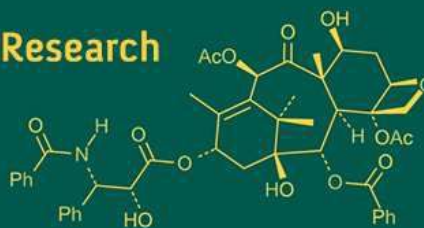


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Estimation of genotypic and phenotypic correlation of gladiolus (*Gladiolus grandiflora* L.) under agro-climatic conditions of Prayagraj

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Abstract

The present investigation was under taken at Horticulture Research Field, Naini Agricultural Institute, SHUATS, during October 2023 to April 2024 for seventeen yield and its attributing traits in Randomized Block Design with three replications. The genotypic and phenotypic correlation coefficient analysis revealed that corms weight plant⁻¹ (g) showed positive significant association with plant height (45 and 60 DAS were 0.351 & 0.357; 0.504 & 0.504, respectively), number of spikes plant⁻¹ (0.256), spike length (0.452 & 0.457 cm), rachis length (0.407 & 0.411 cm), number of florets spike⁻¹ (0.297 & 0.299), basal floret diameter (0.328 & 0.322), number of corms plant⁻¹ (0.421 & 0.420), diameter of corms (0.930 & 0.929 mm) and number of cormels mother⁻¹ corm (0.495 & 0.495). The significant and negative association were observed in days taken to 50% spike emergence (-0.289 and -0.287), while non-significant positive association were observed in plant height (30 DAS) (0.0625 & 0.0665), number of leaves plant⁻¹ (0.0752 & 0.0791), number of spikes plant⁻¹ (0.2492), vase life (days) and (0.1836 & 0.1838), weight of cormels (0.1468 & 0.1485 cm) whereas non-significant and negative association was observed in days taken to 50% sprouting of corms (-0.1777 & -0.1738).

Keywords: Gladiolus, genotypic, phenotypic, correlation

Introduction

Gladiolus is a bulbous ornamental flower having beautiful spikes as well as longer vase life. It is called as the queen of bulbous flowers and popularly known as sword lily because of its sword shaped leaf. Gladiolus is native to the Sub-African region, and is found mainly in tropical Africa and South Africa. It is first among bulbous flowers and eighth among cut flowers in world trade (Nazir *et al.*, 2003) ^[1]. It is one of the most widely used bulbous ornamentals being utilized in the form of cut flower, flower arrangements, making bouquets and bedding purposes.

Correlation studies can be used as a basis for selection, since they show how desired features interact with one another and how traits affect yield. It measures the degree and direction of association between two or more variables and mutual relationship between various plant characters and determines the component character on which selection is based for genetic improvement for a particular character. Thus, association of yield with yield-attributing characters is of great importance for planning and executing of breeding program. As correlation provides information about yield contributing characters, this information is useful to plant breeders in selection of elite genotypes from diverse genetic populations.

Materials and Methods

The experiment was conducted at Horticulture research field, Naini Agricultural Institute, SHUATS, Prayagraj during the year 2023-2024. This region located in central India is characterized by unique type of climatic condition having dry and hot climatic zone, resembling partly with desert and partly with tropical type, dominated by less rainfall as well as ground water. Uniform, healthy and disease-free corms of 20 gladiolus varieties namely Sunayana, Swarnima, Chandni, Anjali, Australian fair, Creamy green, High Hops, Suchitra, Hunting Song, Bindiya, Friendship, Pusa Red Valentine, Pusa Shanti, Pink Parasol, Plum Tart, Pusa Manmohak, Sancerre, Subham, Jyotsana and Pusa Rajat were planted at 30 cm × 15 cm spacing in three replications with randomized block design (RBD).

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Table 1: Phenotypic correlation coefficient for 17 characters viz., Growth, Spike yield and Vase life with corms weight/plant (g)

	Days taken to 50% sprouting of corms	Plant height (30 DAS)	Plant height (45 DAS)	Plant height (60 DAS)	Number of leaves per plant	Days taken to 50% spike emergence	Number of spikes per plant	Spike length (cm)	Rachis length (cm)	Number of florets per spike	Basal floret diameter (cm)	Vase life (Days)	Number of corms per plant	Diameter of corms (mm)	Number of cormels/mother corm	Weight of cormels (gm)	Weight of corms (g)
Days taken to 50% sprouting of corms	1.00	-0.0584	-0.1857	-0.309*	0.2365	0.564**	0.2463	-0.2306	-0.1774	-0.1309	-0.0726	0.0585	-0.0309	-0.1276	-0.0456	0.1908	-0.1777
Plant height (30 DAS)		1.00	0.707**	0.371*	-0.388*	0.411*	-0.0074	0.0242	0.0462	-0.0927	-0.2057	-0.1603	0.0382	0.1474	-0.0752	0.0269	0.0625
Plant height (45 DAS)			1.00	0.783**	-0.339*	0.2028	0.268*	0.423**	0.452**	0.276*	0.0869	0.1367	0.385*	0.399*	0.1436	0.2186	0.351*
Plant height (60 DAS)				1.00	-0.0684	-0.0478	0.317*	0.815**	0.822**	0.480**	0.1818	0.1936	0.407*	0.478**	0.295*	0.2533	0.504**
Number of leaves per plant					1.00	-0.1023	0.226	0.1624	0.1417	-0.1429	-0.286*	-0.258*	0.0737	0.0957	0.0053	-0.1806	0.0752
Days taken to 50% spike emergence						1.00	0.0353	-0.1341	-0.1063	-0.254	-0.329*	-0.1586	-0.2136	-0.2332	-0.393*	0.0154	-0.289*
Number of spikes per plant							1.00	0.1574	0.1519	0.255*	0.185	0.374*	0.302*	0.2118	0.328*	0.324*	0.256*
Spike length (cm)								1.00	0.977**	0.547**	0.0942	0.2356	0.283*	0.449**	0.316*	0.2126	0.452**
Rachis length (cm)									1.00	0.561**	0.1063	0.267*	0.307*	0.416**	0.275*	0.1979	0.407*
Number of florets per spike										1.00	0.474**	0.471**	0.446**	0.1897	0.506**	0.288*	0.297*
Basal floret diameter (cm)											1.00	0.520**	0.277*	0.2118	0.404*	0.256*	0.328*
Vase life (Days)												1.00	0.284*	0.1524	0.444**	0.486**	0.1836
Number of corms per plant													1.00	0.343*	0.387*	0.257*	0.421**
Diameter of corms (mm)														1.00	0.409*	0.1006	0.930**
Number of cormels/mother corm															1.00	0.692**	0.495**
Weight of cormels (gm)																1.00	0.1468
Weight of corms (g)																	1.00

Table 2: Genotypic correlation coefficient for 17 characters viz., Growth, Spike yield and Vase life with Corms weight/plant (g)

	Days taken to 50% sprouting of corms	Plant height (30 DAS)	Plant height (45 DAS)	Plant height (60 DAS)	Number of leaves per plant	Days taken to 50% spike emergence	Number of spikes per plant	Spike length (cm)	Rachis length (cm)	Number of florets per spike	Basal floret diameter (cm)	Vase life (Days)	Number of corms per plant	Diameter of corms (mm)	Number of cormels/mother corm	Weight of cormels (gm)	Weight of corms (g)
Days taken to 50% sprouting of corms	1.00	-0.0555	-0.1802	-0.308*	0.2372	0.564**	0.2355	-0.2254	-0.1741	-0.1308	-0.0751	0.0595	-0.0347	-0.123	-0.0439	0.194	-0.1738
Plant height (30 DAS)		1.00	0.707**	0.372*	-0.385*	0.411*	-0.0116	0.0297	0.0502	-0.0906	-0.2082	-0.1592	0.0374	0.1506	-0.0734	0.0296	0.0665
Plant height (45 DAS)			1.00	0.780**	-0.331*	0.2019	0.260*	0.430**	0.456**	0.279*	0.0803	0.1371	0.383*	0.402*	0.1455	0.2205	0.357*
Plant height (60 DAS)				1.00	-0.0669	-0.0479	0.314*	0.812**	0.821**	0.481**	0.1802	0.1936	0.406*	0.478**	0.296*	0.2527	0.504**
Number of leaves per plant					1.00	-0.1022	0.2232	0.1673	0.1458	-0.139	-0.287*	-0.257*	0.0759	0.0979	0.0064	-0.179	0.0791
Days taken to 50% spike emergence						1.00	0.0332	-0.1331	-0.1059	-0.2537	-0.328*	-0.1583	-0.2133	-0.232	-0.393*	0.0161	-0.287*
Number of spikes per plant							1.00	0.1543	0.1498	0.258*	0.1868	0.368*	0.312*	0.2012	0.321*	0.309*	0.2492
Spike length (cm)								1.00	0.977**	0.549**	0.0873	0.2348	0.286*	0.450**	0.316*	0.2127	0.457**
Rachis length (cm)									1.00	0.563**	0.1012	0.266*	0.308*	0.417**	0.276*	0.198	0.411*
Number of florets per spike										1.00	0.470**	0.470**	0.449**	0.1896	0.505**	0.285*	0.299*
Basal floret diameter (cm)											1.00	0.519**	0.275*	0.2069	0.402*	0.2523	0.322*
Vase life (Days)												1.00	0.281*	0.1533	0.445**	0.486**	0.1838
Number of corms per plant													1.00	0.337*	0.383*	0.2484	0.420**
Diameter of corms (mm)														1.00	0.410*	0.1046	0.929**
Number of cormels/mother corm															1.00	0.692**	0.495**
Weight of cormels (gm)																1.00	0.1485
Weight of corms (g)																	1

All cultural operations were timely followed for all the varieties. Observations were recorded on various growth, corms and cormels attributes and data were analyzed statistically.

Results and Discussion

Correlation coefficient is a statistical measure which is used to find out the degree and direction of relationship between two or more variables. A positive value of correlation shows the changes of two variables are in the same directions. In the present investigation, Correlation coefficient analysis measures the mutual relationship between various plant characters and to determine the component character on which selection can be used for genetic improvement in yield while selecting the suitable plant type. In this study the genotypic and phenotypic correlation coefficient of different characters with Corms weight/plant (g) and their relationship among themselves are presented in Table 1 and 2. The Phenotypic and Genotypic correlation coefficient analysis revealed that corms weight plant⁻¹ (g) showed positive significant association with plant height (45 DAS 0.351 & 0.357 cm), plant height (60 DAS 0.504 & 0.504 cm), number of spikes plant⁻¹ (0.256), spike length (0.452 & 0.457 cm), rachis length (0.407 & 0.411 cm), number of florets spike⁻¹ (0.297 & 0.299), basal floret diameter (0.328 & 0.322 cm), number of corms plant⁻¹ (0.421 & 0.420), diameter of corms (0.930 & 0.929 mm) and number of cormels mother⁻¹ corm (0.495 & 0.495). The negative significant association was observed with days taken to 50% spike emergence (-0.289 and -0.287) at both phenotypic and genotypic level while non-significant and positive association was observed with plant height (30 DAS 0.0625 & 0.0665), number of leaves plant⁻¹ (0.0752 & 0.0791), number of spikes plant⁻¹ (0.2492), vase life (days) and (0.1836 & 0.1838), weight of cormels (0.1468 & 0.1485 g) and non-significant and negative association was observed with days taken to 50% sprouting of corms (-0.1777 & -0.1738).

The character days taken to 50% sprouting of corm showed positive significant association with Days taken to 50% spike emergence (0.564 & 0.564). While non-significant and positive association with number of leaves plant⁻¹ (0.2372 & 0.2365), number of spikes plant⁻¹ (0.2355 & 0.2463), vase life (days) (0.0595 & 0.0585), weight of cormels (0.194 & 0.1908 g). While, significant and negative association with plant height (60 DAS) (-0.308 & -0.309). While, non-significant negative association with plant height (30 DAS) (-0.0555 & -0.0584), plant height (45 DAS) (-0.1802 & -0.1857), spike length (cm) (-0.2254 & -0.2306), rachis length (cm) (-0.1741 & -0.1774), number of florets per spike (-0.1308 & -0.1309), basal floret diameter (cm) (-0.0751 & -0.0726), number of corms per plant (-0.0347 & -0.0309), diameter of corms (mm) (-0.123 & -0.1276), number of cormels/mother corm (-0.0439 & -0.0456) at both genotypic and phenotypic level. Similar results were obtained by Singh (2009) in *antirrhinum* and Pattanaik *et al.* (2015)^[3] and Singh *et al.* (2017)^[4] in *gladiolus*.

Conclusion

Correlations ensure simultaneous improvement in two or more variables and negative correlations bring out the need to obtain a compromise between the desirable traits. High correlations between two characters indicates that selection for the improvement of one-character leads to the

simultaneous improvement in the other character depending upon the magnitude of association between them (Gourishankarayya *et al.*, 2005 and Pattanaik *et al.*, 2015)^[8, 3].

On the basis of the present investigation, it is concluded that corms weight/plant showed positive significant association with plant height (45 DAS) (0.351 & 0.357), plant height (60 DAS) (0.504 & 0.504), number of spikes per plant (0.256), spike length (cm) (0.452 & 0.457), rachis length (cm) (0.407 & 0.411), number of florets per spike (0.297 & 0.299), basal floret diameter (cm) (0.328 & 0.322), number of corms per plant (0.421 & 0.420), diameter of corms (mm) (0.930 & 0.929) and number of cormels/mother corm (0.495 & 0.495).

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