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Yield Components and their Implication to Selection in Foxtail Millet

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Correlation coefficients and selection indices were studied in 19 genotypes of foxtail millet. Grain yield per plant showed significant positive association with 1000 grain weight, ear length number of ears per plant, days to maturity and days to heading. Grain weight and number of ears per plant had significant positive association with each other. With the help of discriminant function, selection indices were computed to determine the efficacy of selection using traits other than yield. It could be seen that the traits number of ears, ear length and 1000 grain weight could be utilized for this purpose with a fair degree of success.

Genotypic correlations are helpful in the construction of selection indices and permit the prediction of correlated response.

In the present study the relative importance of yield components for the improvement of grain yield in foxtail millet was tested.

MATERIAL AND METHODS

Nineteen promising genotypes of foxtail millet were raised in randomized blocks with three replications in kharif, 1979. The plot size consisted of ten rows each 3.75 m long spaced 22.5 cm apart. The data were recorded on grain yield per plant, ear length, number of ears per plant. plant height, days of maturity, days to heading, 1000 - grain weight and density of grains (number of grains per cm of ear) on ten random plants from central rows. The mean values of ten selected plants were used for statistical analysis. Correlation coefficients were calculated from the variance and covariance components. The four characters that contribute to fitness and form components of grain yield, were used for the construction of selection indices according to the procedure given by Robinson *et al.* (1951).

RESULTS AND DISCUSSION

The estimates of correlation coefficients between all possible pairs of characters are presented in Table 1. Genotypic correlation coefficient volue revealed that yield per plant was significantly and positively correlated with 1000-grain weight, ear length. number of ears per plant, days to maturity and days to heading, while the plant height had positive but non-significant correlation. This findings is substantiated by similar results reported by Patnaik (1968) in finger millet. Association of density of grains (number of grains per cm of ear) with 1000 grain weight was negatively

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significant at genotypic level. It indicated that compact ear had lower 1000-grain weight and loose ear had higher 1000-grain weight. No correlation was observed for number of ears per plant. days to maturity and days to heading with plant height in the present study.

Yield per plant, 1000- grain weight and number of ears per plant had significant positive associations with each other, which would mean that selection for either of these characters would result in improvement of other characters and hence are important in foxtail millet breeding programme.

Different discriminant functions obtained by taking individual characters and various combinations of characters along with the expected genetic advance and their relative efficiencies over straight selection for grain yield are presented in Table 2.

The present study indicated that selection based on yield components was fairly indicative of the expected genetic gain. While selection based upon three traits namely grain weight (X_2) number of ears (X_8) and ear length (X_4) could account for 86.71% of genetic gain, X_2 and X_4 or X_8 and X_4 alone could give 81.90 and 74.32% of gain.

REFERENCES

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TABLE 1. Estimates of phenotypic (P) and genotypic (G) correlation coefficients in foxtail millet

Characters	Correlations	Yield/plant	1000-grain weight	Density of grains	Ear length	No. of ears/plant	Plant height	Days to maturity
1000-grain weight	P	0.1028						
	G	0.8858**						
Density of grains	P	0.0309	0.1473					
	G	−0.1772	−0.6816**					
Ear length	P	0.5008*	0.0761	−0.0710				
	G	0.4761*	0.4971	0.3785				
Number of ears per plant	P	0.5051*	0.0510	−0.4099	−0.2895			
	G	0.4799*	0.5707**	−0.5697**	−0.4248			
Plant height	P	0.3347	0.0871	−0.2711	0.5142*	0.0844		
	G	0.3460	0.3866	−0.4260	0.6687**	0.0669		
Days to maturity	P	0.6250**	0.0452	−0.0751	0.2896	0.7308**	0 0803	
	G	0.4635*	0.7692**	−0.1265	0.4205	0.8071**	0.0883	
Days to heading	P	0.3955	0.2442	−0.8295**	−0.0365	0.6480**	−0.0120	0.9421**
	G	0.7758**	0.5491*	0.6040**	0.3386	0.6274**	−0.0043	0.9485**

*, **: Significant at 5% levels of probability respectively.

Table-2, Expected genetic advance in grain yield and relative efficiency of different selection indices in foxtail millet

Selection index	Discriminant function	Genetic advance per plant	Relative efficiency
X_1	$Y = (0.5430)\ X_1$	2.6984	100.00
X_2	$Y = (0.8561)\ X_2$	0.8992	33.32
X_3	$Y = (0.6219)\ X_3$	1.6052	59.50
X_4	$Y = (0.2365)\ X_4$	1.3403	49.67
X_1X_2	$Y = (0.5326)\ X_1 + (0.1928)\ X_2$	2.7063	100.29
X_1X_3	$Y = (0.5086)\ X_1 + (0.1250)\ X_3$	2.7088	100.38
X_1X_4	$Y = (0.5418)\ X_1 + (0.0021)\ X_4$	2.6983	100.00
X_2X_3	$Y = (0.7692)\ X_2 + (0.6093)\ X_3$	1.8030	66.82
X_2X_4	$Y = (0.6923)\ X_2 + (0.5569)\ X_4$	2.2100	81.90
X_3X_4	$Y = (0.7133)\ X_3 + (0.1405)\ X_4$	2.0056	74.32
$X_1X_2X_3$	$Y = (0.5309)\ X_1 + (0.1571)\ X_2 - (0.0759)\ X_3$	2.6368	97.72
$X_1X_2X_4$	$Y = (0.5829)\ X_1 + (0.1702)\ X_2 - (0.0909)\ X_4$	2.6993	100.03
$X_1X_3X_4$	$Y = (0.4290)\ X_1 + (0.2573)\ X_3 + (0.0792)\ X_4$	2.6112	96.77
$X_2X_3X_4$	$Y = (0.6923)\ X_2 + (0.7560)\ X_3 + (0.2222)\ X_4$	2.3398	86,71
$X_1X_2X_3X_4$	$Y = (0.5692)\ X_1 + (0.1282)\ X_2 + (0.0038)\ X_3 - (0,0622) X_4$	2.7013	100.20

X_1 = grain yield per plant, X_2 = 1000 grain weight, X_3 = number of ears per plant X_4 = ear length,