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GENETIC VARIABILITY, HERITABILITY AND GENETIC ADVANCE FOR POD YIELD AND ITS CONTRIBUTING TRAITS IN OKRA HYBRIDS

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ABSTRACT

Genotypic coefficient of variation, heritability and genetic advance of pod yield and seven other traits were estimated in 40 F_1's of okra. The characters like number of branches, number of pods and total pod yield per plant had higher genotypic as well as phenotypic coefficient of variation in both the environments. All the characters under study except days to first flower appearance and girth of pod were highly heritable in nature. High heritability coupled with high genetic advance was observed for plant height, number of pods and total pod yield per plant which indicated that these traits are more reliable for improvement through selection.

KEY WORDS : Okra, variability, heritability, genetic advance

Of the numerous vegetables grown in the country, okra (*Abelmoschus esculentus*(L.) Moench) also known as lady's finger, *gumbo* or *bhindi* is very popular vegetable. It is extensively cultivated throughout the continent for its long, slender and immature green frutis (capsule) during summer and rainy seasons. Deterioration takes place in old varieties and to overcome the problem, crop improvement is needed. Improvement in any crop depends on the magnitude of its genetic variability. A knowledge of the available variability within the species for the designed characters enables the breeder in determining the most potential genotype. The partitioning of the overall variances as genetic and non-genetic components becomes necessary for any effective breeding programme. It was suggested that genetic variability along with heritability should be considered for effective selection. Studies on the variability using genetic parameters like genotypic coefficient of variation, heritability and genetic advance are essential for initiating a breeding programme.

MATERIALS AND METHODS

The material used in the present study comprised of 40 F_1 hybrids obtained in a Line x tester programme. The experiments were conducted under two sets of environment. Under first set of environment (E_1), the sowing was done on 25 February 1994 as summer season crop and for second environment (E_2), the sowing was done on 10 July 1994 as rainy season crop. The material was grown in a randomised block design with three replications at the Vegetable Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. Observations on ten randomly selected plants of each hybrid were recorded for days to first flower appearance, node at which first flower appears, plant height (cm), number of branches/plant, number of pods/plant,

length of pod (cm), girth of pod (cm) and total pod yield/plant (g).

ANOVA of the design was worked on in the usual way for all the characters under study. The genotypic and phenotypic coefficient of variation (Burton and Devane, 1953), heritability (broad sense) (Hanson *et al.*,1956) and genetic advnace (Johnson *et al.*, 1995) calculated

RESULTS AND DISCUSSION

The analysis of variance (Table 1) revealed highly significant differences among the genotypes for most of the characters. This indicated that genotypic difference existed for the characters studied. The mean, range, genotypic and phenotypic coefficient of variation, heritability and genetic advance as percentage of mean for all the traits are presented in Table 2. In the present investigation, phenotypic coefficient of variation was found to be higher than the genotypic coefficient of variation for all the traits. Highest genotypic coefficient of variation was recorded for yield per plant, which indicated the possibilities of utilization of the variation for further improvement. The characters like number of branches/plant, number of pods/plant and total pod yield/plant had higher genotypic as well as phenotypic coefficient of variation in both the enviroments which suggested a greater scope of selection for three characters. Higher magnitude of genetic variance suggested the presence of high genetic variability. The results coincide with the findings of Agrawal *et al.*, (1964) and Palve *et al.*,(1985).

The heritability portion of variation was obtained by calculating the heritability estimates. Heritability estimates have been found to be satisfactory tools for selection based on phenotypic performance. Estimates of heritability obtained in the present investigation were very high for all the characters except days to first flower appearance and girth of pod. Similar results have been reported by Murthy and Bavaji (1980). High estimates of heritability for the traits suggested that the selection based on phenotypic performance would be more effective.

Although estimates of heritability are useful to plant breeder as they provide base for selection,

Table 1. Analysis of variance for eight characters in okra

Source of variation	d.f.	Days to first flower appearance		Node at which first flower appears		Plant height (cm)		No.of branches/plant		No.of pods/plant		Length of pod (cm)		Girth of pod (cm)		Total pod yield/plant (g)	
		E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2
Replication	2	6.398*	0.859	3.349**	0.006	20.531*	1.500	2.997**	0.020	78.524**	0.265	1.874	0.124	0.945	0.028	191.875	5.750
Treatment	39	5.449	2.670	0.292	0.517**	144.383*	841.863**	0.157	0.264**	8.148*	5.468**	4.207	6.177**	1.057	0.033	3529.722**	2826.867**
Error	78	1.767	0.918	0.187	0.015	5.529	2.789	0.159	0.014	1.662	0.120	1.593	0.123	1.053	0.007	179.443	9.655

* Significant at 5% level; ** Significant at 1% level.

Table 2. Mean, range, phenotypic and genotypic coefficient of variation, heritability and genetic advance as percentage of mean in 40 F_1's of okra

Details		Days to first flower appearance	Node at which first flower appears	Plant height (cm)	No.of Branches/ plant	No.of pods/ plant	Lenght of pod (cm)	Girth of pod (cm)	Total pod yield/ plant(g)
Mean	E_1	41.20	4.15	51.69	1.63	9.38	14.27	1.63	167.06
	E_2	42.77	6.74	134.48	0.74	8.32	15.80	1.79	151.39
Range	E_1	38.67-43.33	3.53-4.80	37.20-65.93	1.27-2.13	6.53-13.87	11.80-18.43	1.50-1.77	97.83-273.00
	E_2	40.33-45.00	5.87-7.47	118.63-163.50	0.33-1.47	7.13-11.30	13.20-19.23	1.63-2.03	110.00-213.67
PVC	E_1	4.20	11.35	13.92	24.58	20.83	10.99	9.20	21.55
	E_2	2.87	6.34	12.50	42.37	16.58	9.26	7.06	20.35
GVC	E_1	2.69	4.52	13.16	11.94	15.66	6.54	2.19	20.00
	E_2	1.79	6.07	12.44	19.25	16.05	8.99	5.14	20.24
Heritability	E_1	41.00	75.90	89.30	60.60	56.50	85.40	30.10	86.20
	E_2	38.90	91.80	99.00	85.80	93.70	94.20	52.90	99.00
Genetic	E_1	1.46	0.15	13.25	0.08	2.28	1.14	0.04	63.90
Advance	E_2	0.98	0.81	34.28	0.55	2.66	2.84	0.14	62.81
Genetic	E_1	3.54	3.61	25.63	4.90	24.30	7.98	2.45	38.24
advance as per centage of mean	E_2	2.29	12.01	25.49	74.32	31.97	17.97	7.82	41.48

PCV : Phenotypic coefficient of variation; GCV : Genotypic coefficient of variation.

more reliable conclusion can be made when heritability is considered in conjunction with genetic advnace. In the present study, the high genetic advance along with high heritability were recorded in both the environments for plant height, number of pods and total pod yield per plant. Therefore, it suggests that selection for these traits would be more useful. These findings are in accordance with the earlier findings of Rao and Kulkarni (1977), Vasistha *et al.*,(1982) and Yadav (1986). For rest of the traits, the value of genetic advance was moderate to low.

In conclusion, the present study revealed the presence of sufficient genetic variability in the available genotypes for various characters and also having high heritability and genetic advance for certain characters. So on the basis of present study, separate selection programme would be initiated for separate environment. However, for any general conclusion, this type of studies could be conducted in more number of environments.

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