VARIETAL EVALUATION OF GLADIOLUS (*GLADIOLUS GRANDIFLORUS L.*) CULTIVARS UNDER AGRO- CLIMATIC CONDITIONS OF PRAYAGRAJ

ABSTRACT

Aim: An experiment to "**Study on Genetic Variability and correlation coefficient of Gladiolus Cultivars Under Agro-Climatic Conditions of Prayagraj"**

Place and Study of Duration: It was carried out at Horticulture Research Farm, Department of Horticulture, Naini Agriculture Institute during the Rabi season of 2023-24 with 22 Cultivars.

Study Design: Randomized Block Design with three replications.

Methodology: The analysis of variance for different quantitative characters reviled significant differences among the genotypes for parameters like growth, flowering and corm yield per plant of gladiolus. The highest corms yield/plant (g/plant) of genotype was observed in White prosperity (111.37). While lowest corms yield/plant (g/plant) was observed for Tambri (55.47). High magnitude of GCV and PCV were recorded for weight of daughter corm (20.396 and 21.71. In the present investigation, the genetic advance estimates were found to be high for no. of days taken for first floret open (24.58), corm weight / plot (g) (126.02), weight of mother corm / plot (g) (166.38), weight of daughter corm (70.43), no. of corm per hectare (42515.19) and no. of cormels per hectare (1349073.89). In the present investigation, the genetic advance as mean percentage estimates were found to be high for number of leaves per plant at 30 das (20.27), days taken for corm sprouting (31.48), no. of days taken for first floret open (31.38), weight of mother corm / plot (g) (27.03), weight of daughter corm (39.46) and no. of cormels per hectare (21.70). Genotypic and phenotypic correlation coefficient analysis revealed that Corms weight/plant (g) showed positive significant association with plant height (cm), number of leaves per plant , number of shoot per plant, rachis length (cm), no. of floret per spike, no. of spike per plant, floret diameter (cm), spike length (cm), vase life (days), corm weight / plot (g), weight of mother corm / plot (g), weight of daughter corm, corm diameter (cm), no. of corm per hectare and no. of cormels per hectare at both levels genotypic and phenotypic.

Key word: -*Gladiolus grandiflorus, Gladiolus,* GCV, PCV, Heritability.

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INTRODUCTION

Gladiolus (*Gladiolus grandiflorus* L.), the queen of the bulbous ornamentals, is the leading geophytes grown worldwide for cut flower trade and garden displays. It occupies 5th place in international cut flower trade among the geophytes in international florist trade and first in domestic bulbous flower trade **(Butt *et al.,* 2015, Wani *et al.* 2018)** India has suitable agro-climatic conditions for gladiolus cultivation, it is being grown over an area of 11660 ha with a production of 106 Crore spikes (agricoop.nic.in).

There are about 260 species of the gladiolus, out of these 250 species are native to sub-Saharan Africa, mostly South Africa and about 10 species are native to Eurasia **(Goldblatt *et al*., 2001)**. The modern hybrids have been derived from at least 12 species which are now called as *Gladiolus grandiflorus*.

Gladiolus (Gladiolus grandiflorusL.) also referred to as the "Queen of bulbous flowers," is a plant native to South Africa and a member of the Iridaceae family with the somatic chromosome number 2n = 2x = 30. The gladiolus is a beautiful cut flower with fascinating spikes and florets of bright colors, attractive shapes and a range of sizes that open up gradually form the bottom to the top. Since the beginning of civilization gladiolus flowers have been connected to people.

They stand for beauty, peace and love. It is often referred to as a "Sword lily" because of the foliage's sword-like form. Gladiolus leaves are narrowly linear, flattened at the sides and sheathed at the base. The stem is herbaceous. The flowers are actinomorphic, bisexual, with three stamens on the petaloid perianth and have a fully developed ovary. A food-storing underground stem known as a "corm" serves as the gladiolus's means of reproduction. Small new corms and cormels or cormletsare formed from the base as the new offspring corm develops on top of the old one. The main method of gladiolus reproduction is by the use of corms and cormels **Chandra *et al.,* (2023).**

MATERIALS AND METHODS

Location and source of experiment

The present investigation was carried out during Rabi season 2023 at Farm of Department of Horticulture at NainiAgricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences Naini, Prayagraj Uttar Pradesh. The genetic materials were consisted of 22 varieties (Table-1).

Table-1 The experiment was laid out in Randomized Block design(RBD) with three replications

S. No.	Notation	Genotypes
1	V1	Pusa Sindhuri
2	V2	Pusa Suhagin
3	V3	Red Ginger
4	V4	Red Majesty
5	V5	Sancerre
6	V6	Shahanoda
7	V7	Shobha
8	V8	Smoky Lady
9	V9	Snow Princess
10	V10	Solan Shrinagar
11	V11	Souvik Biscuits
12	V12	Surya kiran

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13	V13	Swarnima
14	V14	Sweta
15	V15	Tambri
16	V16	Urmi
17	V17	Vicky Lin
18	V18	Wedding Creamby
19	V19	White Prosperity
20	V20	Yellow Stone
21	V21	Suchitra
22	V22	Summer Sunshine

Results and Discussion

Analysis of variance showed significant differences among the genotypes for the 22 characters studied analysis of variance showed significant difference among the genotypes for the different characters at 1% significance. The mean sum of squares due to genotypes showed significant differences for all characters under study for except days taken for emergence of flower spike and days taken to show color of basal floret. In other words, the performance of the genotypes with respect to these characters was statistically different, suggesting scope for growth, flowering and corm yield characters improvement in Gladiolus. The present investigation confirms the earlier finding **Bhujbal *et al.,* (2013), Ahmad *et al.*, (2012) and Ramzan *et al.*, (2016).**

Table 2 Analysis of variance for 25 different growth, flowering and corm yield of Gladiolus

ANOVA Summary				
Sl.No.	Source	Mean Sum of Squares (MSS)		
		Replication	Treatment	Error
	Degrees of freedom	2	21	42
1	Plant height (30 das)	11.110	35.923**	11.37
2	Plant height (60 das)	31.9460	44.4*	20.524
3	Plant height (90 das)	82.640	110.569**	41.414
4	Number of leaves per plant at 30 DAS	0.1190	0.917**	0.13
5	Number of leaves per plant at 60 DAS	0.0740	1.237**	0.199
6	Number of leaves per plant at 90 DAS	0.2220	1.503**	0.633
7	no. of shoot per plant	0.0090	0.037**	0.008
8	Days taken for corm sprouting	0.0150	2.237**	0.142
9	Rachis length (cm)	1.4280	48.113**	12.889
10	Days for spike emergence	52.4090	91.307**	18.504
11	Days for colour break stage	2.2880	112.214**	38.129
12	No. of Floret Per Spike	0.6260	1.153**	0.438
13	No. of spike per plant	0.0020	0.02**	0.005
14	No. of Days taken for first floret open	34.5760	584.914**	46.721
15	No. of days taken for last floret open	0.7220	0.846**	0.363
16	Floret diameter (cm)	0.5690	2.371**	0.794
17	Spike length (cm)	170.024*	142.352**	47.449
18	Vase life (days)	0.7670	0.823**	0.25
19	Corm weight / plot (g)	396.7520	19938.246**	2923.948
20	Weight of mother corm / plot (g)	3302.3440	28235.022**	2631.033
21	Weight of daughter corm	219.4040	4150.58**	176.55
22	Corm diameter (cm)	0.1590	0.337**	0.127
23	No. of corm per hectare	610407435.5910	2698662740.664**	515543684

24	No. of cormels per hectare	12709124297.50	2319460755283.19**	3.49E11
25	Corm Yield/Plant (g)	55.9750	392.346**	94.839

Table 2.a Mean performance of 22 genotypes for growth, flowering characters of Gladiolus (*Gladiolus grandiflorus* L.)

Sl. No.	Genotypes	Plant height (30 das)	Plant height (60 das)	Plant height (90 das)	Number of leaves per plant at 30 DAS	Number of leaves per plant at 60 DAS	Number of leaves per plant at 90 DAS	no. of shoot per plant
1	PusaSindhuri	35.86	64.15	117.26	4.40	7.80	9.44	1.44
2	PusaSuhagin	35.20	63.51	111.21	4.53	8.02	9.84	1.43
3	Red Ginger	37.96	62.72	101.26	4.26	7.63	9.83	1.34
4	Red Majesty	42.64	64.48	116.55	3.96	7.68	9.54	1.42
5	Sancerre	35.93	63.34	114.07	3.66	7.66	9.84	1.34
6	Shahanoda	37.29	60.34	109.90	3.89	7.87	10.04	1.45
7	Shobha	40.39	69.39	113.67	4.17	7.45	10.32	1.41
8	Smoky Lady	44.18	70.00	119.96	5.27	8.40	10.59	1.49
9	Snow Princess	39.16	65.88	109.66	4.46	7.52	10.02	1.32
10	SolanShrinagar	36.61	65.78	109.96	4.54	7.08	9.65	1.29
11	Souvik Biscuits	44.60	70.93	121.58	5.31	8.50	10.69	1.59
12	Suryakiran	37.28	63.99	111.59	4.27	7.70	10.42	1.38
13	Swarnima	35.76	62.35	115.07	4.01	7.54	10.29	1.32
14	Sweta	37.29	65.08	109.55	3.79	7.34	10.26	1.35
15	Tambri	32.39	53.88	96.96	3.19	5.44	7.26	1.16
16	Urmi	37.44	63.37	118.04	3.46	7.84	9.74	1.42
17	Vicky Lin	42.40	66.21	108.43	4.19	6.79	10.00	1.29
18	Wedding Creamby	36.60	65.46	107.42	4.43	7.47	10.15	1.37
19	White Prosperity	46.14	72.32	122.40	5.36	8.63	10.86	1.71
20	Yellow Stone	40.49	64.89	108.85	4.44	7.42	9.93	1.30
21	Suchitra	37.33	62.57	113.18	3.87	7.80	10.07	1.41
22	Summer Sunshine	38.04	63.13	110.54	4.28	7.50	9.42	1.38
Mean		**38.68**	**64.72**	**112.14**	**4.26**	**7.59**	**9.92**	**1.39**
CV		**8.72**	**7.00**	**5.74**	**8.45**	**5.88**	**8.02**	**6.24**
SEm		**1.95**	**2.62**	**3.72**	**0.21**	**0.26**	**0.46**	**0.05**
CD at 5%		**5.56**	**7.46**	**10.60**	**0.59**	**0.74**	**1.31**	**0.14**
Minimum		**32.39**	**53.88**	**96.96**	**3.19**	**5.44**	**7.26**	**1.16**
Maximum		**46.14**	**72.32**	**122.40**	**5.36**	**8.63**	**10.86**	**1.71**
Treatment		**S**	**S**	**S**	**S**	**S**	**S**	**S**

Sl. No.	Genotypes	Days taken for corm sprouting	Rachis length (cm)	Days for spike emergence	Days for colour break stage	No. of Floret Per Spike	No. of spike per plant	No. of Days taken for first floret open	No. of days taken for last floret open
1	PusaSindhuri	5.00	56.86	79.00	85.67	10.57	1.24	68.17	11.38
2	PusaSuhagin	5.33	55.54	74.33	81.00	11.10	1.26	69.31	11.13
3	Red Ginger	5.00	56.41	76.00	83.33	10.81	1.27	77.30	11.24
4	Red Majesty	5.00	53.68	72.67	80.00	10.82	1.26	79.83	11.97
5	Sancerre	5.00	54.65	76.00	82.33	10.62	1.28	88.96	11.64
6	Shahanoda	6.00	50.98	74.33	80.67	10.66	1.24	89.49	11.49
7	Shobha	5.00	51.33	76.33	84.67	11.50	1.19	81.58	11.73
8	Smoky Lady	3.67	59.80	68.00	74.33	11.97	1.31	51.20	10.72
9	Snow Princess	5.00	52.51	77.33	85.00	10.58	1.13	91.56	11.57
10	SolanShrinagar	5.33	54.38	80.00	88.67	11.16	1.15	69.27	11.46
11	Souvik Biscuits	3.00	60.77	66.67	72.67	12.18	1.35	50.19	10.57
12	Suryakiran	5.00	52.95	77.67	84.33	10.99	1.19	85.72	11.07
13	Swarnima	5.00	50.80	75.33	82.00	11.44	1.09	87.00	11.25
14	Sweta	5.33	51.67	77.67	85.00	11.83	1.20	84.16	11.32
15	Tambri	7.00	42.74	92.00	100.33	9.69	1.05	97.75	13.11
16	Urmi	5.33	52.76	75.67	82.33	10.88	1.16	88.37	11.00
17	Vicky Lin	5.00	52.96	80.00	87.67	10.86	1.15	78.39	11.46
18	Wedding Creamby	4.67	53.57	80.33	88.00	10.64	1.15	81.55	11.27
19	White Prosperity	3.00	62.12	64.00	69.67	12.30	1.40	48.35	10.51
20	Yellow Stone	5.33	51.35	77.67	85.33	10.49	1.23	92.90	11.62
21	Suchitra	5.33	52.23	76.00	82.33	10.84	1.20	87.86	11.19
22	Summer Sunshine	5.33	54.17	77.00	84.00	10.82	1.23	73.93	11.59
Mean		**4.98**	**53.83**	**76.09**	**83.15**	**11.03**	**1.22**	**78.31**	**11.38**
CV		**7.56**	**6.67**	**5.65**	**7.43**	**6.00**	**5.64**	**8.73**	**5.29**
SEm		**0.22**	**2.07**	**2.48**	**3.57**	**0.38**	**0.04**	**3.95**	**0.35**
CD at 5%		**0.62**	**5.92**	**7.09**	**10.17**	**1.09**	**0.11**	**11.26**	**0.99**
Minimum		**3.00**	**42.74**	**64.00**	**69.67**	**9.69**	**1.05**	**48.35**	**10.51**
Maximum		**7.00**	**62.12**	**92.00**	**100.33**	**12.30**	**1.40**	**97.75**	**13.11**
Treatment		**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**

Table 2 b : 25 different growth, flowering and corm yield of Gladiolus

Genotypic Coefficient of Variation (GCV)

Wide range of genotypic coefficient of variation (GCV) was observed for the characters ranging Weight of daughter corm (20.39) to No. of days taken for last floret open (3.53). High magnitude of GCV were recorded for weight of daughter corm (20.396). While as moderate estimates were observed for no. of cormels per hectare (13.03), corm yield/plant (g) (10.56), no. of corm per hectare (10.93), weight of mother corm / plot (g) (15.01), no. of days taken for first floret open (17.10), days taken for corm sprouting (16.77) and number of leaves per plant at 30 das (12.02). Similar findings were also reported by **Bhujbal *et al.,* (2013), Blamuurugan*et al.,* (2002), Kumar et al., (2011), Naresh *et al.,* (2015), Panwar *et al.,* (2013), Mishra (2008) and Pattanaik*et al.,* (2013).**

Phenotypic Coefficient of Variation (PCV)

Wide range of phenotypic coefficient of variation (PCV) was observed for the characters ranging from Weight of daughter corm (21.71) to No. of days taken for last floret open (6.36). High magnitude of PCV were recorded for weight of daughter corm (21.71). While as moderate estimates were observed for Weight of mother corm / plot (g) (17.17), Corm diameter (cm) (10.08), No. of corm per hectare (14.29), No. of cormels per hectare (16.13), Corm Yield/Plant (g) (14.77), Plant height (30 das) (11.43), Number of leaves per plant at 30 DAS (14.69), Days taken for corm sprouting (18.39), No. of Days taken for first floret open (19.20), Corm weight / plot (g) (12.30). Similar findings were also reported by **Bhujbal *et al.,* (2013), Blamuurugan*et al.,* (2002), Kumar *et al.,* (2011), Naresh *et al.,* (2015), Panwar *et al.,* (2013), Mishra (2008) and Pattanaik*et al.,*(2013).**

Heritability

The heritability estimates were found to be high (more than 75%). The high heritability in broad sense was observed for the characters viz. weight of daughter corm (88.24), weight of mother corm / plot (g) (76.436), no. of days taken for first floret open (79.33) and days taken for corm sprouting (83.09). While as moderate estimates were observed for Number of leaves per plant at 30 DAS (66.959), Number of leaves per plant at 60 DAS (63.428), Corm weight / plot (g) (65.982) and No. of cormels per hectare (65.298). The present findings are in accordance with the findings of **Anuradha and Gowda (1990), Sorianathasundaram and Nambisan (1991), Mahanta and Paswan (1995), Sheikh *et al.,* (1995), Balaram et al., (2000), Deepti (2000), Balamurugan *et al.,* (2002), Bichoo*et al.,* (2002), and Pratap and Rao (2006), Balaram and Janakiram (2009), Bhujbal *et al.,*(2013), Archana *et al.,* (2008), Choudhary *et al.,* (2012), Naresh *et al.,* (2015), Singh *et al.,* (2017) and Vanlalruati*et al.,*(2013).**

Genetic Advance

In the present investigation, the genetic advance estimates were found to be high for no. of days taken for first floret open (24.58), corm weight / plot (g) (126.02), weight of mother corm / plot (g) (166.38), weight of daughter corm (70.43), no. of corm per hectare (42515.19) and no. of cormels per hectare (1349073.89). The results was also in accordance with the findings of **Pragnyashree*et al.,* (2014), Ganesh *et al.,* (2014), Vanlalruati*et al,* (2013), Sing *et al.,* (2017), Naresh *et al.,* (2015), Bhujbal *et al.,* (2013)** and **Kumar *et al.,*(2011).**

Table 3 Estimation of component of variance and genetic parameters for 25 character growth, flowering and corm yield of 22 genotypes in Gladiolus.

Sl.No.	Genetic Parameters	GCV	PCV	h2 (Broad Sense)	GA	GAM
1	Plant height (30 das)	7.40	11.43	41.853	3.81	9.86
2	Plant height (60 das)	4.36	8.25	27.942	3.07	4.75
3	Plant height (90 das)	4.28	7.16	35.759	5.91	5.27
4	Number of leaves per plant at 30 DAS	12.02	14.69	66.959	0.86	20.27
5	Number of leaves per plant at 60 DAS	7.75	9.72	63.428	0.97	12.71
6	Number of leaves per plant at 90 DAS	5.43	9.69	31.421	0.62	6.27
7	no. of shoot per plant	7.14	9.48	56.704	0.15	11.08
8	Days taken for corm sprouting	16.77	18.39	83.09	1.57	31.48
9	Rachis length (cm)	6.37	9.22	47.671	4.87	9.05
10	Days for spike emergence	6.47	8.60	56.737	7.64	10.05
11	Days for colour break stage	5.98	9.53	39.308	6.42	7.72
12	No. of Floret Per Spike	4.43	7.45	35.28	0.60	5.42
13	No. of spike per plant	5.82	8.11	51.565	0.11	8.61
14	No. of Days taken for first floret open	17.10	19.20	79.338	24.58	31.38
15	No. of days taken for last floret open	3.53	6.36	30.742	0.46	4.03
16	Floret diameter (cm)	5.51	8.74	39.823	0.94	7.17
17	Spike length (cm)	5.15	8.13	40.001	7.33	6.70
18	Vase life (days)	4.75	7.22	43.263	0.59	6.44
19	Corm weight / plot (g)	9.99	12.30	65.982	126.02	16.71
20	Weight of mother corm / plot (g)	15.01	17.17	76.436	166.38	27.03
21	Weight of daughter corm	20.39	21.71	88.24	70.43	39.46
22	Corm diameter (cm)	6.01	10.08	35.492	0.32	7.37
23	No. of corm per hectare	10.93	14.29	58.533	42515.19	17.23
24	No. of cormels per hectare	13.03	16.13	65.298	1349073.89	21.70
25	Corm Yield/Plant (g)	10.56	14.77	51.116	14.67	15.55

CONCLUSION

Based on the present investigation it was concluded that the high magnitude of heritability (in broad sense) coupled with high genetic gain was observed for most of traits exhibiting additive genetic effect. The analysis of variance for different quantitative characters reviled significant differences among the genotypes for parameters like growth, flowering and corm yield per plant of gladiolus. In the present study the heritability estimates in broad sense were classified into 3 groups such as high (>75%), moderate (60% - 75%), low (<60%). In the present investigation, the genetic advance estimates were found to be high for no. of days taken for first floret open (24.58), no. of corm per hectare (42515.19) In the present investigation, the genetic advance as mean percentage estimates were found to be high for number of leaves per plant at 30 das (20.27), days taken for corm sprouting (31.48), no. of days taken for first floret open (31.38). Genotypic and phenotypic correlation coefficient analysis revealed that Corms weight/plant (g) showed positive significant association with plant height (cm), number of leaves per plant , number of shoot per plant, rachis length (cm), no. of floret per spike, no. of spike per plant, floret diameter (cm), spikelength (cm),

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vase life (days), no. of corm per hectare at both levels genotypic and phenotypic.

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