research article | International Journal of Plant Sciences, (July to December, 2009) Vol. 4 Issue 2 : 498-501

Genetic variability, correlations and path co-efficient analysis in okra [*Abelmoschus esculentus* (L.) Moench]

R.G. MAGAR AND I.A. MADRAP

Accepted : April, 2009

SUMMARY

The present study was undertaken on 41 genotypes of okra to assess the genotypic and phenotypic variability, heritability, genetic advance and to determine the nature of association among different yield attributes and their direct and indirect contribution towards yield. Phenotypic co-efficient of variability was higher than the genotypic ones. GCV and PCV were of higher magnitude for fruit yield per plant followed by number of fruits per plant, node at which first flower appear, plant height and fruit weight. Heritability estimates were of high magnitude for fruit length, total fruit yield per plant indicating major role of genotype with less environmental influence. The magnitudinal difference between PCV and GCV estimate was maximum for node at which first flower appear and number of fruits per plant suggesting influence of environment on these traits. Total fruit yield per plant was significantly and positively correlated with number of fruits per plant, fruit weight and plant height. Path co-efficient study revealed that number of fruits per plant had maximum direct contribution towards total yield followed by fruit weight, plant height and days to first flowering. These important traits may be viewed in selection programme for the further improvement of Okra.

Key words : Genetic variability, Path co-efficient, Correlations, Okra

Okra (*Abelmoschus esculentus* L. Moench) is an important vegetable crop grown for its tender green pods, throughout India, Africa, Turkey and other neighboring countries. It is a potential export earner and provides high returns to the farmers.

A successful breeding programme depends upon the extent of genetic variability present in the available germplasm. The knowledge on magnitude of variability and heritability is important to make on effective breeding strategy and ascertain the scope of its improvement. Further the estimation of genetic advance help in deducing the genetic facts.

Information regarding association of characters like growth, earliness, quality yield and its component characters is very useful for plant breeder in developing commercial variety of hybrid.

Hence, an attempt has been made in the present investigation to study the extent of genetic variability, association of different traits, direct and indirect effects of characters based on *per se* performance.

MATERIALS AND METHODS

The experimental material consisted of 41 genotypes of okra collected from different sources were evaluated in randomized block design with three replications at experimental farm of Botany, College of Agriculture, Parbhani during *kharif*, 2007.

Observations were recorded on days to first flowering, node at which first flower appear, days to first picking, number of fruits per plant, fruit length, fruit weight, plant height and total yield per plant each replication on five random competitive plants.

The data collected was subjected to analyse the variability as suggested by Panse and Sukhatme (1985).

Correlation co-efficients were computed by the method suggested by Johnson *et al.* (1955). Path co-efficient analysis was estimated by the method described by Deway and Lu (1959).

RESULTS AND DISCUSSION

Analysis of variance revealed highly significant variation among genotypes for all the characters studied (Table 1).

It was observed that the GCV and PCV were of high magnitude for fruit yield per plant followed by number of fruits per plant, fruit length, node at which first flower appear, plant height and fruit weight (Table 2).

The magnitude of PCV was higher than GCV for all the traits, suggesting the role of environmental variance. The characters *viz.*, days to first flowering and days to first picking exhibited very low GCV and PCV estimates suggesting the narrow range of variation for these traits.

Correspondence to:
I.A. MADRAP, Department of Agricultural Botany, Marathwada Agricultural University, PARBHANI (M.S.) INDIA
Authors' affiliations:
R.G. MAGAR, Department of Agricultural Botany, College of Agriculture, PARBHANI (M.S.) INDIA

Table 1 : Analysis of variance (Mean sum of square) for different characters in okra

Sr. No.	Characters	Mean sum of squares		
		Replication d.f.=r-1=2	Treatment d.f.=t-1=40	Error d.f. (r-1) (t-1) =80
1.	Days to first flowering	1.080	50.868**	8.215
2.	Node at which first flower appear	0.903	2.927**	0.977
3.	Days to first picking	2.479	58.551**	7.163
4.	No. of fruits per plant	10.756	31.519**	5.464
5.	Fruits length (cm.)	0.172	18.957**	0.119
6.	Fruit weight (g)	1.951	6.153**	0.561
7.	Plant height (cm.)	352.268	1020.229**	107.057
8.	Total yield plant $^{-1}$ (g)	306.183	4805.200**	215.770

* and ** indicates significant of values at P=0.05 and 0.01 respectively

Table 2 : Parameters of genetic variability for yield and yield contributing characters in okra

Sr. No.	Characters	GV (σ^2g)	PV (σ^2p)	GCV	PCV	Heritiability (%)	Genetic advance	EGA (%)
1.	Days to first flowering	14.22	22.43	8.225	10.33	63.38	6.18	13.48
2.	Node at which first flower appear	0.65	1.63	15.44	24.44	39.93	1.04	20.10
3.	Days to first picking	17.13	24.29	8.18	9.74	70.51	7.16	14.15
4.	No. of fruits per plant	8.69	14.149	19.43	24.79	61.38	4.18	31.35
5.	Fruit length(cm.)	6.03	6.145	19.61	19.79	98.06	5.0	39.99
6.	Fruit weight(g)	1.86	2.43	11.41	13.01	76.88	2.46	20.60
7.	Plant height (cm.)	304.39	411.45	12.13	14.10	73.98	30.91	21.49
8.	Total yield plant -^{1}(g)	1529.81	1745.58	21.43	22.89	87.64	75.42	41.33

Table 3 : Genotypic and phenotypic correlation coefficients (r) between yield and yield contributing characters in okra

Characters		Days to first flowering	Node at which first flower appear	Days to first picking	No. of fruits per plant	Fruits length (cm)	Fruit weight (g)	Plant height (cm)	Total yield plant $^{-1}$ (g)
Days to first flowering	G	1.00	0.474**	0.918**	-0.207	-0.045	-0.227	0.227	-0.380
	P	1.00	0.178	0.853**	-0.152	-0.052	-0.186	0.173	-0.284
Node at which first	G		1.00	0.453**	0.063	0.084	0.118	0.433**	0.071
flower appear	P		1.00	0.213	0.020	0.059	0.092	0.224	0.083
Days to first picking	G			1.00	-0.238	-0.057	-0.157	0.294	-0.375
	P			1.00	-0.157	-0.055	-0.106	0.238	-0.297
No. of fruits per plant	G				1.00	-0.057	0.004	0.344*	0.951**
	P				1.00	-0.051	0.039	0.365*	0.682**
Fruits length(cm.)	G					1.00	-0.265	0.037	-0.19
	P					1.00	-0.234	0.031	-0.205
Fruit weight(g)	G						1.00	-0.009	0.402**
	P						1.00	0.018	0.346*
Plant height (cm.)	G							1.00	0.333*
	P							1.00	0.263
Total yield plant $^{-1}$ (g)	G								1.00
	P								1.00

* and ** indicates significant of values at P=0.05 and 0.01, respectively

These results are in agreement with the earlier findings of Gandhi *et al.* (2001) and Dakahe *et al.* (2007).

The estimate of high heritability (b) accompanied with high expected genetic advance for fruit length, total fruit yield per plant indicating the presence of additive gene action in the expression of these traits. This suggest that

Table 4 : Path coefficients (Direct and indirect effect) at genotypic level in okra

Characters	Days to first flowering	Node at which first flower appear	Days to first picking	No. of fruits per plant	Fruits length (cm)	Fruit weight (g)	Plant height (cm)	Correlation coefficients
Days to first flowering	0.053	0.005	-0.196	-0.183	0.004	-0.081	0.017	-0.380
Node at which first flower appear	0.025	0.011	-0.088	0.055	-0.007	0.042	0.033	0.071
Days to first picking	0.053	0.005	-0.195	-0.210	-0.005	-0.056	0.022	-0.375
No. of fruits per plant	-0.011	0.001	0.046	0.882	-0.005	0.002	0.026	0. 951**
Fruits length (cm)	-0.002	0.001	0.011	-0.050	-0.086	-0.094	0.003	-0.19
Fruit weight (g)	-0.012	0.001	0.031	0.004	0.023	0.356	-0.001	0.402**
Plant height (cm)	0.012	0.005	0.057	0.304	-0.003	-0.003	0.076	0.333*

* and ** indicates significant of values at P=0.05 and 0.01, respectively

such traits can be improved by direct selection. These results are in agreement with finding of Bindu *et al.* (1997), Jeyapandi and Balakrishnan (1992) Thakur *et al.* (1996) and Dakahe *et al.* (2007).

The genotypic correlations were of greater magnitude than phenotypic correlations (Table 3). The total yield per plant was positively and significantly correlated with number of fruits per plant, fruit weight and plant height, suggesting that yield is the function of these characters and selection of these characters would be effective. Bhalekar *et al.* (2005) and Dakahe *et al.* (2007) reported similar results.

Node at which first flower appear was positively associated with total yield per plant, this was in conformity with findings of Dhankhar and Dhankhar (2002).

Days to first flowering was negatively correlated with total yield per plant suggesting that there was limited scope for selecting early genotype with higher fruit yield in the present material. Similar results were obtained by Dhankhar and Dhankhar (2002) and Hazra *et al.* (2002). Fruit length was negatively correlated with fruit yield per plant.

Path analysis indicated that number of fruits per plant, fruit weight, plant height and days to first flowering made high direct contribution towards yield (Table 4). The characters days to first picking and fruit length had negative direct effect on yield.

Number of fruits per plant exerted the highest positive direct effect (0.882) and highest genotypic correlation value (0.951) on total fruit yield per plant. The magnitude of direct effect of fruit weight (0.356) was next to number of fruits per plant and hence may be regarded as other important character influencing fruit yield per plant.

The path co-efficient analysis thus showed that the number of fruits per plant, fruit length, plant height, days to first flower and node at which first flower appear exerted high direct influence on total fruit yield per plant. Further these characters also scored high genotypic values. Breeder should, therefore, concentrate on these characters for the improvement in okra.

REFERENCES

Bhalekar, S.G., Numbalkar, C.A. and Desai, U.T. (2005). Correlation and path analysis studies in okra. *J. Maharashtra agric. Univ.*, **30** (1) : 109-112.

Bindu, K.K., Manju, P. and Sreekumar, S.G. (1997). Genetic variability in bhendi [*Abelmoschus esculentus* (L) Moench]. South Indian Hort., **45** (5 & 6): 286-288.

Dakahe, K., Patil, H.E. and Patil, S.D. (2007). Genetic variability and correlation studies in Okra [*Abelmoschus esculentus* (L) Moench.]. *Asian J. Hort.*, **2** (1): 201-203.

Dewey, D.R. and Lu, K.G. (1959). A correlation and path analysis of yield component of crested wheat grass seed production. *Agron J.*, **15** : 513-518.

Dhankhar, B.S. and Dhakhar, S.K. (2002). Correlation and path analysis in okra (*Abelmoschus esculentus* (L.) Moench). *Haryana J. Hort. Sci.*, **31** (3 & 4) : 294.

Gandhi, H.T., Yadav, M.D. and Navale, P.A. (2001). Studies on variability in okra, *J. Maharashtra agric. Univ.*, **26** (2) : 146-148.

Hazra, P., Basu, D., and Sahu, F.K. (2002). Genetic divergence in okra. *Indian J. Hort.*, **59** (4) : 406-410.

Jeyapandi, A. and Balkrishnan, R. (1992). Genetic variability in okra. *Indian Hort.*, **49** (2) : 197-199.

Johnson, H.W., Robinson, H.F. and Comstock, R.E. (1955). Estimates of genetic and environmental variability in Soybean. *Agron. J.*, **47** : 34-38.

Panse, V.G. and Sukhatme, P.V. (1985). *Statistical methods for Agricultural workers*. 4th edn. ICAR, publication, New Delhi. pp. 58-67.

Thakur, P.C., Luthra, S.K. and Verma, T.S. (1996). Genetic variability in okra (*Abelmoschus esculentus* (L) Moench). *Haryana J. Hort. Sci*., **25** (2) : 57-59.

****
*****