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## Performance of various *Gladiolus* cultivars under Punjab conditions

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### Abstract

An experiment was conducted to evaluate the performance of *Gladiolus* cultivars under Punjab conditions at Horticulture Research Farm, SAST, RIMT University, Mandi Gobindgarh (Punjab). The experiment was layout under randomized block design (RBD) with ten treatments (T1- Sarla, T2- White prosperity, T3- American beauty, T4- Jester, T5- Red Ginger, T6- Poppy Tears, T7- Punjab Dawn, T8- Summer Sunshine, T9- Darsan and T-10 Arti) during (October-April, 2018-19). The evaluation of cultivars had done for various growth and flowering parameters i.e days to sprouting, days to spike emergence, plant height (cm), number of leaves per plant, number of shoots per plant, days taken to first floret colour shown, days taken to first floret opening, days to last floret opening, length of spike (cm), diameter of first floret (cm), durability of whole spike, number of florets per spikes, corms, cormels produced per plant, diameter (cm) of corms and weight of corm (g), for improving farmers income. The results is revealed that cultivars Summer Sunshine, American Beauty and Red Ginger had produced maximum number of florets per spike, length of spike and flowering duration which are the major characters of *Gladiolus* cut flower production. Maximum corms and cormels per plant produced by cultivars Arti, Summer Sunshine and Punjab Dawn.

**Keywords:** Performance, *Gladiolus* cultivars, Punjab conditions

### Introduction

*Gladiolus grandiflorus* L. ( $2n = 30$ ) belonging to the family Iridaceae. It is one of the most cultivated, commercial cut flower worldwide. *Gladiolus* is native to subtropical climate of South Africa (Saleem *et al.*, 2013) [20]. The genus *Gladiolus* includes about 180 species with more than 10,000 cultivars of which about 20 species are grown commercially for cut flower production (Chauhan, 2005) [2]. It is a winter season crop but can be grown during rainy season in low rainfall areas with mild climate. *Gladiolus* is known as queen of the bulbous plants, it has wide range in spike forms, color and color combinations which makes it every popular for floral arrangement (Negi *et al.*, 2014) [14].

In the cultivation of *Gladiolus* crop both soil and climatic conditions have extreme effect on the nourishment, growth and succeeding survival of plants. Growth and yield performance of *Gladiolus* is strongly determined by different climatic conditions (Lu *et al.*, 1996) [10]. The genetic make-up, environmental conditions are also important factors which determine the growth and development of *Gladiolus* under specific conditions (Al-Humaid, 2004) [1]. There are many excellent varieties of *Gladiolus* with magnificent inflorescence in exhaustive range of different shades, colours, number and size of the florets, spike length, arrangement of the florets, post-harvest life and adaptability to different seasons. However it is useful for both cut flowers and garden display. Among *Gladiolus* growing countries India ranks second. In the international cut-flower trade *Gladiolus* occupies fourth place. The major *Gladiolus* growing states are West Bengal, Maharashtra, Uttar Pradesh, Himachal Pradesh and Uttrakhand (PHB, 2015) [18]. *Gladiolus* is one of the dominating flowers in the flower market of Punjab it is blessed with many natural advantages like abundant sunshine and favorable temperature range for its growth. There is much scope for increase of *Gladiolus* cultivation in Punjab especially out of season cultivation (Kumar, 2017) [9]. Hence, it is very much necessary to collect and evaluate suitable varieties for the Punjab region. The performance of any cultivar depends upon the genotypic and environmental interaction. To evaluate different cultivars of *Gladiolus* and find out the suitable cultivars for cut flower production under Punjab plains, the present investigation entitled "Performance of various *Gladiolus* cultivars under Punjab conditions" carried out at Horticulture Research Farm, School of Agriculture Sciences and Technology, RIMT, Mandigobindgarh, (Punjab).

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## Materials and methods

The present experiments entitled "Performance of various *Gladiolus* cultivars under Punjab conditions" was carried out at Horticulture Research Farm, School of Agricultural Sciences and Technology, RIMT University, Mandi Gobindgarh (Punjab) under randomized block design (RBD) replicated thrice. The experiment conducted during (October-April, 2018-19). Ten cultivars which were selected for the study, considered as treatments (T1- Sarla, T2- White prosperity, T3- American beauty, T4- Jester, T5- Red Ginger, T6- Poppy Tears, T7- Punjab Dawn, T8- Summer Sunshine, T9- Darsan and T-10 Arti) planted with plant spacing 30 × 30 cm in a plot size of 2 × 1.5 m<sup>2</sup>. Various growth and flowering traits were observed viz., days to sprouting, days to spike emergence, plant height (cm), number of leaves per plant, number of shoots per plant, days taken to first floret colour shown, days taken to first floret opening, days to last floret opening, length of spike (cm), diameter of first floret (cm), durability of whole spike, number of florets per spikes, number of corms per plant, number of cormels per plant, diameter of corms (cm) and weight of corm (g) for evaluate suitable cultivars under Punjab condition.

### 3.7 Statistical analysis

The data was analysis through the statistical software OPSTAT, 1998 (Sheoran *et al.*, 1998) [22]. One way ANOVA was applied for data analysis from Randomized Block Design according to the method given by Panse and Sukhatme (1985) [15]. The calculated 'F' value is compared with table F values at 5% level of significance for field data. If the calculated 'F' value is greater than the table value the difference is said to be significant and critical difference is calculated for further comparison.

### Result and discussion

The significant variations were observed among the cultivars for growth and floral parameters. Maximum Plant height (135.30 cm), spike length (106.7 cm), floret/spike (17.13) and duration of flowering (14.27) were recorded under cultivar Summer Sunshine followed by American Beauty and Red Ginger. Maximum corms/plant (1.67) and cormels/plant (51.73) were recorded in cultivar Arti followed by Summer Sunshine and Punjab Dawn. Minimum number of days (7.87) to sprouting taken by cultivar American Beauty followed by Arti (8.33). Whereas, maximum days (12.70) taken to sprouting was recorded in cultivar Jester. The minimum days to spike emergence taken by cultivar Punjab Dawn (66.53) followed by Arti (77.57). While, maximum number of days for spike emergence (91.73) was recorded in cultivar Jester. Minimum days to first floret colour showing were observed in cultivar Punjab Dawn (72.27) followed by the cultivar Darsan (86.33) While, maximum days to first floret colour were recorded in cultivar Jester (99.73). Minimum days to first floret opening were observed in cultivar Punjab Dawn (80.00) followed by the cultivar Arti (93.67), while maximum days to first floret opening were recorded in cultivar Jester (109.60). Maximum diameter of first floret was observed in cultivar Sarla (13.20) followed by the cultivar Summer Sunshine (13.03). However, minimum diameter of first floret was recorded in cultivar Punjab Dawn (9.83). Maximum number of tillers per plant was observed in cultivar Arti (2.30)

followed by the cultivar Summer Sunshine (1.53). Minimum number of tillers per plant (1.00) was recorded Sarla and white Prosperity respectively. Maximum number of leaves per plant were observed in cultivar summer Sunshine (9.13) followed by cultivar Arti (8.87) while, minimum number of leaves were recorded in cultivar Poppy Tears (7.00). The maximum corm weight was observed in cultivar White Prosperity (44.65 g.) followed by the cultivar Arti (43.03). While, minimum corm weight (g.) was recorded in cultivar Punjab Dawn (19.78). Maximum corm diameter was observed in cultivar White Prosperity (5.67) followed by the cultivar Summer Sunshine (5.30), whereas minimum corm diameter (3.97cm) has recorded in cultivar Punjab Dawn (Table 1 and Table 2).

Significant variations in days to corm sprouting which is due the genotypic differences that may contributed to different hormones levels, especially of gibberellins and abscisic acid in the corms which is controlling the period of dormancy (Kumar *et al.*, 2015 and Nair and Shiva, 2003) [7, 13] and it may resulted due to the genetic makeup of the cultivars and food reserves in plants that is the major source of spike emergence, growth of plants (Punam *et al.*, 2009 and Sindhu *et al.*, 2014) [17, 23]. The performance of cultivars for days to first floret opening, it might due to genetic capacity which respond to the vegetative and reproductive growth and also due to other factors such as nutrition and light (Thakur *et al.* 2015) [25]. Variations in spike length and number of floret, it may occurs due to characters viz., number of florets per spike, Rachis length, plant height, climatic conditions of the particular area and genetic makeup in the varieties (Chourasia *et al.*, 2015 and Thakur *et al.*, 2015) [4, 25]. The variations in flowering duration of spike may be due to the genetic makeup of the cultivars as well as environmental and climatic factors (Nagaraju and Parthasarathy, 2001) [12]. Variation in corm weight under various cultivars is due to available food material for the development of corms, genetic makeup of the cultivar which may get further development of corm in the particular environmental conditions. Similar result reported by Sharma *et al.*, (2018) [21] and Pragya *et al.* (2010) [16]. The variation in production of cormels per plant is might due to the soil and climatic and genetic composition (Swain *et al.*, 2008) [24]. The corms production per plant is related to number of shoots/ plant and vegetative growth (Chopde *et al.*, 2012; Momin *et al.*, 2015; Kumar *et al.*, 2019 and Hossain *et al.* (2011) [3, 11, 6, 5]. Significant variation was reported in the number of leaves per plant among the different cultivars. The variation in number of leaves could be due to genotype as well as some environmental factors (Safiullah and Ahmed (2001) [19].

### Conclusion

The present study revealed that, out of ten cultivars, cultivars Summer Sunshine, American Beauty and Red Ginger had produced maximum number of florets per spike, length of spike and flowering duration which are most important characters for *Gladiolus* producing farmers. Maximum corms and cormels per plant were produced by cultivars Arti, Summer Sunshine and Punjab Dawn. It may concluded that cultivars, Summer Sunshine, American Beauty, Red Ginger, Arti and Punjab Dawn are suitable for *Gladiolus* producing farmers of Punjab.

**Table 1:** Evaluation of vegetative parameters of various *Gladiolus* cultivars under punjab condition

Treatments	Weight of corm (g)	Diameter of corm (cm)	Tillers/Plant	Leaves/Plant	Plant height (cm)	Number of corms/plant	Cormels/Plant
T1: Sarla	34.30	4.37	1.00	7.63	123.83	1.00	36.87
T2: White Prosperity	44.65	5.67	1.00	8.13	124.57	1.00	23.87
T3: American Beauty	26.56	4.77	1.13	7.50	133.10	1.00	24.10
T4: Jester	24.63	4.60	1.10	7.67	120.50	1.00	22.53
T5: Red Ginger	25.93	4.90	1.00	7.63	130.37	1.00	32.87
T6: Poppy Tears	26.53	4.23	1.20	7.00	117.90	1.00	37.53
T7: Punjab Dawn	19.78	3.97	1.40	7.33	107.57	1.40	39.73
T8: Summer Sunshine	24.13	5.30	1.53	9.13	135.30	1.47	47.27
T9: Darsan	25.83	4.00	1.07	8.50	106.10	1.00	26.93
T10: Arti	43.03	4.80	2.30	8.87	105.53	1.67	51.73
Mean	29.54	4.66	1.27	7.94	120.48	1.15	34.34
SE(d)	1.00	0.24	0.14	0.41	2.28	0.07	1.88
C.D. (5%)	2.12	0.50	0.31	0.86	4.82	0.14	3.98
C.V. (%)	4.14	6.21	13.84	6.26	2.31	6.92	6.71

**Table 2:** Evaluation of floral parameters of various *Gladiolus* cultivars under punjab condition

Treatments	Days to corm sprouting	Days to spike emergence	Days to first color showing	Days to first floret opening	Days to last floret Opening	Diameter of first floret	Floret/spike	Spike length (cm)	Flowering duration
T1: Sarla	10.47	90.71	95.30	103.33	116.20	4.37	14.40	101.4	12.27
T2: White Prosperity	11.93	84.20	94.40	100.93	115.80	5.67	14.93	98.4	12.33
T3: American Beauty	7.87	84.67	95.40	101.73	117.00	4.77	16.13	103.5	14.00
T4: Jester	12.70	91.73	99.73	109.60	121.87	4.60	13.90	102.5	12.73
T5: Red Ginger	8.47	83.90	94.00	97.87	111.93	4.90	15.00	103.2	13.40
T6: Poppy Tears	8.67	85.03	93.67	101.60	112.53	4.23	11.33	99.9	11.40
T7: Punjab Dawn	9.80	66.53	72.27	80.00	91.13	3.97	13.73	95.4	11.80
T8: Summer Sunshine	9.40	85.70	93.07	100.07	107.13	5.30	17.13	106.7	14.27
T9: Darsan	8.87	78.53	86.33	94.47	102.33	4.00	12.00	98.5	11.47
T10: Arti	8.33	77.57	87.30	93.67	105.60	4.80	14.87	96.3	13.13
Mean	9.65	82.96	91.15	98.33	110.15	4.66	14.34	100.58	12.68
SE(d)	0.54	1.12	1.07	1.80	1.46	0.24	0.55	0.763	0.62
C.D.(5%)	1.14	2.36	2.27	3.82	3.09	0.50	1.16	2.286	1.30
C.V.(%)	6.85	1.65	1.44	2.25	1.62	6.21	4.67	1.314	5.95

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