the growing region and various management practices. Among the various agro-techniques, the optimum planting time is of outmost importance. The Present investigation efforts aim tostandard time of planting and suitability of varieties for local climate and edaphic conditions of the Nalanda (Bihar). A field investigation was conducted during winter season of 2018-19 at Research Farm of Nalanda College of Horticulture, Noorsarai, Nalanda, Bihar. Corms of gladiolus cultivars *viz.*, Red Beauty, Candyman, White Prosperity and Intrepid were planted at different planting dates. The soils of experimental site are newly formed alluvial soils with pH 7.40. The experiment consisted of 16 treatment combinations with four (04) varieties and four planting dates (D_1- 25th Sept., D_2- 10th October and D_3- 25th Oct. and D_4-10thNov.) were laid out in split-plot-design with three replications. Minimum days to sprouting of corm (16.33 days), number of leaves per plant (11.27), length of leaves (86.87cm.) were with D_2V_2. However, maximum plant height (146.07 cm.) was in D_2V_1. Minimum days to initiation of spike (80.47 days), days taken to open first floret (95.07 days) and maximum length of spike (126.07cm.) were observed in D_2V_1. On the other hand, maximum numbers of florets per spike (21.20), fresh weight of flower spike (170.25 gm.), floret diameter (11.17cm.) and vase life (14.80 days) were in D_2V_3. Highest values for no. of corms per plant (1.40) and no. of cormels per plant (111.53) were noticed in D_2V_3. Besides, corm diameter (7.53 cm) and average weight of corm per plant (123.08 gm.) were found maximum in D_2V_1.

Introduction

"The genus Gladiolus belonging to the family Iridaceae**,** is an important cut flower crop, grown commercially in many parts of the world including India. It has gained popularity among the growers often due to its incomparable beauty, attractive colours, various sizes and shapes of florets, variable spike length and vast-long vase life. Gladiolus produces beautiful spikes in the form of colourful florets starting from December to March in the plains and from June to September in the hilly regions of India. Gladiolus itself having large varietal wealth and every year there is an addition of new varieties; hence varietal evaluation becomes necessary to find out suitable variety for a particular region. Like all other economical plants, the growth and development of gladiolus is governed by its genetic makeup and environmental factors of the growing region and various management aspects too. Among the various agro-techniques, the optimum planting time is of outmost importance. Present

research efforts aim at standardization of planting date and suitability of varieties for local climate and edaphic conditions of the sub-humid growing zones of India. Date of planting plays an important role in regulating growth and quality of gladiolus. Vegetative growth and quality of gladiolus is improved by proper planting times which also satisfy the consumer's demands"[1]. "Different planting schedule supply gladiolus steadily to the market as well as it adds to the beauty of the landscape longer. The timing of flowering from various planting dates is quite predictable under ideal environmental conditions. It prefers cool and dry conditions, and temperature plays a major role in growth and flowering of crop. The semi-arid climate of Hisar offers suitable environment for growing of cut flowers in winter months from November to February. Date of planting have an important role in regulating growth and flower quality of gladiolus"[2]."Maximum plant height was found in variety 'Charisma' (101.63 cm) in October month (100.96 cm), Maximum number of leaves was found in variety 'Ocilla' (7.54) in October month (8.91), minimum number of days taken for spike emergence from planting was found in 'Ocilla' (68.78 days) in November month (66.21 days), maximum number of florets per plant was found in 'Ocilla' (13.85) in October month (14.18), minimum number of days taken for first floret opening was found in 'Ocilla' in October month (10.18 days), maximum floret diameter was observed in 'Ocilla' (8.25cm) in October month (9.77cm), maximum vase life of spike was found in 'Ocilla' (11.08 days) in October month (10.91 days) and maximum Benefit cost ratio was found in 'Ocilla' (3.79) in October month (2.18)" [3]. Thus, to evaluate a variety for early, mid and late planting season, this can be achieved either through suitable variety which can perform well on staggered planting or variety suitable for planting in different time of growing season [4].

MATERIALS AND METHODS

A field investigation was conducted during winter season of 2018-19 at the Research Farm of Nalanda College of Horticulture, Noorsarai, Nalanda, Bihar (Bihar Agricultural University,

Sabour, Bhagalpur). The healthy and uniform corms of gladiolus cultivars *namely:* Red Beauty, Candyman, White Prosperity and Intrepid were planted at different planting dates. The soils of experimental site are newly formed alluvial soils with pH 7.40. The experiment consisted of 16 treatment combinations with four (04) varieties and four planting dates (D_1- 25th Sept., D_2- 10th October and D_3- 25thOct., and D_4-10thNov.) were laid out in split-plot-design with three replications. The observations were recorded on different growth and corm characters and subjected to statistical analysis [5] for suitable interpretation.

RESULTS AND DISCUSSION

Effect of date of planting on growth, flowering and corm characters

The data presented in the Table 1 revealed significant effect of date of planting on growth attributes of Gladiolus. Earliest sprouting of corms (18.55 days), maximum plant height (139.95 cm), highest number of leaves per plant (10.63) and leaf length (81.58 cm) were observed with planting date D_2 as 10th October. Data on flowering attributes have been presented in Table 1. Planting date D_2 as 10thOctober was noticed withminimum values for days to initiationof spike (90.80 days), days taken to open first floret (106.30 days) and maximum length of spike (119.95 cm), number of florets per spike (17.42), fresh weight of spike (145.21gm), diameter of florets (10.90 cm) and vase life (12.55 days).Data oncorm characters have been presented in Table 1. Planting date D_2 as 10th October was noticed with maximum number of corms per plant (1.23), number cormels per plant (73.88), diameter of corms (7.04 cm) and average weight of corms per plant (99.95 gm). These results are close conformity to those of given by [4] and [6].

Effect of genotype on growth, flowering and corm characters

The data presented in the Table 1 revealed significant effect of genotypes on growth attributes of Gladiolus. Earliest sprouting of corms (17.58 days) was found in V2 which was non-significantly followed by V_1. Maximum plant height (141.48 cm) was observed in

variety Red Beauty. However, highest number of leaves per plant (10.82), maximum leaf length (83.10 cm.) was observed with variety Candyman. Data on flowering attributes presented in Table 1.Variety Red Beauty was noticed with minimum values for days to initiation of spike (81.63 days), days taken to open first floret (96.73 days) and maximum length of spike (121.48 cm). Besides, maximum number of florets per spike (19.55), fresh weight of spike (161.78gm.) was found in White Prosperity. Diameter of florets (10.80 cm) was with variety $V_2$and maximum vase life (13.95 days) was with V_3. Data oncorm characters have been presented in Table 1.The variety Candyman (V_2) was noticed with maximum number of corms per plant (1.12), maximum number cormels per plant (93.77) and diameter of corms (7.09 cm) in V_1 and average weight of corms per plant (94.65 gm) was in V_4. Similar results were obtained by [7] and [8].

Interaction effect of Date of planting and genotype on growth, flowering and corm characters

The data on interaction effect of date of planting and genotype on growth, flowering and corm characters have been presented in Table 2. Minimum days to sprouting of corm (16.33 days), number of leaves per plant (11.27), length of leaves (86.87 cm.) were with D_2V_2. However, maximum plant height (146.07 cm.) was in D_2V_1. Minimum days to initiation of spike (80.47 days), days taken to open first floret (95.07 days) and maximum length of spike (126.07 cm.) were observed in D_2V_1**.** On the other hand, maximum numbers of florets per spike (21.20), fresh weight of flower spike (170.25 gm.), floret diameter (11.17cm.) and vase life (14.80 days) werein D_2V_3. Highest values for number of corms per plant (1.40) and number of cormels per plant (111.53) were noticed in D_2V_3. Besides, corm diameter (7.53 cm) and average weight of corm per plant (123.08 gm.) were found maximum in D_2V_1. The results are in partial agreement to those of given by [9] and [10].

Conclusion

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. Researchers across the globe has mentioned that date of planting plays an important role in regulating growth and quality of gladiolus. Futher,vegetative growth and quality of gladiolus is improved by proper planting times which also satisfies the consumer's demands. On the basis of results of present investigations, it can be concluded to grow Red Beauty variety of gladiolus with the planting time of 10th October or 25th October to harvest spikes with highest length. Followed by variety "Interpid" with planting time as Nov. 11th.

Fig. 1: Effect of varieties of gladiolus on length of spike (cm)

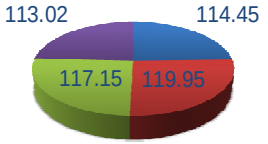

Fig. 2: Interaction effect of date of planting and vareity of spike length of spike (cm)

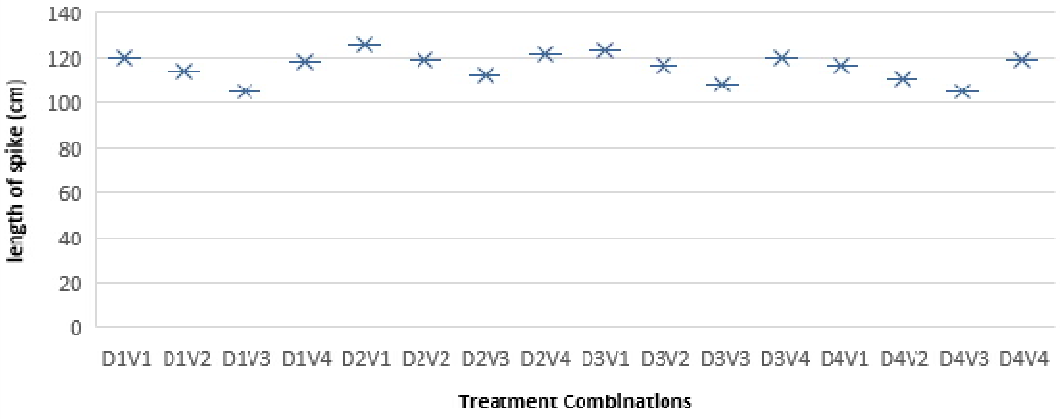

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Table-1: Effect of date of planting and varieties on growth, flowering behaviour and corm production of Gladiolus

Treatment	Days taken to complete sprouting	Plant height (cm)	No. of leaves/ plant	Length of leaves (cm)	Days taken to initiation of spike	Days taken to open first floret	Length of spike (cm)	Number of florets per spike	Fresh weight of flower spike (gm)	Diameter of floret (cm)	Vase life of spike (in days)	Number of corms per plant	Number of cormels per plant	Diameter of corms (cm)	Average weight of corms per plant (gm)
D_1	21.30	134.45	10.08	77.95	93.48	109.55	114.45	16.15	135.34	10.44	11.67	1.05	63.18	6.12	75.45
D_2	18.55	139.95	10.63	81.58	90.80	106.30	119.95	17.42	145.21	10.90	12.55	1.23	73.88	7.04	99.95
D_3	19.22	137.15	10.35	80.07	91.63	107.20	117.15	16.70	142.11	10.58	12.15	1.03	62.38	6.66	87.09
D_4	19.85	133.02	09.98	76.93	92.33	108.18	113.02	16.03	133.91	10.36	11.53	1.03	57.87	5.92	65.94
CD (0.05%)	**1.076**	**4.411**	**0.473**	**3.053**	**1.099**	**1.142**	**4.412**	**0.924**	**N/A**	**0.285**	**0.580**	**0.134**	**N/A**	**0.611**	**13.849**
SE (d)	**0.524**	**2.150**	**0.230**	**1.488**	**0.536**	**0.557**	**2.150**	**0.450**	**4.686**	**0.139**	**0.283**	**0.065**	**7.423**	**0.298**	**6.748**
V_1	18.57	141.48	09.90	75.85	81.63	96.73	121.48	15.52	122.88	10.31	11.90	1.11	93.77	7.09	94.39
V_2	17.58	135.43	10.82	83.10	85.77	102.13	115.43	14.20	131.47	10.80	11.07	1.10	29.77	6.88	84.21
V_3	22.40	127.73	09.73	77.02	99.45	115.62	107.73	19.55	161.87	10.56	13.95	1.12	80.62	5.00	55.18
V_4	20.48	139.92	10.60	80.57	101.40	116.75	119.92	17.03	140.33	10.52	10.98	1.02	53.17	6.78	94.65
CD (0.05%)	**1.076**	**4.411**	**0.473**	**3.053**	**1.099**	**1.142**	**4.412**	**0.924**	**9.617**	**N/A**	**0.580**	**N/A**	**15.234**	**0.611**	**13.849**
SE (d)	**0.524**	**2.150**	**0.230**	**1.488**	**0.536**	**0.557**	**2.150**	**0.450**	**4.686**	**0.139**	**0.283**	**0.065**	**7.423**	**0.298**	**6.748**

Planting Time: D_1-25/09/2019D_2- 10/10/2019D_3- 25/10/2019D_4- 10/11/2018

Varieties: V_1- Red Beauty V_2- Candyman,V_3- White ProsperityV_4- Intrepid

Table: 2 Interaction effect of Date of planting and varieties on growth, flowering behaviour and corm production of Gladiolus.

Treatment combination	Days taken to complete sprouting	Plant height (cm)	No. of leaves/ plant	Length of leaves (cm)	Days taken to initiation of spike	Days taken to open first floret	Length of spike (cm)	Number of florets per spike	Fresh weight of flower spike (gm)	Diameter of floret (cm)	Vase life of spike (in days)	Number of corms per plant	Number of cormels per plant	Diameter of corms (cm)	Average weight of corms per plant (gm)
D_1V_1	20.07	140.27	9.87	75.20	83.20	98.47	120.27	15.27	120.29	10.27	11.53	1.00	97.33	7.07	80.73
D_1V_2	19.93	134.47	10.73	82.33	87.13	104.53	114.47	14.07	131.91	10.85	10.93	1.13	28.93	6.89	88.34
D_1V_3	23.87	124.73	9.40	74.53	101.47	117.67	104.73	18.53	151.56	10.27	13.47	1.00	77.13	4.07	47.38
D_1V_4	21.33	138.33	10.33	79.73	102.13	117.53	118.33	16.73	137.61	10.40	10.73	1.07	49.33	6.47	85.33
D_2V_1	17.47	146.07	10.27	77.87	80.47	95.07	126.07	16.13	129.13	10.81	12.47	1.27	34.73	7.53	123.08
D_2V_2	16.33	139.40	11.27	86.87	84.67	100.53	119.40	14.87	137.35	10.92	11.60	1.27	91.87	7.30	95.25
D_2V_3	20.73	132.47	10.07	79.87	97.33	113.60	112.47	21.20	170.25	11.17	14.80	1.40	111.53	6.31	65.41
D_2V_4	19.67	141.87	10.93	81.73	100.73	116.01	121.87	17.47	144.10	10.70	11.33	1.00	57.40	7.03	116.07
D_3V_1	17.87	143.07	9.93	76.87	80.93	95.80	123.07	15.73	126.32	10.45	12.13	1.07	85.47	7.45	100.87
D_3V_2	16.93	136.60	11.00	84.27	85.33	101.33	116.60	14.40	133.62	10.80	11.20	1.00	30.73	6.96	92.18
D_3V_3	21.93	128.67	9.80	78.27	99.13	115.27	108.67	19.53	167.53	10.56	14.20	1.07	79.67	5.43	59.79
D_3V_4	20.13	140.27	10.67	80.87	101.13	116.40	120.27	17.13	140.93	10.11	11.07	1.00	53.67	6.81	95.53
D_4V_1	18.67	136.53	9.53	73.47	18.93	97.60	116.53	14.93	115.78	10.07	11.47	1.13	80.73	6.30	72.87
D_4V_2	17.13	131.27	10.27	78.93	85.93	102.13	111.27	13.47	123.01	10.38	10.53	1.00	24.67	6.36	61.08
D_4V_3	23.07	125.07	9.67	75.40	99.87	115.93	105.07	18.93	158.15	10.48	13.33	1.00	73.80	4.21	48.14
D_4V_4	20.53	139.20	10.47	79.93	10.60	117.07	119.20	16.80	138.69	10.49	10.80	1.00	52.27	6.80	81.67