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Morphological Characteristics of Different Genotypes of Gladiolus Flower

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ABSTRACT
The experiment was carried out during the period from 2011,2012 and 2013 to compare the morphology of five gladiolus flowers genotypes with respect to plant height, length and breadth of leaf, number of leaves per plant, length of flowers, breadth of flower, weight of flower, weight of single stick, length of spike, length of rachis, flowers per plant, days to reach 50% spike initiation, number of corm and cormel per plant, breadth of corm and weight of cormel per plant. The results indicated the significant variation amongst the gladiolus genotypes with respect to studied morphological characteristics as well as with yield, yield attributes and plant height. The plant height was higher (70.15cm) and lower (55.52cm) in (SKG14) yellow and(SKG18) orange /(SKG24)red respectively due to genotype. The lengths of leaves were almost same but higher with(SKG14) yellow and(SKG20) violet (50.20/51.10 cm) than the(SKG10) white and(SKG18) orange ones where the smallest length was recorded for(SKG24) red (40.36cm) one. Almost same trends were recorded for breadth of leaves with the exception of few. The average number of leaves was highest for(SKG10) white (14.10) followed by(SKG24) red, (SKG20) violet, (SKG18) orange and (SKG14)yellow respectively. Most of the parameters of flower characteristics did not maintain regular trend and correlation when considered in terms of sequences starting from white to red as shown in the table 1, 2 and 3. The recorded results clearly indicate that the(SKG10) white genotype has the best planting materials which may be planted for luxuriant growth of plants and production of excellent flowers.

Introduction

Gladiolus belongs to family Iridaceae and includes more than 150 species. Most of them are native to Africa with only about 12 originating from Mediterranean areas, Western Asia and Europe (Cohat, 1993). Out of the total 23 species have been found involved in development of the modern cultivar which number about 30,000 (Arora *et al.*, 2002).Gladiolus is a herbaceous plant having leaves with overlapping bases and a flowering stem bearing a terminal spike. Individual florets enclosed in two bracts consists of a six-member perianth, three stamens and an inferior ovary. Formation of underground storage organs, called corms takes place through condensation and swelling of 5-8 basal internodes of the flower stalk and they serve as the mode of survival under unfavourable growing conditions i.e winter. Gladiolus which has gained popularity in different parts of world because of its unsurpassed beauty and economic value. It is grown on an area of about 8500 ha throughout the world (DeHertogh and LeNard, 1993) and it has been estimated that in India gladiolus is grown on an area of about 1270 ha out of which about 50 ha are occupied by this flower in J&K state (Arora *et al.*, 2002).It is attributed as the queen of bulbous plants because of its beautiful bloom, the character usually governed by its genetic make up. However, cultural management is an important as that of genetic constituent for improved expression of the characters. Plant density, corn size and sowing time are among the various cultural requirements which have profound effect on the growth and development of plants.Floriculture industry has become one of the most rapidly expanding and dynamic global activities. The global trade in floriculture is estimated at USD 50 billion and trade of over USD 6 billion in cut flowers and pot plants with an annual growth rate of 17 per cent. The major demand comes from developed nations which impart flowers and ornamental plants from developing economies. India's share in this vast market has come up to somewhere around USD 16 million in last 5-6 years from a meagre level of USD 1.6 million. Large number of joint ventures involving foreign collaboration are coming up in floriculture sector due to low cost of production, benign climate and abundant variability available in India. The major destinations from fresh cut flowers from India during 1995-96 have been Japan. Netherlands, Germany, U.K. and Hong Kong. India is fast emerging as an exporter of cut flowers.The developments in the last couple of years are a clear pointer to the fact that India will play a significant role in the world trade. The government is playing a major role in physical planning, infrastrutural development and facilitation at policy level to promote the cut flower industry in India. It is considered as one of the extreme focus segments by the government for development and promotion of exports .The gladiolus is grown in hilly as hilly as well as plain areas of Uttaranchal, Himachal Pradesh, West Bengal, Jammu and Kashmir, Karnataka, Maharashtra, Haryana, Punjab and Delhi. The state of Jammu and Kashmir, has an added advantage in that it can be effectively used for "off season" flower production. Thus while gladiolus, irises, narcissus, lilies and other cut flowers can be produced in the plains during January-March, they can be produced in hills during April-November (Sehgal, 1993).Among the vast number of floricultural crops available for exploitation on a commercial scale, gladiolus is the premier one, highly suitable for the agroclimatic conditions of Jammu and Kashmir state. Like all economic plants, the growth and development of the gladiolus are controlled by genetic and environmental factors

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and various management practices. Similarly the planting dates in gladiolus greatly effect the germination, plant growth, flowering and yield of corms (Singh, 1992). Flowering period can be extended by planting gladiolus at different intervals. Planting of corms at regular intervals of 10-15 days or so produce an array of bloom for longer periods. Screening of certain varieties which can tolerate adverse conditions will further help in extending availability of flower spikes under ordinary growing conditions (Singh, 1992). Considerable initiative has already been taken-up, to standardize suitable agro-techniques for different set of climatic conditions that will help in improving floriculture industry in India.In India, Gladiolus has became an important commercial cut flower crop due to its greater demand. In Indigenous market. It is next to rose in India flower trade. In addition to cut flower, corms can also be exported on commercial basis it is mainly cultivated in the vicinity of metropalitan cities and at par of places in hills, from where large quantity of spikes are sent for sale in big cities during summer months. In Punjab its commercial cultivation is fast gaining popularity due to prevalence of congenial climatic conditions from September to April and being ideally located near to major consumption centres like Chandigarh and Delhi. The area under gladiolus cultivation in the state of Punjab is 32 hectares (Arora, et al., 1994) .

The morphological character of Gladiolus varies due to its genotypes. Rao and Negi (1994) studied the variability, heritability and genetic advancement on 12 biometric characters in gladiolus and found the highly significant differences due to genotypes. Negi and Raghava (1986) observed a higher phenotypic co-efficient of variation than the corresponding co-efficient of variation for plant height, flower number, corm number, spike length, spike diameter and rachis length. Negi et al (1978 a) conducted an experiment in gladiolus and concluded that the maximum variability was observed for plant height, corm number and flower yield. In addition to genotypic factors, the morphological character of gladiolus like all other flowering plants are directly or indirectly influenced by some environmental factors(temperature, humidity, rainfall, fog/dew, wind speed, soil texture, soil topography) as reported by several investigators. Owing to the above said facts and fallacies (environmental factors), the present study was undertaken to compare the variability among the genotypes and to find out the suitable genotypes of gladiolus flower for increasing the production of flower, corm and cornel of gladiolus in order to meet the demand of flower lovers.

Materials And Methods

The present experiment was carried out at Regional Research Station Wadura SKUAST-K during the period from 2011,2012 and 2013 to investigate the morphology of different gladiolus genotypes. The experiment examined five gladiolus genotypes. The observation characteristics were plants height, leaves, flowers, corm and cormels. The experiment was laid out in a randomized Complete Block Design each having 5 replications. The unit plot size was 1m×1m. The experimental area was tilled three to four times thoroughly followed by cold breaking and removal of weeds etc. Then the field was levelled and well rotten farmyard manure, applied at the rate of 20 t ha-1 was applied and mixed thoroughly with the soil. A basal dose of phosphorus and potassium and half dose of nitrogen through di-ammonium phosphate, muriate of potash and urea was applied uniformly a week before the planting of corms in each plot. The remaining half dose of nitrogen was applied at 4th leaf stage. Corms were selected according to grades and dipped in 0.2 per cent Bavistin for 15 minutes one day before planting of corms as a protective measure against fungal diseases. Irrigation, weeding cum hoeing and planting protection measures were carried out as and when required. Staking and tying of spikes was also done to avoid lodging.

The spikes were cut when one or two lower most florets showed color but still in tight bud stage (Mukhopadhyay, 1995). Harvesting of corms and cormels were performed only when leaves turned into brown (Mukhopadhyay, 1995). Data were collected and recorded from the selected genotypes in accordance with different parameters. The recorded data on the selected parameters were set for statistical analysis. The mean for collected data for each treatment was calculated.

Results and Discussion

Plant height

The plant height varied enormously due to genotype (Table1). The tallest plant (70.15cm) was in (SKG14)Yellow and the shortest one was in(SKG18) Orange (55.52cm). The variation observed in plant height among the genotypes might be due to difference in genetically constituents as well as environmental effects.

Leaf length

Leaf length was affected by genotypes and varied from 40.36cm to 51.20cm (Table 1). The longest leaf (51.20cm) was recorded in (SKG14)Yellow followed by(SKG20) Violet (50.10 cm),(SKG10) White (48.14cm) and(SKG18) Orange (46.40cm), while the shortest one was recorded for(SKG24) Red (40.36cm). Wide variation in leaf length amongst some genotypes of gladiolus was observed by Singh, and Dadlani. (1990).

Leaf breadth

There was variation (2.65cm to 4.15cm) in leaf breadth amongst the genotypes (Table 1). The (SKG14)Yellow genotype attained the maximum leaf breadth (4.15cm), which was followed by(SKG10) White genotype (4.00cm), (SKG20)Violet (3.20cm) and(SKG24) Red (3.10cm). Breadth of leaf was found to be minimum in(SKG18) Orange (2.60cm). Bhagur (1989) recorded significant variation in respect of leaf breadth amongst thirty genotypes of gladiolus. He found that leaf breadth varied from 1.3 to 4.5cm.

Number of leaves

Significant variation was observed as to the number of leaves amongst the genotypes (Table 1). The maximum number of average leaves (14.10) was obtained from the(SKG10) White genotype followed by Red genotype(SKG24) (12.12), (SKG20)Violet (12.00) and(SKG18) Orange (10.20) whereas in(SKG18) Yellow genotype attained the minimum number of leaves (10.00). This variation might be due to genotype as well as some known and/or unknown environmental factors.

Plant produces food materials through the process of photosynthesis. With the increasing number of leaves, photosynthesis generally increases, and plant can produce more food that influences the growth and development of the plant. So, genotypes that can produce more leaves have more plant growth leading to higher yield.

Days to reach 50% spike initiation

Marked differences were observed for days to 50% spike initiation amongst the genotypes under investigation (Table 2). The (SKG14)Yellow genotypes took maximum days (65 days) to reach 50% spike initiation which was followed by(SKG18) Orange (62 days),(SKG24)Red (63 days) and(SKG20) Violet (57 days). The minimum number of days (55 days) was taken by the (SKG10)White genotype. In a varietal trial, Ashwath and Parthasarathy (1994) reported that the white varieties required 40-70 days to 50% spike initiation which was in consonance with majority of the genotypes under investigation.

Table 1. Morphological (Phonological)

characteristics of different genotypes of gladiolus Genotypes	Color of genotypes	Plant height(cm)	Length of leaves(cm)	Breadth of leaves(cm)	No. of average leaves per plant
SKG10	White	58.24	48.14	4.00	14.10
SKG14	Yellow	70.15	51.20	4.15	10.00
SKG18	Orange	50.52	46.40	2.60	10.20
SKG20	Violet	56.97	50.10	3.20	12.00
SKG24	Red	55.65	40.36	3.10	12.12

Table 2. Morphological characteristics of different genotypes of Gladiolus

Sl. No.	Color genotype	Days to reach 50% spike initiation	Length of floret (cm)	Breadth of floret (cm)	Wt. of floret (g)	Wt. of single spike (g)	Length of spike (cm)	Length of rachis (cm)	Average Flowers per plant
SKG10	White	55	9.42	9.09	7.14	61.15	110.10	53.24	18.15
SKG14	Yellow	65	9.75	9.41	7.25	53.20	83.22	40.40	13.14
SKG18	Orange	62	8.39	6.90	4.54	34.10	70.05	31.60	12.30
SKG20	Violet	57	9.28	9.28	6.20	45.30	82.50	34.32	14.10
SKG24	Red	60	8.78	8.52	6.51	47.25	75.14	42.62	15.05

Table 3. Corm and cormel characteristics of gladiolus flower

Sl.No.	Color of genotype	No. of corm / plant	Av. Breath of corm (cm)	Wt. of corm (g)	No. of cormel/ plant	Wt. of cormel (g) / plant
SKG10	White	2.00	3.24	40.87	53.30	8.30
SKG14	Yellow	2.30	3.81	46.71	47.30	8.29
SKG18	Orange	3.60	2.74	28.11	45.85	7.10
SKG20	Violet	2.40	3.17	36.25	38.95	7.65
SKG24	Red	2.50	3.26	35.25	45.80	7.20

Singh and Dadlani(1990) recorded 38.7 days to 50% spike initiation in case of Apsara as an earliest genotype. The differences in days to reach 50% spike initiation might be due to the genetical factors of the concerned genotype.

Spike length

Significant variation in respect of spike length was found among the genotypes (Table 2). The longest spike(110.10cm) was produced by (SKG10)White genotype which was followed by (SKG14), (SKG20) and(SKG24) (83.22,82.50 and 75.14cm respectively) ones while the shortest spike(70.05cm) was produced by (SKG18)Orange genotype. Bhagur(1989) found that spike length ranges from 61.60 to 137.97cm in varietal evaluation of gladiolu

Rachis length

A great deal of genotypic variation in rachis length was observed (Table 2) and varied from 31.60 to 53.24cm. The highest rachis length was observed in (SKG10)White (53.24cm), which was followed by (SKG24)Red (42.62cm), (SKG14)Yellow (40.40cm) and (SKG20)Violet (34.32cm). The lowest rachis length (31.60cm) was observed in(SKG18) Orange genotype. Anuradha and Gowda (1994) reported that rachis length was highest (51.77cm) in Deep Red (GL-06) genotype.

Number of flower

Variation in average number of floret per plant amongst the genotypes was ranged from 12.30 to 18.15(Table 2). The highest number of floret per plant was produced by(SKG10) White one (18.15). The (SKG18)Orange genotype (12.30) produced the lowest number of floret per plant. The number of floret per plant varied from 5.33 to 20.00 as reported by Negi *et al*., (1982) from their experiment at the Hariana Agricultural University Farm, Hissar, India. Lal and Plant (1989) recorded 8 flowers per plant in GL-06 to 18 flowers in GL-15 in a gladiolus trail conducted at Maharastra in India.

Weight of single spike

Genotypes had displayed a wide range of variability amongst them in respect of spike weight. It ranged from in 34.10 to 61.15 gm (Table 2). Highest spike weight was recorded for(SKG10) white genotype White (61.15g) which was followed by(SKG14) (53.20g),((SKG24) (47.25g) and((SKG20) (45.30g). The lowest spike weight producer genotype was ((SKG18)Orange (34.10g).

Number of corms

Data recorded in respect of corm production of five genotypes of gladiolus are presented in Table 3. The number of corms produced per plant was the highest in(SKG18) Orange genotype (3.60) followed by (SKG24)Red (2.50),(SKG20) Violet (2.40) and (SKG14)Yellow (2.30) ones. The lowest number of corms (2.00) was produced by the (SKG10)White genotype. The variation observed in corm production amongst the genotypes might be due to difference in genetically constituents as well as environmental factors. Variation (1.0 to 4.0m) in corm production amongst some genotypes of gladiolus was observed at Bangalore in India by Anuradha and Gowda (1994).

Weight of corms

Genotypes had displayed a wide range of variability amongst them in respect of corm weight (Table). It ranged from 28.11 to 46.71 g. The highest corm weight (46.71g) was recorded from the(SKG14) Yellow genotype which was followed by(SKG10) White (40.87gm),(SKG20) Violet (36.25g) and(SKG24) Red (35.25g) ones. The lowest corm weight per plant was obtained from the Orange genotype (28.11g). harma and Sharma (1984) reported that corm weight was the highest in Yellow genotype (67g) and lowest inGL-25(18g) genotype which was more or less in consonance with the present investigation

Number of cormel per plant

Number of cormel per plant differed significantly affected by genotypes (Table 3). The highest number of cormels per plant was obtained from the(SKG10) White genotype (53.30) which was followed by(SKG20) Violet (38.95),(SKG14) yellow (47.30) and(SKG18) Orange (45.85) one. The(SKG24) Red

genotype (45.80) produced the lowest number of cormels per plant. Misra and Saini (1990) recorded 5 to 20 cormel per plant in gladiolus genotypes in a trial conducted at Bangalore, India

Weight cormel per plant

Genotypes had displayed a range of variability among them in respect of cormel weight per cormel(Table 3). It ranged from 7.10 to 8.30 g. The highest cormel weight was recorded in genotype(SKG10) White (8.30g) which was closely followed by(SKG14) Yellow (8.29g),(SKG20) Violet (7.65g) and (SKG24)Red (7.20g).The Orange genotype (7.10g) produced the lowest weight of cormel per corm. Negi et al.(1982) reported that cormel weight in gladiolus genotypes ranged from 5.2 to 17.0g which is more or less similar result with the findings of the present investigation.

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References

Anuradha, S. and J.V. Gowdha. (1994). Correlation studies in Gladiolus. [In: Floriculture-Technology, Trades and Trends. (Eds.) Prakash, J. and K. R. Bhandry.] Oxford and IBH Publishing Co. Pvt. Ltd. Calcutta. pp.285-287.

Ashwath, G. and V. A. Parthasarathy. (1994). Genetic variability in some quantitative characters of gladiolus. [In: Floriculture-Technology, Trades and Trends. (Eds.) Prakash, J. and K. R. Bhandry.] Oxford and IBH Publishing Co. Pvt. Ltd. Calcutta. pp.288-290.

Bhagaur, H. S. (1989). Studies of variability and genetic component of flower in exotic varieties of gladiolus. Ph.D.thesis, Kanpur University, Kanpur.

Lal, S. D. and C. C. Plant. (1989). Some newly developed hybrids of gladiolus. *Progressive Horticulture*. 21:189-93.

Mirsa, R.L. and H. C. Saini. (1990). Genotypic and Phenotypic variability in gladiolus. *J. Hort. Sci*., 45:427-34.

Negi, S.S., S.P.S. Raghava and T.V.R.S. Sharma. (1982). New cultivars of Gladiolus. *Indian Horticulture*. 26(4): 19-20.

Negi, S.S., T.V.R.S. Sharma, S.P.S. Raghava and P.R. Ramachandra. (1978a). Studies on heritability and interrelationship among various characters in gladiolus. 20th Int. Hort. Congr., Sydney, Australia, Abstr. 1982.

Negi, S.S., T.V.R.S. Sharma, S.P.S. Raghava and V.R. Srinivasan, (1986). Variability studies in Gladiolus. *Indian J. Hort*., 39: 269-72.

Rao, T.M. and T. Jamaicn. (1994). Quantitative and qualitative evaluation of Fusarium and tolerant hybrids of gladiolus. [In: Floriculture Technology, Trades and Trends. (Eds.) Prakash, J. and K. R. Bhandry.] Oxford and IBH Publishing Co. Pvt. Ltd. Calcutta. pp.265-268.

Sharma, A.N. and S.C. Sharma, (1984). Some promising gladiolus hybrids. NAGC Bull., No. 157. pp.51-52.

Singh, and Dadlani. (1990). Research Highlights (1971-1985). All Indian Coordinated Floriculture Improvement Project, ICAR, New Delhi.

Cohat, J. 1993. Gladiolus, pp 207-230. In : *The Physiology of Flower Bulbs* (Eds. D.C. Hertogh and M. Le Nard). Elsevier Publishers, Netherlands.

Arora, J.S. Misra, R.L., Singh, K., Singh, P. and Bhattacharje, S.K. 2002. Gladiolus, Technical Bulletin, All India Coordinated Research Project on Floriculture, Division of Floriculture and landscaping, IARI New Dehli, 14 : 1-3.

DeHertogh, A. and Le Nard, M. 1993. World production and Horticulture utilization of Flower Bulbs, pp. 21-27. In : *The Physiology of Flower Bulb* (Eds. A. DeHertogh and M. Le Nard). Elsevier Science Publishers, Netherlands

Singh, S.P. 1992. Gladiolus cultivation. Associated Publishing Company, New Dehli, pp. 120-127.

Sehgal, O.P. 1993. Ornamentals in hills. *Journal of Ornamental Horticulture* 1(1) : 62-67.

Arora, J.S., Singh, Kushal, and Singh, Premjit 1994. Gladiolus cultivation. Punjab Agricultural University Ludiana..