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Correlation and path analysis studies in Gerbera (*Gerbera jamesonii*)

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SUMMARY

The correlation and path coefficient analysis were worked out for twenty eight diverse genotypes of gerbera for 11 characters. The correlations studies revealed that the genotypic correlations were higher than corresponding phenotypic correlations. The number of flowers per plant showed significant positive correlation with number of leaves per plant, plant spread, leaf area and number of suckers per plant at genotypic level. Path coefficient analysis showed that the leaf area (0.536) had highest direct effect on number of flowers per plant, followed by plant spread (0.227) and number of leaves per plant (0.207) and direct selection could be made for these characters for improving the yield. Considering correlation and path coefficients the characters *viz*., leaf area, plant spread, number of leaves per plant and number of suckers per plant emerged out as important component of cut flower yield in gerbera in the present study.

Key words : Gerbera, Correlation, Path analysis

Improvement in any crop depends on the magnitude of genetic variability and the degree of transmission of characters from one generation to next generation. Besides this, the knowledge of association between yield and its contributing traits will be of great value in planning a breeding programme. But it does not give the exact position of the relative importance of direct and indirect effects of various yield attributes. Path analysis facilitates the partitioning of correlation coefficients into direct and indirect effects of various characters on yield or any other attributes. Gerbera is an important flower crop but very little information is available on its genetic potential for yield and yield contributing characters. Therefore, the present efforts was made investigate and to know inter–relationship and association of 11 characters and to understand the nature of direct and indirect effect of these characters on yield.

MATERIALS AND METHODS

The experiment was carried out at the Hi-tech Floriculture and Vegetable Improvement Project, College of Agriculture, Pune during 10th January, 2007 to 10th January, 2008 for one year. Twenty–eight genotypes of gerbera were collected from different sources. The experiment was laid out in completely randomized design with three replications. Each genotype was represented by single row one m long and width 50 cm with plant to plant spacing of 25 cm. All recommended intercultural practices were followed to maintain good growth of the crop. The observations were recorded from randomly selected five plants from each genotype in each replication for number of leaves per plant, plant spread (cm), leaf area (cm^2), number of days required for first flowering, flower diameter (cm), flower stalk length (cm), number of ray florets per flower, flower stalk thickness (mm), number of suckers per plant, vase life (days) and number of flowers per plant. Correlation coefficients of genotypic and phenotypic level were worked out (Snedecor and Cocharan, 1967) and Path coefficients (Direct and indirect effects) by Dewey and Lu (1959).

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RESULTS AND DISCUSSION

In plant breeding, correlation coefficient analysis measures the mutual relationship between various characters and determines the component characters on which selection can be based for genetic improvement in yield. The knowledge of association between different characters with yield helps the breeder to sort out the characters associated with yield. Genotypic correlation coefficients provide a measure of genotypic association between characters and give an indication of characters which may be useful for over all improvement in the crop Johnson *et al*. (1956).

In the present investigation the genotypic correlations were higher than the phenotypic ones, which revealed that the phenotypic expressions of the correlation are

Table 1 Phenotypic (above diagonal) and genotypic (below diagonal) correlation of 11 characters in 28 genotypes in Gerbera

Sr. No.	Treatments	Number of leaves /plant	Plant spread	Leaf area $(cm)^2$	No. of days required for 1st flowering	Flower diameter (cm)	Flower stalk length (cm)	No. of ray florets per flower	Flower stalk thickness	Number of suckers / plant	Vase life in days	No. of flowers / plant
1.	Number of leaves/plant	1.000	0.736**	0.813**	-0.137	0.151	0.264	0.070	-0.139	0.389*	0.140	0.761**
2.	Plant spread	1.092**	1.000	0.755**	-0.008	0.153	0.162	0.123	-0.047	0.301	0.127	0.715**
3.	Leaf area $(cm)^2$	0.970**	0.903**	1.000	-0.285	0.197	0.274	-0.046	-0.094	0.485**	0.111	0.884**
4.	No. of days required for 1st flowering	-0.165	-0.016	-0.307	1.000	-0.111	-0.191	0.189	0.065	-0.276	0.086	-0.204
5.	Flower diameter (cm)	0.212	0.098	0.228	-0.133	1.000	0.464*	0.191	0.017	0.189	0.296	0.165
6.	Flower stalk length (cm)	0.318	0.239	0.284	-0.197	0.537**	1.000	0.124	-0.165	0.265	0.739**	0.204
7.	No. of ray florets per flower	0.109	0.135	-0.046	0.206	0.189	0.141	1.000	-0.033	-0.151	0.161	-0.149
8.	Flower stalk thickness	-0.191	-0.109	-0.110	0.067	0.069	-0.179	-0.022	1.000	-0.264	-0.136	-0.053
9.	Number of suckers / plant	0.629**	0.481**	0.636**	-0.341	0.239	0.335	-0.173	-0.396	1.000	0.241	0.441
10.	Vase life in days	0.209	0.172	0.120	0.086	0.329	0.777**	0.195	-0.137	0.349	1.000	0.031
11.	No. of flowers / plant	0.968**	0.925**	0.967**	-0.224	0.221	0.213	-0.158	-0.074	0.601**	0.036	1.000

* and ** significant at P = 0.05 and P = 0.01, respectively

Table 2 : Direct (diagonal) and Indirect (off diagonal) effects of 11 characters in 28 genotypes in Gerbera

Sr. No.	Treatments	Number of leaves/ plant	Plant spread	Leaf area $(cm)^2$	No. of days required for 1st flowering	Flower diameter (cm)	Flower stalk length (cm)	No. of ray florets per flower	Flower stalk thickness	Number of suckers / plant	Vase life in days	No. of flowers / plant
1.	Number of leaves/plant	0.207	0.248	0.520	-0.009	0.012	0.031	-0.020	-0.009	0.014	-0.025	0.968**
2.	Plant spread	0.226	0.227	0.484	-0.001	0.005	0.023	-0.025	-0.005	0.010	-0.021	0.925**
3.	Leaf area $(cm)^2$	0.200	0.205	0.536	-0.018	0.012	0.027	0.009	-0.005	0.010	-0.015	0.967**
4.	No. of days required for 1st flowering	-0.034	-0.004	-0.165	0.058	-0.007	-0.011	-0.039	0.003	-0.008	-0.011	-0.224
5.	Flower diameter (cm)	0.044	0.022	0.122	-0.008	0.055	0.052	-0.036	0.003	0.005	-0.039	0.222
6.	Flower stalk length (cm)	0.066	0.054	0.152	-0.011	0.029	0.097	-0.081	-0.008	0.007	-0.092	0.214
7.	No. of ray florets per flower	0.023	0.031	-0.025	0.012	0.010	0.042	-0.188	-0.001	-0.004	-0.058	-0.151
8.	Flower stalk thickness	-0.040	-0.025	-0.059	0.004	0.004	-0.017	0.004	0.047	-0.009	0.017	-0.074
9.	Number of suckers / plant	0.130	0.0109	0.341	-0.020	0.013	0.032	0.033	-0.019	0.022	-0.042	0.601**
10.	Vase life in days	0.043	0.039	0.064	0.005	0.018	0.075	-0.094	-0.006	0.008	-0.118	0.036

* and ** significant at P = 0.05 and P = 0.01, respectively.

reduced under the influence of environment, although there is a strong inherent association between various characters (Table 1).

At the genotypic level, number of flowers per plant found to be significantly and positively correlated with four characters namely, number of leaves per plant, leaf area (cm^2), plant spread (cm) and number of suckers per plant which confirm well with the findings of Kannan and Ramdas (1990), Chaudhury *et al*.(1998), Anuradha and Gowda (2000), Nair and Shiva (2003).

Number of leaves per plant was positively and significantly correlated with plant spread, leaf area, number of suckers per plant and number of flowers per plant this observation finds support from earlier worker Kannan and Ramdas (1990), Anuradha and Gowda (2000), Nair and Shiva (2003).

Plant spread was significant and positively correlated with leaf area, number of suckers per plant and number of leaves per plant at genotypic level while, significantly and positively correlated with number of leaves per plant at phenotypic level this results are in agreement with Nair and Shiva (2003).

Leaf area was significantly and positively correlated with number of suckers per plant and number of flowers per plant at genotypic level. This finding was similar to Chaudhury *et al*. (1998) and Nair and Shiva (2003).

Flower diameter was significantly and positively correlated with stalk length.

Flower stalk length was significantly and positively correlated with vase life.

Number of suckers per plant was significantly and positively correlated with number of leaves per plant and leaf area at phenotypic level and number of flowers per plant at genotypic level. This result was in agreement with Kannan and Ramdas (1990) and Chaudhary *et al*. (1998).

Path coefficient analysis showed, leaf area (0.563) had highest direct effect on number of flowers per plant followed by plant spread (0.227), number of leaves per plant (0.207) (Table 2). Flower stalk length, number of days required for first flowering, flower stalk thickness and number of suckers per plant had also expressed positive direct effect but low in magnitude. The direct selection for these characters would be beneficial for crop improvement since most of these characters also showed positive correlation. The results are in accordance with the findings of Chaudhury *et al*. (1998), Anuradha and Gowda (2000).

Number of leaves per plant had maximum positive indirect effect through leaf area (0.520) followed by plant spread (0.248) on number of flowers per plant, plant spread had maximum positive indirect effect through leaf area (0.484) on number of flowers per plant. The characters leaf area, plant spread and number of leaves per plant more significantly and positively correlated with yield and had positive direct effect on yield with positive indirect effect via each other. Therefore, they do not affect each other adversely and hence to select for improving yield.

On the basis of present findings, path analysis studies have indicated that top priority should be given to selection based on the number of leaves per plant, plant spread, leaf area and number of suckers per plant for yield improvement and could be considered while formulating selection indices in the improvement of gerbera.

REFERENCES

Anuradha, S. and Gowda, J.V.N. (2000). Association of cut flower yield with growth and floral characters in gerbera. *Crop Res. Hisar,* **19** (1): 63-66.

Choudhury, S., Mahanta, P.J. , Paswan, L., Talukdar, M.C. and Sarma, D. (1998). Correlation and path coefficient analysis in gerbera. *Hort. J.,* **11** (2) : 79-85.

Dewey, D.R. and Lu, K.H. (1959). A correlation and path coefficient analysis of components of crested wheatgrass seed production. *Agron. J.,* **51** (9) : 515 – 518.

Johnson, H.W., Robinson, H.F. and Comstock, R.E. (1956). Genotypic and phenotypic correlations in soybean and their implications in selection. *Agron. J*., **47**: 477 - 783.

Kannan, M. and Rammadas, S. (1990). Variability and heritability studies in gerbera (*Gerbera jamesonii* L.). *Prog. Hort*., **22** (1-4) : 72-76.

Nair, S. A. and Shiva, K.N. (2003). Genetic variability, correlation and path coefficient analysis in gerbera, *J. Ornamental Hort*., **6** (3): 180 – 187.

Snedecor, G. W. and, Cochran, W.G. (1967). *Statistical Methods,* 6th Ed. Oxford and IBH Pub. Co., Bombay.

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