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Variability studies in okra (*Abelmoschus esculentus* L.)

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ABSTRACT : Twenty five genotypes of okra collected from different districts of Tamil Nadu were evaluated to assess the variability, heritability, genetic advance. Morphological characters like days to first flowering, plant height, number of branches per plant, internodal length, node at first flowering, days to first fruit harvest, fruit length, fruit girth, fruit weight, number of fruits per plant, 1000 seed weight and yield per plant were studied. Analysis of variance revealed that there were significant differences among the genotypes studied for all the characters. In variability studies, among 25 genotypes AE 13 was identified as the best genotypes as it has recorded higher yield per plant followed by AE 7, AE 6 and AE21. Maximum phenotypic and genotypic co-efficient of variation (PCV and GCV) was found for yield per plant followed by plant height and number of fruits per plant. High heritability was recorded for all the characters except internodal length and fruit girth. Traits like plant height, number of branches per plant, node at first fruit, fruit length, number of fruits per plant, fruit weight and yield per plant had high heritability along with high genetic gain which reveals the predominance of additive gene action on these characters.

KEY WORDS : Variability, Heritability, Genetic advance, Okra

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Okra belongs to the family Malvaceae with 2n = 8x = 72 or 144 chromosomes and is polyploidy in nature. Being native of tropical Africa, it is widely cultivated in India. There are 30 species under genus *Abelmoschus* in the old world and four in the new world. Out of them *Abelmoschus esculentus* is the only species known to be cultivated extensively.

Okra provides an excellent example of a crop grown in different environments and it is particularly appropriate to embark upon a variation study as a primary step in formulating a rational improvement programme. The biological variation occurring in this crop offer great scope for its genetic improvement through selection. Improvement in okra is being made by exploiting the available source of variability. In any crop improvement programme, germplasm serve as a valuable source of base population, which offers much scope for further improvement. The primary aim of the breeder is to evolve superior varieties from the available genotypes. Evolving superior genotypes would be effective, only when the existing variability in the chosen material is wide. The observed variability for any character is the result of interaction of hereditary effects of concerned genes and the influence of environment. Hence, it becomes necessary to partition the overall phenotypic variability into heritable and non-heritable components to have an effective selection for superior genotypes. Keeping in view, the above facts, the present investigation was undertaken in okra to assess the magnitude of genetic variability, heritability and genetic gain for yield and its component traits.

RESEARCH METHODS

The present study was carried out during 2012-2013 in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalainagar. The okra germplasm consisting of twenty five genotypes collected from different districts of Tamil Nadu were selected for the experiment as summarized below. The experimental plots were ploughed and brought to fine tilth. Recommended dose of fertilizers (62.5:75:62 kg of NPK ha^{-1}) were incorporated into the soil before sowing. Two to three seeds were dibbled at each hill at a spacing of 60 × 30 cm with the help of markers in Randomized Block Design with two replications. Plants were thinned to one seedling per hill at four leaf stage. The remaining 62.5 kg of nitrogen was applied as top dress after one month of planting. Here, 12 quantitative characters *viz.*, days to first flowering, plant height, node at first fruit, number of branches per plant, internodal length, days to first fruit harvest, fruit length, fruit girth, fruit weight, number of fruits per plant, 1000 seeds weight and yield per plant were recorded. The estimation of mean, variances and standard error were worked out by adopting standard methods (Panse and Sukhatme, 1967). Phenotypic and genotypic co-efficient of variations were calculated by Burton (1952) and Comstock and Robinson (1952). Heritability in broad sense and genetic advance (GA) were estimated by adopting the formula suggested by Lush (1940) and Johnson *et al.* (1955), respectively.

RESEARCH FINDINGS AND DISCUSSION

Significant differences were observed among genotypes for all the characters studied (Table 1). Wide range of variation was recorded for all the characters, suggesting presence of high genetic variability. The mean, range, co-efficient of phenotypic and genotypic variation, heritability, genetic advance and genetic advance as per cent of mean are given in Table 2. Among the twelve traits studied, the phenotypic varinace ranged from as low as 0.34 number of branches per plant to 7074.39 in yield per plant. Plant height exhibited the higher phenotypic variance (647.11) but next to fruit yield.

The characters such as fruit girth exhibited relatively lesser phenotypic variance. The phenotypic co-efficient of variation ranged from 9.17 per cent for days to first fruit harvest to 29.13 per cent for yield per plant. The genotypic variance was also higher in respect of yield per plant (7069.34). The characters like plant height, 1000 seed weight exhibited higher genotypic variance next to yield per plant. The GCV ranged from 7.32 for days to first flowering to 29.12 per cent for yield per plant. The highest GCV was exhibited for plant height and number of fruits per plant. Manivannan *et al.* (2007) also reported the same. In general phenotypic values were higher than genotypic values, but the differences were less for yield per plant, plant height and number of fruits per plant suggesting that these characters were less influenced by the environmental factors and for these characters indicates presence of high degree of variability and better scope of improvement through straight selection. These findings are in close agreements with the results obtained by Patil *et al.* (1996); Dhankar and Dhankar (2002) and Singh *et al.* (2007).

To determine the amount of heritable variation, estimation of GCV alone is not sufficient. Heritable variation can be found out with greater degree of accuracy when heritability is studied in conjunction with genetic advance. The broad sense heritability was highest for yield per plant (99.93 %) while it was least for fruit girth (42.83 cm). High heritability was reported for plant height, number of fruits per plant, fruit length, number of branches per plant, days to fruit harvest, 1000 seed weight, node at first fruit, fruit weight and days to first flower next to yield per plant. This in confirmity with the results of Majumdar *et al.* (2007) and Hazra and Basu (2000); Sharma *et al.* (2007). It was moderate for the characters like internodal length and fruit girth. The character yield per plant exhibit highest genetic advance and lowest genetic advance exhibited by fruit

Table 1 : General analysis of variance for various characters of okra genotypes

Source	Df	Mean sum of square (MSS)											
		Days to first flowering	Plant height (cm)	Number of branches per plant	Internodal length (cm)	Node at first fruit	Days to first fruit harvest	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	Number of fruits per plant	1000 seed weight (g)	Yield per plant (g)
Replication	2	3.53	6.71	0.01	1.55	0.02	9.52	12.28	1.55	14.13	5.65	1.92	22.73
Genotype	24	38.22**	1936.10**	0.89*	5.10**	2.02*	61.77**	27.91**	1.81*	65.30**	61.38**	68.95**	21213.08**
Error	48	6.92	2.62	0.07	1.18	0.25	7.13	1.72	0.56	2.15	3.42	8.04	5.04

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

Table 2 : Range, phenotypic variance, genotypic variance, phenotypic co-efficient of variation, genotypic co-efficient of variation, heritability and genetic advance for different characters in okra genotypes

Characters	Mean range	pv	gv	PCV (%)	GCV (%)	Heritability h^2 (%)	Genetic advance	Genetic advance as per cent of mean
Days to first flowering	38.40-52.46	17.35	10.43	9.44	7.32	60.11	5.16	11.69
Plant height (cm)	65.38-160.72	647.11	644.49	23.10	23.05	99.60	52.19	47.40
Number of branches per plant	1.80-3.73	0.34	0.27	20.30	18.11	79.56	0.95	33.28
Internodal length (cm)	4.64-9.63	2.46	1.27	24.17	17.41	51.88	1.67	25.83
Node at first fruit	2.40-5.26	0.83	0.58	23.51	19.67	69.99	1.31	33.90
Days to first fruit harvest	46.66-63.66	25.34	18.21	9.17	7.78	71.88	7.46	13.58
Fruit length (cm)	10.18-20.27	10.45	8.73	21.35	19.51	83.54	5.56	36.74
Fruit girth (cm)	4.58-7.44	0.98	0.42	16.54	10.82	42.83	0.87	14.59
Fruit weight (g)	10.13-18.17	6.15	3.99	17.67	14.24	64.94	3.31	23.64
Number of fruits per plant	12.46-29.33	22.74	19.32	23.32	21.49	84.98	8.34	40.81
1000 seed weight (g)	44.12-60.05	28.34	20.30	10.34	8.75	71.64	7.85	15.26
Yield per plant (g)	180.96-506.57	7074.39	7069.34	29.13	29.12	99.93	173.12	59.98

Phenotypic variance, gv – Genotypic variance, PCV – Phenotypic co-efficient of variation, GCV – Genotypic co-efficient of variation

girth.

High heritability coupled with genetic advance was reported for yield per plant, plant height and number of fruits per plant indicated that the presence of additive gene action effects could be effectively used in phenotypic selection. This is in confirmity with the results of Panda and Singh (2003). Yield per plant exhibited the highest genetic advance as per cent of mean followed by plant height. Other characters like fruit girth, days to first fruit harvest and days to first flowering exhibited low to moderate genetic advance as per cent of mean. The high heritability and low to moderate genetic advance values were observed in other characters namely days to first fruit harvest and days to first flower indicated that expression of these characters was governed by non-additive gene action and can be exploited for heterosis breeding.

REFERENCES

Burton, G.W. (1952). Quantitative inheritance in grass. *Proc. 6th Intl. Grassland Congress.*, **1** : 277-278.

Comstock, R.E. and Robinson, H.F. (1952). Genetic variability and correlation studies in muskmelon (*Cucumis melo* L.). *Indian J. Hort.*, **41** : 101-102.

Dhankar, B.S. and Dhankar, S.K. (2002). Genetic variability, correlation and path analysis in okra [*Abelmoschus esculentus* (L.) Moench]. *Veg. Sci.*, **29**(1) : 63-65.

Hazra, P. and Basu, D. (2000). Genetic variability, correlation and path analysis in okra. *Ann. Agric. Res.*, **21**(3) : 452-453.

Johnson, H.W., Robinson, H.D. and Comstock, R.E. (1955). Estimates of genetical and environmental variability in soybean. *Agron. J.*, **47** (7) : 314-318.

Lush, J.L. (1940). Intra-sine correlation and regression of offspring in ramie as a method of estimating heritability of characters. *Proc. American Soc. Ani. Prod.*, **33** : 292-301.

Manivannan, M.I., Rajangan, J. and Geetharani, P. (2007). Variation studies in okra. *Asian J. Hort.*, **2**(2):188-191.

Majumdar, M.K., Chatterjee, S.D., Bose, P. and Bhattacharya, G. (1974). Variability, interrelationships and path analysis for some quantitative characters in okra [*Abelmoschus esculentus* (L.) Moench]. *Indian Agric.*, **18**(1):13-20.

Panda, P.K. and Singh, K.P. (2003). Character association and path analysis in okra [*Abelmoschus esculentus* (L.) Moench]. *Andhra Agric. J.*, **50**(3 & 4) : 302-305.

Panse, V.G. and Sukhatme, P.V. (1967). *Statistical methods for agricultural workers*. ICAR, NEW DELHI (INDIA).

Patil, Y.B., Madalgeri, B.B., Biradar, B.D. and Hosmani, R.M. (1996). Variability studies in okra [*Abelmoschus esculentus* (L.) Moench]. *Ann. Plant Physiol.*, **8** : 96-98.

Sharma, Jag Paul, Singh, A.K., Chopra, S. and Tiwari, S.P. (2007). Yield and yield component analysis in hybrid okra [*Abelmoschus esculentus* (L.) Moench]. *J. Res.*, **6**(2) : 286-291.

Singh, A.K., Ahmed, N., Narayan, Raj and Chatoo, M.A. (2007). Genetic variability, correlations and path co-efficient analysis in okra under Kashmir conditions. *Indian J. Hort.*, **64**(4) : 472-474.