

Original Research Article

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Performance of Different *Gladiolus* (*Gladiolus grandiflora* L.) Cultivars for Plant Growth and Corm Production under Chhattisgarh Plains Agroclimatic Zone Condition

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ABSTRACT

An experiment entitled “Performance of different gladiolus cultivars on growth, flowering and corm production under Chhattisgarh plains agroclimatic zone condition” was carried out in Horticulture Research Farm at the Department of Floriculture and Landscape Architecture, IGKV, Raipur, Chhattisgarh, India. The experiment was laid out in simple Randomized Block Design with three replication. Healthy corms of fourteen gladiolus cultivars were planted during October 2016-17. Among cultivars Punjab Dawn (8.67) taken minimum number of days to 50% sprouting. The observation on plant height, number of leaves plant⁻¹, length of leaves and width of leaves was recorded at 20, 40, 60 days after planting. Maximum plant height at 20 days was recorded in cv. Candyman (49.11 cm), while, minimum height was recorded cv. Dull Queen (30.34 cm). Maximum plant height at 40 days was recorded in cv. Summer Sunshine (72.31 cm). While, minimum height was recorded cv. Dull Queen (43.37 cm) and Maximum plant height at 60 days was recorded in cv. Candyman (100.21 cm). While, minimum height was recorded cv. Dull Queen (53.70 cm). Maximum number of leaves plant⁻¹ at 20 days was recorded in cv. GS-2 (3.57). While, minimum number of leaves plant⁻¹ was recorded cv. Her Majesty (2.40). Maximum number of leaves plant⁻¹ at 40 days was recorded in cv. Gujan (6.07). While, minimum number of leaves plant⁻¹ was recorded cv. Nova Lux (4.17) and Maximum number of leaves plant⁻¹ at 60 days was recorded in cv. Candyman (8.03). While, minimum number of leaves plant⁻¹ was recorded cv. Dull Queen (6.03). Maximum length of leaves at 20 days was recorded in cv. Candyman (25.67 cm). While, minimum length of leaves was recorded cv. Dull Queen (17.63 cm). Maximum length of leaves at 40 days was recorded in cv. Candyman (38.29 cm). While, minimum length of leaves was recorded cv. Dull Queen (26.61 cm) and Maximum length of leaves at 60 days was recorded in cv. White Prosperity (47.70 cm). While, minimum length of leaves was recorded cv. American Beauty (37.14 cm). Maximum width of leaves at 20 days was recorded in cv. Candyman (1.92 cm). While, minimum width of leaves was recorded cv. American Beauty (1.09 cm). Maximum width of leaves at 40 days was recorded in cv. Candyman (2.38 cm). While, minimum width of leaves was recorded cv. Her Majesty (1.22 cm) and Maximum width of leaves at 60 days was recorded in cv. White Prosperity (2.81 cm). While, minimum width of leaves was recorded cv. Dull Queen (1.74 cm). Maximum number of corms plant⁻¹ was recorded in cv. Advantage (4.69). However, Diameter and weight of corms plant⁻¹ was found maximum in cv. Candyman. Number and weight of cormels was observed maximum in cv. White Prosperity.

Keywords

Gladiolus,
Cultivars,
Vegetative growth,
Corms and cormels

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Introduction

Gladiolus (*Gladiolus grandiflora* L.) also known as “sword lily” belonging to family Iridaceae and is native of South Africa and Tropical Africa. It is one of the most popular flowers with magnificent inflorescence, referred as “Queen of bulbous flowers”. It is herbaceous plant which develops from axillary buds on the corm, usually unbranched leafy, leaves basal and cauline and sword shaped (Goldblatt *et al.*, 1998). Gladiolus possesses a great potential for export market, to European countries especially during winter. In Holland and other European countries it is very popular and ranks next to Tulip. In India too, gladiolus has become an important cut flower crop in the domestic flower market. Gladiolus is additionally useful for flower beddings in gardens, pot crops, rockeries etc (Abbasi *et al.*, 2005).

The state of Chhattisgarh is one of the potential areas for commercial cultivation of Gladiolus. There is a heavy demand for flowers during marriage, festivals and other social functions. There is a big gap between supply and demand that local growers can use their advantage. Gladiolus is one of the dominant flowers in the flower market of Chhattisgarh is blessed with many natural advantages such as abundant sunshine and favourable temperatures for its growth. There is much scope for increase Gladiolus cultivation in Chhattisgarh. 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 (Pandey, 2012). Hence, the present experiment was conducted to performance of different gladiolus cultivars for plant growth and corm production under Chhattisgarh plains agroclimatics zone condition.

Materials and Methods

An experiment entitled “Performance of different gladiolus cultivars for plant growth and corm production under Chhattisgarh plains agroclimatics zone condition” was carried out in Horticultural Research cum Instruction Farm at the Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, (C.G.) India during October 2016-17. The experiment was laid out in Randomized Block Design (RBD) with three replication. Healthy corms of fourteen varieties viz. Candyman, Nova Lux, Gunjan, Advantage, Punjab Dawn, Summer Sunshine, Her Majesty, Dull Queen, Saffron, GS-2, American Beauty, White Prosperity, Red Majesty, Fancy Pink. Standard cultivation and recommended cultural practices were followed. The plants were planting at a distance of 30x20 cm. Observations were recorded on various vegetative growth, corm and cormels yield attributes and data were analyzed statistically.

Results and Discussion

Vegetative growth characters

Various vegetative growth parameters were influenced significantly due to response of varieties (Table 1 & 2). The cultivar Punjab Dawn (8.67) taken minimum number of days to 50% sprouting which was at par with cultivar Candyman (9.33), Summer Sunshine (9.67), Saffron (9.67), American Beauty (9.67) and White Prosperity (9.67). Cultivar Punjab Dawn was significantly minimum days taken to 50% sprouting over others. The maximum number days (13.33) to taken 50% sprouting was recorded in cultivar Gunjan during investigation.

The maximum (49.11 cm) plant height was recorded in cultivar Candyman at 20 DAP

which was at par with cultivar White Prosperity (47.94 cm), Nova Lux (47.57 cm) and Advantage (47.31 cm). The minimum plant height was recorded in cultivar Dull Queen (30.34 cm).

The maximum (72.31 cm) plant height was recorded in cultivar Summer Sunshine at 40 DAP which was statistically at par with cultivar Candyman (71.42 cm), Nova Lux (69.12 cm), Red Majesty (69.00 cm), Advantage (68.81 cm) and GS-2 (67.07 cm) and minimum was observed in cultivar Dull Queen (43.37 cm).

At 60 DAP maximum plant height (100.21 cm) was recorded in cultivar Candyman. Which was significantly superior to rest of the other cultivars. The minimum plant height was recorded in cultivar Dull Queen (53.70 cm). The variation in plant height may be due to genetic makeup of the cultivar, which might differ variety to variety. Kumari and kumar (2015) reported that variation in final plant height among all the cultivars may be due to the hereditary traits or prevailing environmental conditions of the growing location.

The maximum (3.57) number of leaves was recorded in cultivar GS-2 which was at par with cultivar Candyman (3.43), White Prosperity (3.07), Gunjan (3.03), Punjab Dawn (3.00), Red Majesty (3.00) and Summer Sunshine (2.97) and significantly higher than rest of the other cultivars. Minimum (2.40) number of leaves was observed in cultivar Her Majesty at 20 DAP.

At 40 DAP highest number of leaves was recorded in cultivar Gujan (6.07) which was at par with cultivar GS-2 (5.83) and Advantage (5.77) and it was found superior over other cultivars at 40 DAP. The lower number of leaves was observed in cultivar Nova Lux (4.17).

In case of 60 DAP the higher (8.03) number of leaves was recorded in cultivar Candyman which was at par with cultivar White Prosperity (7.87), GS-2(7.67), Summer Sunshine (7.50), Gunjan (7.47), American Beauty (6.97) and Her Majesty (7.13). However, it was significantly superior then rest of the cultivars. The lowest number of leaves was recorded in cultivar Dull Queen (6.03). Significant variation was observed as to the number of leaves amongst the cultivars. The variation in number of leaves might be due to genotype as well as some known or unknown environmental factors. Similar results were also reported by Hossain *et al.*, (2011).

The data on length of leaves was recorded at 20, 40 and 60 DAP. Significantly the maximum length of leaves (25.67 cm) was recorded in cultivar Candyman which was at par with cultivar Punjab Dawn (24.26 cm), Nova Lux (24.20 cm), American Beauty (23.81 cm), Advantage (23.79 cm), Red Majesty (23.70 cm), Gunjan (23.23 cm), Saffron (22.57), Fancy Pink (21.80 cm) and Summer Sunshine (21.71 cm). The lower length of leaves (17.63 cm) was noted in cultivar Dull Queen during the first growth stage.

Different cultivars shows significant impacts on length of leaves during 40 DAP. Higher leaves length (38.29 cm) was observed in cultivar Candyman which was at par with cultivar White Prosperity (36.52 cm), Nova Lux (35.48 cm) and significantly higher than rest of the other cultivars. The minimum length of leaves (26.61 cm) was noted in cultivar Dull Queen.

At 60 DAP significantly maximum length of leaves (47.70 cm) was recorded in cultivar White Prosperity which was at par with cultivar Candyman (47.00 cm), Nova Lux (46.10 cm) and Punjab Dawn (45.29 cm) and

significantly differ with rest of the other cultivars. The lowest length of leaves was recorded (37.14 cm) in cultivar American Beauty. Differences in length of leaves might be due to genetic makeup of the cultivars, which is governed by the genotypic constituent of the plant. Similar results were also found by Kumar and Yadav (2005) and Swaroop *et al.*, (2011).

The data in respect to gladiolus width of leaves was recorded at 20, 40 and 60 DAP. Significantly higher width of leaves (1.92 cm) was observed in cultivar Candyman which was at par with cultivar Advantage (1.80 cm), Fancy Pink (1.76 cm), White Prosperity (1.75 cm) and Red Majesty (1.74 cm) and it was found significantly differ with rest of the other cultivars. The lower width of leaves was recorded in cultivar Her Majesty (1.09 cm) at 20 DAP.

At 40 DAP maximum width of leaves (2.38 cm) was observed in cultivar Candyman which was at par with cultivar White Prosperity (2.36 cm), Summer Sunshine (2.20 cm), Fancy Pink (2.19 cm), Red Majesty (2.13 cm) and Advantage (2.07 cm). The lowest width of leaves (1.22 cm) was noted under cultivar Her Majesty.

During 60 DAP the cultivar White Prosperity gave maximum width of leaves (2.81 cm) which was at par with cultivar GS-2 (2.77 cm), Summer Sunshine (2.74 cm), Gunjan (2.71 cm), Fancy Pink (2.61 cm) and Punjab Dawn (2.50 cm) and it was noted significantly differ with rest of the other cultivars. The minimum width of leaves was noted from cultivar Dull Queen (1.74 cm).

The variation in leaf width among the cultivars might be due to variation in their genetic constitution that could have lead to differential rates of photosynthesis and ultimately influence to vegetative growth and

development of the plants. Variation in leaf width amongst gladiolus varieties has also been reported by Kumar and Yadav (2005).

Corm and cormel attributes

The maximum number of corms (4.69) per plant was recorded in cultivar Advantage followed by Saffron (3.82), Fancy Pink (3.73) and Nova Lux (3.48). However, it was found significantly differed to rest of the other cultivars of the gladiolus. Minimum number of corms (2.14) per plant was recorded in cultivar Summer Sunshine. Similar variation for number of corms plant⁻¹ in gladiolus was also observed by Saini *et al.*, (1991), Ravidas (1993), Shiramagond and Hanamashetti (1999), Neeraj *et al.*, (2000), Rajiv and Yadav (2005), and Neha *et al.*, (2012).

Significant differences were observed among the cultivars with respect to weight of corms per plant and ranged from 80.56 (g) to 21.15 (g). The maximum weight of corms per plant was recorded in cultivar Candyman 80.56 (g) and minimum weight of corms plant was recorded in cultivar Dull Queen 21.15 (g). Saini *et al.*, (1991), Das (1998), Dimri (2002), Rajiv and Yadav (2005) and Rahul *et al.*, (2011) also reported similar variations in weight of corms.

The maximum diameter of corm was recorded in cultivar Candyman (6.46 cm) and minimum was recorded in Dull Queen (3.27 cm). This was significantly greater than other cultivars of the gladiolus. Neeraj *et al.*, (2001), Ram *et al.*, (2005), Naik *et al.*, (2011) and Sankari *et al.*, (2012) also observed similar variations for diameter of corm.

Significant variation was observed among cultivars of gladiolus with respect to number of cormels per plant.

Table.1 Performance of different gladiolus cultivars for vegetative growth characters

Treatment	Days to 50% sprouting	Plant height (cm)			Number of leaves per plant			Length of leaves (cm)			Width of leaves (cm)		
		20 DAP	40 DAP	60 DAP	20 DAP	40 DAP	60 DAP	20 DAP	40 DAP	60 DAP	20 DAP	40 DAP	60 DAP
Candyman	9.33	49.11	71.42	100.21	3.43	5.27	8.03	25.67	38.29	47.00	1.92	2.38	2.46
Nova Lux	10.33	47.57	69.12	87.91	2.70	4.17	6.37	24.20	35.48	46.10	1.35	1.60	1.81
Gunjan	13.33	42.45	58.91	86.02	3.03	6.07	7.47	23.23	32.78	44.36	1.35	1.72	2.71
Advantage	11.00	47.31	68.81	88.83	2.73	5.77	6.13	23.79	33.51	42.33	1.80	2.07	2.17
Punjab Dawn	8.67	40.89	54.31	85.43	3.00	5.07	6.57	24.26	34.04	45.29	1.24	1.53	2.50
Summer Sunshine	9.67	42.31	72.31	84.83	2.97	4.80	7.50	21.71	33.12	43.37	1.74	2.20	2.74
Her Majesty	11.00	40.33	62.00	71.97	2.40	4.63	7.13	20.48	28.02	38.07	1.09	1.22	1.95
Dull Queen	10.33	30.34	43.37	53.70	2.90	4.37	6.03	17.63	26.61	38.90	1.11	1.31	1.74
Saffron	9.67	42.14	60.52	70.47	2.53	4.50	6.87	22.57	32.95	42.74	1.17	1.64	2.20
GS-2	11.67	40.69	67.07	97.47	3.57	5.83	7.67	19.66	32.49	41.66	1.29	1.83	2.77
American Beauty	9.67	33.88	43.60	68.41	2.73	4.83	6.97	23.81	27.69	37.14	1.35	1.75	2.14
White Prosperity	9.67	47.94	65.04	89.17	3.07	4.90	7.87	18.12	36.52	47.70	1.75	2.36	2.81
Red Majesty	11.33	43.44	69.00	81.21	3.00	4.33	6.20	23.70	32.23	40.86	1.74	2.13	2.19
Fancy Pink	11.67	41.98	61.23	95.97	2.70	5.10	6.70	21.80	33.80	42.97	1.76	2.19	2.61
S.Em±	0.81	1.88	2.00	0.57	0.21	0.23	0.37	1.57	1.09	0.96	0.06	0.11	0.14
C.D at 5%	2.36	5.48	5.83	1.68	0.62	0.67	1.08	4.58	3.16	2.78	0.19	0.32	0.40

Table.2 Performance of different gladiolus cultivars for corms and cormels production

Treatments	Number of corms per plant	Weight of corms per plant (g)	Diameter of corms (cm)	Number of cormels per plant	Weight of cormels per plant (g)
Candyman	2.33	80.56	6.46	54.95	17.47
Nova Lux	3.48	32.09	4.14	53.27	12.53
Gunjan	2.48	31.69	4.19	72.92	32.49
Advantage	4.69	42.33	4.74	49.18	10.67
Punjab Dawn	2.99	39.12	4.28	35.35	13.53
Summer Sunshine	2.14	58.71	5.36	42.82	11.43
Her Majesty	3.31	33.01	4.43	52.75	16.15
Dull Queen	3.32	21.15	3.27	120.79	30.89
Saffron	3.82	33.41	4.17	83.49	18.27
GS-2	2.66	25.42	4.19	25.67	13.12
AmericanBeauty	2.16	33.42	4.28	42.74	12.69
White Prosperity	2.55	46.73	5.55	132.46	45.14
Red Majesty	2.40	53.79	4.92	43.40	18.68
Fancy Pink	3.73	49.61	4.81	44.83	21.61
S. Em ±	0.24	1.26	0.24	1.75	1.16
C.D at 5%	0.71	3.67	0.69	5.10	3.36

The cultivar White Prosperity (132.46) was significantly superior over all other cultivars under study, followed by Dull Queen (120.79) and lowest number of cormels (25.67) per plant was noted in the cultivar GS-2. The results for number of cormels plant⁻¹ confirm with the findings of Mishra and Saini (1990), Jhon *et al.*, (1996), Rani *et al.*, (2007), Ranpise *et al.*, (2007) and Hossain *et al.*, (2011) in gladiolus.

The weight of cormels was highest in cultivar White Prosperity (45.14 g) followed by Gunjan (32.49 g) and lowest cormel weight per plant was recorded Advantage (10.67 g). Similar variations for weight of cormels per plant were also recorded by Nair and Shiva (2003), Nimbalkar (2007) and Kishan (2010).

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