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Selection Criteria for Improving Yield Potential in Okra

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ABSTRACT

An experiment comprising seven genotypes of okra and 21 diallel crosses was conducted in randomized block design with three replications at the Plant Breeding Research Farm, GAU, Anand to study the significance of agromorphological traits in selection programme for improving yield potential of okra. Pod yield was positively associated with all the attributes barring days to first flower. The yield was influenced directly and/or indirectly through pod weight, pod length, pod girth and number of pods per plant suggesting that prime emphasis should be given on these traits for evolving high yielding genotypes.

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INTRODUCTION

The primary objective of a plant breeding programme is to improve yield and quality of crop by evolving superior varieties. The yield of green pod of okra (*Abelmoschus esculentus* L. Moench) being consumed as vegetable, is an economically important quantitative character. Effective improvement in yield could be achieved through improving yield components which show associations among themselves and with yield. The knowledge about associations between characters may also help to identify characters that have little or no importance in the selection programme. Very limited information on this aspect is available for okra under Gujarat conditions (Patel, 1982). The present investigation was undertaken at the Plant Breeding Research Farm, Gujarat Agricultural University, Anand with a view to find out significance of agro-morphological characters of okra in breeding programme through correlation and path analysis (Wright, 1934).

MATERIALS AND METHODS

The experimental material consisted of seven parents (genotypes) and 21 diallel crosses. The parents were selected at random from the germplasm maintained by the farm. The material was grown at 45 cm x 30 cm spacing in randomized block design with three replications during *kharif* season of 1982. Each plot had two rows of ten plants each. End borer rows were provided in each replication. Cultural practices in vogue on the farm were followed.

Three plants were tagged at random per plot for recording days to first flower(days from seeding to the opening of first flower), plant height in cm (from ground level to the tip of the main stem after last picking) and number of branches per plant. The same tagged plants were inspected daily in the morning hours. The flowers which were found open on tagged plants were labelled with date. The six days old green pods developed from labelled flowers were harvested separately for recording pod weight (g), pod length (cm) and pod girth (cm). The number of pods as well as pod yield per plant were derived after last picking. The average values were used in estimation of correlation coefficients (genotypic and phenotypic) between pairs of attributes and path coefficients based on genotypic and phenotypic correlations.

RESULTS AND DISCUSSION

The results (Table 1) revealed that out of 28 intercharacter associations, 14 genotypic and 11 phenotypic correlation coefficients were significant. In general, the estimates of genotypic correlations were higher in magnitude than phenotypic correlations. The pod yield per plant (pod yield) was significantly influenced by all the attributes studied barring days to first flower. The latter had positive significant genotypic association with plant height as well as number of pods per plant and negative association with pod girth suggesting that selection in favour of late flowering type will induce tall stature and also increase number of pods per plant but at the same time it will reduce pod girth which is not desirable from yield view point. The plant height had significant positive genotypic as well as phenotypic associations with number of pods per plant which showed significant correlations with number of branches per plant. The pod weight, pod length and pod girth showed positive high associations among themselves. These results suggested that the selection in favour of longer pods will help in increasing pod weight as well as pod girth and thereby pod yield. These results are akin to those reported by Singh and Singh (1978), Mahajan and Sharma (1979) and Murty and Bavaji (1980).

The results (Table 2) revealed that days to first flower, plant height and number of branches per plant had very low direct contribution to pod yield. These attributes had low positive indirect effect on pod yield through number of pods per plant. The pod weight had maximum direct positive influence on pod yield. The number of pods per plant had moderate positive effect on pod yield. The pod length had moderate negative genotypic direct effect on pod yield. It had very high positive (genotypic) contribution through pod weight to pod yield. The pod girth had low negative direct effect on pod yield and very high positive indirect effect (genotypic) on pod yield through pod length.

The results thus indicated that pod weight and number of pods per plant were the main attributes in increasing pod yield of okra. From indirect effect view point also these traits were of prime importance for the improvement of pod yield. It is interesting to note that though the association (r_g) of pod length as well as pod girth with pod yield was significant and positive they had indirect contribution through pod weight. The results thus suggest that the breeder should give prime emphasis on selecting plants having more number of long heavy thick pods for evolving high yielding okra cultivars. These results are in conformity with those reported by Majumdar *et al.* (1974) and Murty and Bavaji (1980).

TABLE 1

The estimates of genotypic (r_g) and phenotypic (r_p) correlation coefficients between all pairs of eight characters.

Character		Plant height	No. of branches per plant	No. of pods per plant	Pod weight	Pod length	Pod girth	Pod yield per plant
Days to first flower	r_g	0.55*	0.36	0.41*	-0.36	-0.37	-0.64**	0.11
	r_p	0.19	-0.02	0.22	-0.18	-0.23	-0.29	0.05
Plant height	r_g	–	0.21	0.68**	-0.17	-0.18	-0.26	0.57*
	r_p		0.24	0.63**	-0.12	-0.16	-0.19	0.44*
No. of branches per plant	r_g	–	–	0.66**	0.04	0.08	0.04	0.61**
	r_p			0.38	0.06	0.05	0.03	0.39*
No. of pods per plant	r_g	–	–	–	-0.20	-0.21	-0.18	0.69**
	r_p				-0.16	-0.18	-0.14	0.68**
Pod weight	r_g	–	–	–	–	0.97**	0.83**	0.68**
	r_p					0.96**	0.88**	0.49**
Pod length	r_g	–	–	–	–	–	0.75**	0.63**
	r_p						0.80**	0.47*
Pod girth	r_g	–	–	–	–	–	–	0.54**
	r_p							0.40*

Legend : * and ** indicate significant at 5 and 1 per cent levels of significance respectively.

TABLE 2

Direct (underlined) and indirect effects of various characters on pod yield per plant.

Character	*	Days to first flower	Plant height	No. of branches per plant	No. of pods per plant	Pod weight	Pod length	Pod girth	Correlation with pod yield per plant
Days to first flower	G	**-0.179**	0.091	0.081	0.262	-0.658	0.302	0.213	0.11
	P	**-0.007**	0.007	-0.001	0.162	-0.083	-0.051	0.023	0.05
Plant height	G	-0.099	**0.166**	0.047	0.433	-0.311	0.147	0.086	0.47*
	P	-0.001	**0.038**	0.015	0.464	-0.056	-0.035	0.015	0.44*
No. of branches per plant	G	-0.065	0.035	**0.224**	0.421	0.073	-0.065	-0.013	0.61**
	P	0.001	0.009	**0.064**	0.280	0.028	0.011	-0.024	0.39*
No. of pods per plant	G	-0.073	0.113	0.148	**0.637**	-0.366	0.171	0.060	0.69**
	P	-0.001	0.024	0.024	**0.736**	-0.075	-0.040	0.011	0.68**
Pod weight	G	0.065	-0.028	0.009	-0.127	**1.829**	-0.791	-0.276	0.68**
	P	0.001	-0.005	0.004	-0.118	**0.467**	0.211	-0.071	0.49**
Pod length	G	0.066	-0.030	0.018	-0.134	1.774	**-0.815**	-0.249	0.63**
	P	0.002	-0.006	0.003	-0.132	0.448	**0.220**	-0.064	0.47*
Pod girth	G	0.115	-0.043	0.009	-0.115	1.518	-0.611	**-0.332**	0.54**
	P	0.002	-0.007	0.002	-0.103	0.411	0.176	**-0.080**	0.40*

* G = Genotypic; P = Phenotypic

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