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Studies on genetic variability and correlation for fruit yield and fruit quantity characters of okra

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Members of the Research Forum

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ABSTRACT : Okra (*Abelmoschus esculentus*) is a most common vegetable crop cultivated for its tender, nutritive fruits. It is well adopted suitable for cultivation all round the year for providing continuous income to the farmer. An experiment was conducted to study the genetic variability and correlation in okra, involving 40 genotypes for eight important economic characters, namely days to first flowering, plant height, number of branches per plant, number of fruiting nodes, fruit length, fruit girth, fruit weight, fruit yield per plant. High PCV and GCV observed for the traits fruit girth, fruit weight, fruit yield per plant. Majority of the traits recorded high heritability. For fruit weight and fruit yield per plant, high heritability coupled with high genetic advance as per cent of mean were observed. The results indicated the inverse relationship between fruit weight and fruit yield per plant. Fruit yield per plant was positively and significantly correlated with fruit girth, fruit length, number of fruiting nodes, number of branches per plant and plant height, whereas, fruit yield per plant had negative and significant correlation with days to first flowering.

KEY WORDS : Okra, Genetic variability, Heritability, Genetic advance, Correlation

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The progress in breeding for yield and its contributing characters of any crop is poly genetically controlled, environmentally influenced and determined by magnitude and nature of their genetic variability (Wright, 1935 and Fisher, 1981). Genetic variability, character association and path co-efficients are pre-requisites for improvement of any crop including okra for selection of superior genotypes and improvement of any trait (Krishnaveni *et al*., 2006). It is very difficult to judge whether observed variability is highly heritable or not. Moreover, knowledge of heritability is essential for selection based improvement as it indicates the extent of transmissibility of a character into future generations. Knowledge of correlation between yield and its contributing characters are basic and foremost endeavour to find out guidelines for plant selection. Keeping in view the above facts, the present investigation was undertaken to know variability and correlation among yield and its contributing characters using 40 okra genotypes.

RESEARCH METHODS

The experiment comprised of 40 genotypes of okra grown during February 2009 at the plant breeding farm (11º24" latitude, 79º44"E longitude and + 5.79 MMSL), Faculty of Agriculture, Annamalai University located at Tamil Nadu, India with soil pH of 8 to 8.5 and EC 2.51 to 2.8 dsm^{-1} in a Randomized Block Design with three replications. Seeds were sown in spacing of 45 × 30 cm between and with in rows, respectively. All the recommended package of practices were followed to raise a good crop. For this study, genetic variability and

correlation of yield contributing and fruit quality traits *viz*., days to first flowering, plant height, number of branches per plant, number of fruiting nodes, fruit length, fruit girth, fruit weight and fruit yield per plant were recorded on five randomly selected plants in each replication. The variability was estimated as per procedure for analysis of variance suggested by Panse and Sukhatme (1985), GVC and PCV by Burton and De Vane (1953). Heritability and genetic advance by Johnson *et al*. (1955). Correlation co-efficient was worked as per Al-Jibouri *et al*. (1958).

RESEARCH FINDINGS AND DISCUSSION

The analysis of variance revealed significant differences among the genotypes for all the characters studied (Table 1). A close relationship between GCV

Table 1 : Analysis of variance for eight characters in okra

Source	df	MSS							
		Days to first flowering	Plant height	No. of branches per plant	No. of fruiting nodes	Fruit length	Fruit girth	Fruit weight	Fruit yield per plant
Replication	1	37.82	35.19	0.05	0.31	5.41	41.62	0.63	2195.0
Genotypes	39	5.11**	44.53**	0.22**	9.97**	5.45**	54.51**	23.70**	5173.85**
Error	39	1.89	4.82	0.20	2.95	1.12	52.30	2.59	817.77

* and ** indicate significance of values at P=0.05 and 0.01, respectively

Table 2 : Variability, heritability and genetic advance for 8 characters in 40 genotypes of okra

Characters	Range	Mean	Variability (%)		Heritability BS (%)	Genetic advance as % of mean
			PCV	GCV		
Days to first flowering	31.50-37.00	34.04	5.50	3.73	46.03	5.21
Plant height	66.85-83.90	42.41	6.86	6.15	80.47	11.37
No. of branches per plant	1.50-2.50	2.13	21.77	4.77	04.79	2.15
No. of fruiting nodes	12.50-20.00	15.24	16.69	12.30	54.31	18.67
Fruit length	9.40-17.05	12.94	13.99	11.33	65.58	18.90
Fruit girth	4.95-38.85	7.00	24.41	18.02	52.07	14.45
Fruit weight	9.45-22.65	15.73	23.05	20.66	80.33	38.51
Fruit yield per plant	186.26-401.95	287.53	19.04	16.23	72.70	28.51

Table 3 : Phenotypic and genotypic correlation coefficients among 8 characters in okra

Characters		DFF	PH	NBPP	NFNP	FL	FG	FW	FYPP
DFF	P	1.000	0.068	-0.144	-0.116	0.101	-0.42	-0.076	-0.233
	G	1.00	0.158	-0.798**	-0.104	0.128	-0.365**	0.112	-0.304*
PH	P		1.000	0.143	0.799**	0.265*	-0.047	0.535**	0.653**
	G		1.000	0.530**	0.880**	0.325**	-0.730**	0.650**	0.813**
NBPP	P			1.000	1.104	0.229	-0.030	0.213	0.116
	G			1.000	0.321*	0.907**	0.974**	0.920**	0.715**
NFNP	P				1.000	0.097	0.033	0.430**	0.687**
	G				1.000	0.097	0.925**	0.625**	0.900**
FL	P					1.000	-0.167	0.394**	0.215
	G					1.000	0.947**	0.333*	0.229
FG	P						1.000	0.037	0.107
	G						1.000	-0.187	0.673**
FW	P							1.000	0.661**
	G							1.000	0.736**
FYPP	P								1.000
	G								1.000

DFF – Days of First Flowering, PH – Plant Height, NBPP – Number of Branches per Plant, NFNP –Number of Fruiting Nodes per Plant, FL – Fruit Length, FG – Fruit Girth, FW – Fruit Weight, FYP – Fruit Yield per Plant.
* and ** indicate significance of values at P=0.05 and 0.01, respectively

and PCV was observed in all characters and PCV values were slightly greater than GCV, revealing very little influence of environment for their expression. More than 60 per cent heritability was observed for four characters *viz*., plant height, fruit length, fruit weight and fruit yield per plant which indicated good scope of selection (Table 2). High heritability along with high values of genetic advance were observed for fruit weight and fruit yield per plant. In the present investigation, the characters, namely number of fruiting nodes, fruit length, fruit weight and fruit yield per plant had a favourable value of GCV accompanied with heritability and genetic advance as per cent of mean which indicated additive gene action and good scope for selection. Johnson *et al.* (1955) suggested that high GCV along with high heritability and genetic advance gave a better picture for the selection of genotypes. Similar results were also reported by Sarkar *et al.* (2007); Anbanandan *et al*. (2009) and Sabesan *et al*. (2009).

Genotypic correlations were observed to be greater than the corresponding phenotypic correlation co-efficients for all the characters indicating the superiority of phenotypic expression under the influence of environmental factors (Table 3).

Fruit yield per plant recorded a positive and significant correlation with plant height (0.81), number of fruiting nodes (0.90) and fruit weight (0.74) at both genotypic and phenotypic levels while it recorded a positive correlation with the number of branches per plant (0.72) and fruit girth (0.67) at genotypic level only. This corroborates with findings of Yugandhar Reddy *et al*. (2008); Babu *et al.* (2006) and Saravanan and Sabesan (2009). It suggests that priority should be given to these traits while making selection for fruit yield improvement. Plant height recorded a significant positive correlation with the number of fruiting nodes (0.79 and 0.88), fruit length (0.27 and 0.33) and fruit weight (0.54 and 0.65) at both levels and with the number of branches per plant (0.53) at genotypic level alone. The number of fruiting nodes exhibited a significant positive correlation with fruit weight (0.43 and 0.63) at both levels and fruit girth (0.93) at genotypic level alone. It suggests that interdependency of these characters should be given due consideration in selection programme. Days to first flowering showed a negatively significant correlation that was observed between number of branches per plant, fruit girth and fruit yield per plant at genotypic level only. Fruit length exhibited a significant positive correlation with fruit weight (0.39 and 0.33) at both levels and with fruit girth (0.95) at genotypic level only.

Conclusion :

The genetic architecture of fruit yield per plant is based on the balance or overall net effect produced by various yield components interacting with one another. Based on the studies on genetic variability and correlation analysis, it maybe concluded that plant height, number of fruiting nodes, fruit weight, fruit yield per plant and days to fruit flowering appeared to be primary yield contributing characters and could be relied upon for selection of genotypes to improve genetic yield potential of okra.

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