Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 8 [4] March 2019 : 87-92

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.876
Universal Impact Factor 0.9804
NAAS Rating 4.95

ORIGINAL ARTICLE **OPEN ACCESS**

Correlation Coefficient Analysis in Gladiolus

S. Naresh, A.V.D. Dorajee Rao, K. Uma Krishna and B. Babu Rao
Department of Floriculture and Landscape Architecture, Dr. Y.S.R. Horticultural University, HCRI, Venkataramannagudem - 534101, West Godavari District, Andhra Pradesh, India.
Email: nareshflori09@gmail.com

ABSTRACT
An evaluation study was conducted on the performance of eight gladiolus (Gladiolus hybrida L.) hybrids in comparison with check variety viz., Dhiraj, based on nineteen quantitative characters at Horticultural College and Research Institute, Venkataramannagudem during Rabi, 2014-15. It was observed that there were significant correlations among yield and its attributing characters at both genotypic and phenotypic levels. Plant height at maturity exhibited a high significant correlation with number of spikes per plant. Among spike parameters, spike length and number of florets per spike were found to be associated at high significance with spike yield. Similarly the association between spike yield and corm weight per plant was noticed as highly significant, whereas that between spike yield and number of cormels per plant was significant only at 5% level.
Key words: Gladiolus, Hybrids, Genetics, Correlations and Yield Attributes

Received 23.11.2018 Revised 29.12.2018 Accepted 01.01.2019

INTRODUCTION

Its cultivation in India dates back to 19th century as 'Firmingers Manual of Gardening in India' published in 1863, mentions that, Charles Gray of Coonoor grew some gladioli from corms and seeds in his garden. Gladiolus is an important bulbous ornamental prized for its beautiful spikes as well as longer vase-life and said to be the "Queen of bulbous flower crops" [3]. The current number of species in the genus gladiolus is 255 [6]. The major states growing gladiolus are Uttar Pradesh, Himachal Pradesh, Haryana, Delhi, Karnataka, Punjab, West Bengal, Assam, Sikkim and Meghalaya [1, 2]. In order to meet the growing demand for cut flowers in the fast growing cities of coastal tract of Andhra Pradesh, introduction and popularization of modern flowers is needed.

MATERIAL AND METHODS

The present investigation entitled as "Evaluation of gladiolus *(Gladiolus hybrida* L.) hybrids under coastal Andhra Pradesh conditions" was carried out during the period 2014-15 at Horticulture College and Research Institute, Dr. Y.S.R Horticultural University, Venkataramannagudem, Tadepalligudemmandal, West Godavari District. The experiment consisted of nine treatments namely (American Beauty, Arun, Darshan, Green Star, Limoncello, Meridiana, Pink Lady, White Prosperity and Dhiraj as a check). Statistical significance was tested by 'F' value at 5 per cent level of significance. It helps in working out the variance due to different sources and also provides the basis for test of significance [9]. Analysis of variance was carried out as per the procedure given by Panse and Sukhatme [4] using the mean values of five randomly selected plants in each replication from all the treatments to find out the significance of treatment effect.

RESULTS AND DISCUSSION

The genotypic correlation and phenotypic correlation studies were carried out for nineteen characters to know the nature of association between number of spikes per plant and its attributing characters (Table 1 and 2).

The number of days taken for sprouting of corm exhibited significant and positive correlation at both genotypic and phenotypic levels with number of corms per plant (r_g: 0.81; r_p: 0.77), number of spikes per plant (r_g: 0.60; r_p: 0.49), corm weight per plant (r_g: 0.51; r_p: 0.44) and total weight of corm and cormels per plant (r_g: 0.43; r_p: 0.39). Significant and negative correlation was recorded by this parameter with corm diameter (r_g: -0.69; r_p: -0.55) and number of leaves per plant (r_g: -0.63; r_p: -0.48). Plant height at maturity had a significant and positive correlation with vase life (r_g: 0.96; r_p: 0.79), corm diameter (r_g: 0.88; r_p: 0.70), floret length (r_g: 0.86; r_p: 0.53), floret diameter (r_g: 0.80; r_p: 0.46), spike length (r_g: 0.73; r_p: 0.68), leaf area per plant at maturity (r_g: 0.70; r_p: 0.66), number of cormels per plant (r_g: 0.60; r_p: 0.55), number of leaves per plant at maturity (r_g: 0.56; r_p: 0.44), number of florets per spike (r_g: 0.55; r_p: 0.50), weight of corm and cormels per plant (r_g: 0.54; r_p: 0.51) and rachis length (r_g: 0.42; r_p: 0.40) at both genotypic and phenotypic levels. The correlations were negatively significant between this parameter and number of corms per plant (r_g: -0.41; r_p: -0.40).

Number of leaves per plant at maturity showed significant and positive correlation at both genotypic and phenotypic levels with leaf area per plant at maturity (r_g: 0.94; r_p: 0.65), floret diameter (r_g: 0.80; r_p: 0.40) and number of cormels per plant (r_g: 0.84; r_p: 0.67) whereas, significant and negative correlation was recorded at genotypic and phenotypic level with number of corms per plant (r_g: -0.55; r_p: -0.42).Leaf area per plant at maturity exhibited significant and positive correlation with it at both genotypic and phenotypic levels with floret diameter (r_g: 0.91; r_p: 0.39), corm diameter (r_g: 0.79; r_p: 0.55), number of cormels per plant (r_g: 0.74; r_p: 0.66) and vase life (r_g: 0.72; r_p: 0.60).

Table 1. Phenotypic correlation among yield and its attributing characters in gladiolus

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9
X_1	1.00								
X_2	-0.36	1.00							
X_3	-0.48**	0.44*	1.00						
X_4	-0.34	0.66**	0.65**	1.00					
X_5	0.01	-0.18	0.20	-0.15	1.00				
X_6	0.07	-0.20	0.17	-0.18	0.98**	1.00			
X_7	0.08	-0.20	0.11	-0.20	0.96**	0.97**	1.00		
X_8	0.00	-0.21	0.12	-0.16	0.93**	0.94**	0.96**	1.00	
X_9	-0.21	0.68**	0.34	0.29	0.07	0.08	0.09	0.06	1.00
X_{10}	0.03	0.40*	0.15	0.05	0.27	0.31	0.32	0.27	0.79**
X_{11}	0.25	0.50**	-0.11	-0.06	-0.01	0.04	0.04	-0.04	0.61**
X_{12}	-0.13	0.53**	0.06	0.30	-0.49**	-0.48**	-0.51**	-0.53**	-0.27
X_{13}	-0.25	0.46*	0.40*	0.39*	-0.15	-0.16	-0.15	-0.14	0.53**
X_{14}	-0.21	0.79**	0.31	0.60**	-0.27	-0.27	-0.30	-0.31	0.66**
X_{15}	0.77**	-0.40*	-0.42*	-0.34	-0.11	-0.04	-0.05	-0.10	-0.27
X_{16}	0.44*	0.50**	0.03	0.23	0.00	0.02	0.06	-0.05	0.62**
X_{17}	-0.55**	0.70**	0.33	0.55**	-0.33	-0.35	-0.34	-0.33	0.60**
X_{18}	-0.29	0.55**	0.67**	0.66**	0.17	0.16	0.15	0.14	0.68**
X_{19}	0.39*	0.51**	0.17	0.31	0.13	0.12	0.14	0.03	0.49**
X_{20}	0.49**	0.11	-0.22	-0.13	-0.04	0.01	0.00	-0.07	0.05

X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}
1.00									
0.56**	1.00								
0.34	0.45*	1.00							
0.38*	0.09	0.66**	1.00						
0.48**	0.45*	0.57**	0.33	1.00					
-0.11	0.22	-0.09	-0.41*	-0.22	1.00				
0.52**	0.62**	0.42*	0.35	0.47*	0.20	1.00			
0.27	0.21	0.68**	0.54**	0.64**	-0.52**	0.22	1.00		
0.45*	0.19	0.43*	0.58**	0.44*	-0.25	0.44*	0.48**	1.00	
0.32	0.48**	0.28	0.29	0.36	0.16	0.92**	0.14	0.47*	1.00
0.32	0.51**	0.07	-0.17	0.65**	0.70**	0.49**	-0.25	0.16	0.52**

Table 2. Genotypic correlation among yield and its attributing characters in gladiolus

	X_1	X_2	X_3	X_4
X_1	1.00			
X_2	-0.37	1.00		
X_3	-0.63**	0.56**	1.00	
X_4	-0.37	0.70**	0.94**	1.00
X_5	0.04	-0.27	0.40	-0.24
X_6	0.15	-0.21	0.32	-0.30
X_7	0.09	-0.24	0.30	-0.34
X_8	0.11	-0.28	0.36	-0.34
X_9	-0.23	0.73**	0.37	0.32
X_{10}	0.10	0.42*	0.21	0.09
X_{11}	0.28	0.55**	-0.28	-0.10
X_{12}	-0.18	0.86**	0.29	0.32
X_{13}	-0.36	0.80**	0.80**	0.91**
X_{14}	-0.26	0.96**	0.36	0.72**
X_{15}	0.81**	-0.41*	-0.55**	-0.35
X_{16}	0.51**	0.54**	0.11	0.29
X_{17}	-0.69**	0.88**	0.36	0.79**
X_{18}	-0.32	0.60**	0.84**	0.74**
X_{19}	0.43*	0.54**	0.20	0.36
X_{20}	0.60**	0.12	-0.32	-0.14

0.05	0.08	0.04	-0.09	0.06	0.37	0.67**	0.09	-0.34	0.74**	0.80**	0.51**	-0.37	0.23
0.16	0.16	0.16	0.06	0.50**	0.37	0.60**	0.35	0.37	0.37	0.17	0.93**	0.18	0.51**
0.31	0.30	0.28	0.28	0.80**	0.59**	0.27	0.64**	0.89**	0.60**	-0.26	0.49**	0.63**	1.00
-0.35	-0.37	-0.37	-0.37	0.72**	0.34	0.26	0.98**	0.96**	0.93**	-0.71**	0.20	1.00	
-0.00	0.03	0.14	-0.06	0.65**	0.62**	0.74**	0.66**	0.37	0.56**	0.23	1.00		
-0.25	0.04	0.02	-0.15	-0.34	-0.12	0.29	-0.28	-0.69**	-0.23	1.00			
-0.36	-0.37	-0.36	-0.34	0.75**	0.53**	0.65**	0.96**	0.36	1.00				
-0.28	-0.24	-0.21	-0.22	0.84**	0.67**	0.11	0.73**	1.00					
-0.64**	-0.63**	-0.59**	-0.63**	0.35	0.35	0.54**	1.00						
-0.06	0.15	0.07	-0.07	0.68**	0.58**	1.00							
0.30	0.35	0.37	0.34	0.87**	1.00								
0.12	0.13	0.15	0.11	1.00									
0.96**	0.97**	0.98**	1.00										
0.98**	0.99**	1.00											
0.99**	1.00												
1.00													
X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20
X_{19}																			1.00	0.55**

* Significant at p = 0.05 probability (0.38) ** Significant at p = 0.01 probability (0.48)

X_1: Days taken for sprouting of corm	X_6: Days taken for full spike emergence	X_{11}: Number of florets per spike	X_{16}: Corm weight per plant
X_2: Plant height at maturity	X_7: Days taken for basal floret to show colour	X_{12}: Floret length	X_{17}: Corm diameter
X_3: Number of leaves per plant at maturity	X_8: Days taken for basal floret fully open	X_{13}: Floret diameter	X_{18}: Number of cormels per plant
X_4: Leaf area per plant at maturity	X_9: Spike length	X_{14}: Vase life	X_{19}: Weight of corm and cormel per plant
X_5:Days taken for spike initiation	X_{10}: Rachis length	X_{15}: Number of corms per plant	X_{20}: Number of spikes per plant

The number of days taken for spike initiation exhibited significant and positive correlation with at both genotypic and phenotypic levels with days taken for full spike emergence (r_g: 0.99; r_p: 0.98), days taken for basal floret to show colour (r_g: 0.98; r_p: 0.96) and days taken for basal floret to fully open (r_g: 0.96; r_p: 0.93) whereas, significant and negative correlation with floret length (r_g: -0.64; r_p: -0.49) at both genotypic and phenotypic levels.The number of days taken for full spike emergence was recorded significant and positive correlation with at both genotypic and phenotypic levels with days taken for basal floret to show colour (r_g: 0.99; r_p: 0.97) and days taken for basal floret to fully open (r_g: 0.97; r_p: 0.94) whereas, significant and negative correlation with floret length (r_g: -0.63; r_p: -0.48) at both genotypic and phenotypic levels.Days taken for basal floret to show colour exhibited significant and positive correlation with at both genotypic and phenotypic levels with days taken for basal floret to fully open (r_g: 0.98; r_p: 0.96) whereas, significant and negative correlation with floret length (r_g: -0.59; r_p: -0.51) at both genotypic and phenotypic levels. The number of days taken for basal floret to fully open was found to record significant and negative correlation at both genotypic and phenotypic levels with floret length (r_g: -0.63; r_p: -0.59).

Spike length exhibited significant and positive correlation with rachis length (r_g: 0.87; r_p: 0.79), floret diameter (r_g: 0.84; r_p: 0.53), number of cormels per plant (r_g: 0.80; r_p: 0.68), vase life (r_g: 0.75; r_p: 0.66), corm diameter (r_g: 0.72; r_p: 0.60), corm weight per plant (r_g: 0.65; r_p: 0.63), number of florets per spike (r_g: 0.68; r_p: 0.61) and weight of corm and cormels per plant (r_g: 0.50; r_p: 0.49) at both genotypic and phenotypic levels.

Rachis length was significantly and positively correlated at both genotypic and phenotypic levels with floret diameter (r_g: 0.67; r_p: 0.38), corm weight per plant (r_g: 0.62; r_p: 0.52), number of cormels per plant (r_g: 0.59; r_p: 0.45), number of florets per spike (r_g: 0.53; r_p: 0.48) and vase life (r_g: 0.53; r_p: 0.48).Number of florets per spike had a significant and positive correlation at both genotypic and phenotypic levels with corm weight per plant (r_g: 0.74; r_p: 0.62), number of spikes per plant (r_g: 0.67; r_p: 0.51), vase life (r_g: 0.65; r_p: 0.45), weight of corm and cormels per plant (r_g: 0.60; r_p: 0.48) and floret length (r_g: 0.54; r_p: 0.45). Floret length exhibited significant and positive correlation at both genotypic and phenotypic levels with corm diameter (r_g: 0.98; r_p: 0.96), vase life (r_g: 0.96; r_p: 0.57), floret diameter (r_g: 0.73; r_p: 0.66), corm weight per plant (r_g: 0.66; r_p: 0.42) and number of cormels per plant (r_g: 0.64; r_p: 0.43). Floret diameter exhibited significant and positive correlation at both genotypic and phenotypic levels with corm diameter (r_g: 0.96; r_p: 0.54) and number of cormels per plant (r_g: 0.89; r_p: 0.58) whereas, the trait was negatively and significantly correlated with number of corms per plant (r_g: -0.69; r_p: -0.41).

Significant and positive correlation at both genotypic and phenotypic levels was recorded by vase life with corm diameter (r_g: 0.93; r_p: 0.64), number of spikes per plant (r_g: 0.74; r_p: 0.65), number of cormels per plant (r_g: 0.60; r_p: 0.44) and corm weight per palnt (r_g: 0.56; r_p: 0.47).Number of corms per plant exhibited significant and positive correlation both at genotypic and phenotypic levels with number of spikes per plant (r_g: 0.80; r_p: 0.70) whereas, exhibited negative significant correlation at both genotypic and phenotypic levels with corm diameter (r_g: -0.71; r_p: -0.52).Weight of corm showed significant and positive correlation both at genotypic and phenotypic levels with weight of corm and cormels per plant (r_g: 0.93; r_p: 0.92), number of spikes per plant (r_g: 0.51; r_p: 0.49) and number of cormels per plant (r_g: 0.49; r_p: 0.44).Corm diameter showed significant and positive correlation at both genotypic and phenotypic levels with number of cormels per plant (r_g: 0.63; r_p: 0.48).The number of cormels per plant exhibited significant and positive correlation at both genotypic and phenotypic levels with weight of corm and number of cormels per plant (r_g: 0.51; r_p: 0.47). Weight of corm and cormels per plant was significant and positively correlated at both genotypic and phenotypic levels with number of spikes per plant (r_g: 0.55; r_p: 0.52).

Information on correlations between the important growth, flower, quality and corm characters are of considerable help in the efficient selection programme. A higher correlation 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. The characters are considered to be independent when weak correlation exists, between them and selection for a character may not affect the other. It is evident by the present study that correlation exists between characters among themselves and in turn with yield [1]. A narrow difference between the genotypic and phenotypic correlation coefficients indicates the lesser influence of environment on the expression of these traits and presence of strong inherent association among the traits.

From the result of present study (table 1 and 2) the number of spikes per plant was found to be positively associated with number of corms per plant (r_g: 0.80; r_p: 0.70), vase life (r_g: 0.74; r_p: 0.65), number of florets per spike (r_g: 0.67; r_p: 0.51), number of days taken for sprouting of corm (r_g: 0.60; r_p: 0.49), weight of corm and cormels per plant (r_g: 0.55; r_p: 0.52) and corm weight per plant (r_g: 0.51; r_p: 0.49).This indicated that the hybrids which were late for corm sprouting has taken more number of days to sprout could produce a higher number of sprouts per mother corm and eventually more number of spikes per plant. The vigorous growth put in by the late sprouted plants could have helped them to accumulate photosynthates at a rapid rate so as to support good growth of spike with maximum number of larger florets. These facts are confirmed to data on various growth and reproductive parameters. Similar opinion was also expressed by Prabhat *et al.* [5], Rahul *et al.* [8] and Pragnyashree *et al.* [7].

The hybrids which showed delayed sprouting also could accumulate a good quantity of underground biomass as evident from their performance in respect of corm weight and weight of corm and cormels per plant. This may also be attributed to the same reason of late sprouting in association with a high vigour in accumulating maximum amount of photosynthates in the sink parts *i.e*. flowers and corms. Similar opinion was also reported by Prabhat *et al.* [5] and Rahul *et al.* [8] in gladiolus.

ACKNOWLEDGEMENT

The author is grateful to Dr.Y.S.R.H.U, Venkataramannagugem for providing facilities to carry out the research work at Horticultural College and Research Institute, Venkataramannagudem. They are also grateful to K.R.C.C.H, Arabhavi for providing planting material of some of hybrids used in the study.

REFERENCES

1. Archana, B.B. (2006). Evaluation of gladiolus hybrids (*Gladiolus hybrids* Hort.) For yield and quality cut flower production. *M.Sc. (hort.) Thesis.* University of Agricultural Sciences. Dharwad.
2. Kolavalli, S., Atheeq, I.K. & Jacob, X. (19910. Floriculture industry in India, *Oxford and Ibh Publication Company Limited*. New Delhi.
3. Pandy, R.K., Sheetal, D., Pal, P.S., Shivani, J. & Bhat, D.J. (2010). Performance of gladiolus cultivars under Jammu conditions. *J. Res.*, 9(2):210-214.
4. Panse, V.G. & Sukhatme, P.V. (1967). Statistical methods for agricultural workers, *ICAR.* New Delhi.
5. Prabhat, K., Kumar, M., Binayak, C., Rakesh, M. & Mishra, D.S. (2011). Genetic variability and correlation studies in *gladiolus* (*Gladiolus hybrida* L.) under Tarai Conditions. *Annals of Hort.,*4(2):140-146.
6. Pragya, R., Bhat, K. V., Misra, R.L., Singh, S.K. & Ranjan, J.K. (2010). Genetic relationships of gladiolus cultivars inferred from fluorescence based AFLP markers. *Scientia Hort.,*123:562–567.
7. Pragnyashree, M., Singh, A.K. & Singh, O.P. (2014). Genetic variability, genetic advance, correlation coefficient and path analysis in gladiolus. *J. Agri. Veterinary Sci*.,7(7):23-26.
8. Rahul, K., Sanjay, K. & Yogesh, C.Y. (2012). Genetic variability, heritability, genetic advance, correlation coefficient and path analysis in gladiolus. *I. J. Hort.* 69(3):369-373.
9. Singh, R.H. & Choudhary, B.D. (1979). Biometrical methods in quantitative genetic analysis. *Kalyani Publishers*. Ludhiana.

CITATION OF THIS ARTICLE

S. Naresh, A.V.D. Dorajee Rao, K. Uma Krishna and B. Babu Rao. Correlation Coefficient Analysis in Gladiolus. Bull. Env. Pharmacol. Life Sci., Vol 8 [4] March 2019 : 87-92