CHARACTER ASSOCIATION ANALYSIS IN F2 GENERATION OF SORGHUM (*Sorgum bicolor*) (L. Moench) CROSSES

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In a study of F_2 population of three crosses and their parents of sorghum, seed yield was observed to be positively and significantly associated with ear weight in all the three crosses and their parents. In cross C, the number of leaves was found to possess negative correlation with plant height. Therefore it is suggested that plants with shorter height with more number of leaves can be selected in cross C.

The efficiency of selection depends on the direction and magnitude of association between yield and its components. Therefore, in the present investigation the inter-relationship of six traits in five parents and their three segregating F2 generations was estimated with a view to identify characters or combination of characters which may be useful as indicators of high yield.

MATERIALS AND METHODS

Three crosses namely 2219 A x SPV 351 (Cross A), 2219 A x Usilampatti-2 (Cross B) and 2760 A x Co 24 (Cross C) with their five parents viz., 2219 B (P_1), 2760 B (P_2), CO. 24 (P_3), Usilampatti-2 (local) (P_4) and SPV 351 (P_5) were studied in F2 generation. A total of 600 segregants from each cross with their five parents were studied. Thirty out of six hundred F2 plants were randomly selected in each of the three crosses and observations were made on selected thirty plants in all the three crosses and also in parents.

Observations were recorded on (1) plant height (2) number of leaves (3) ear length (4) ear weight (5) 100 grain weight and (6) grain yield. The estimates of correlation and inter component correlation were calculated as per the method suggested by Goulden (1952).

RESULTS AND DISCUSSION

Phenotypic correlations between different pairs of characters were estimated separately in parents and in F2 generations for each of the three crosses. The data are presented in the table.

Plant height with number of leaves in SPV 351, ear weight with plant height in SPV 351 and cross B, ear weight with number of leaves in cross C and SPV 351, ear weight with ear length in 2219 B and cross C, 100 grain weight with ear weight in 2219 B, grain yield with plant height in cross B and grain yield with number of leaves in CO. 24 and SPV 351 showed positively ignificant correlation. But, negatives

Table Phenotypic correlations between all possible pairs of six characters among parents and F_2 populations of sorghum crosses

(a) Number of Leaves With Plant Height

Characters	P₁	P₂	P₃	P₄	P₅	Cross A (P₁XP₅)	Cross B (P₁XP₄)	Cross C (P₁XP₃)
Plant height	0.122	0.275	0.026	0.061	0.371**	0.110	0.402**	-0.303*

(b) Ear length with other characters

Characters	P₁	P₂	P₃	P₄	P₅	Cross A	Cross B	Cross C
Plant height	0.119	0.023	-0.301*	0.104	0.069	0.002	0 046	0 390**
Number of leaves	0 277	-0 416**	0.049	0.268	0.195	0.122	-0.031	0.296

(c) Ear weight with other characters

Characters	P₁	P₂	P₃	P₄	P₅	Cross A	Cross B	Cross C
Plant height	-0.001	0.089	-0.024	0.032	0.353*	0.210	0.451**	0.089
Number of leaves	0.166	-0.131	-0.076	-0.007	-0.523**	-0.261	-0.021	0.331*
Ear lengh	0.399**	0.076	-0.276	0.121	0.117	0.212	0.032	0.377**

(d) 100 Grain weight with other characters

Characters	P₁	P₂	P₃	P₄	P₅	Cross A	Cross B	Cross C
Plant height	0.411**	0.093	0.145	-0.348*	-0.098	0.101	0.540**	0.088
Number of leaves	0.651**	0.236	-0.101	-0.242	-0.233	0.741**	-0.222	0.013
Eer length	0.690**	0.041	-0.011	-0.041	-0.029	-0.170	0.471**	-0.171
Ear weight	0.942**	0.194	-0.833**	-0.071	0.118	0 312	0.151	-0.051

(e) Grain yield with other characters

Characters	P₁	P₂	P₃	P₄	P₅	Cross A	Cross B	Cross C
Plant hight	-0.230	-0.073	0.044	0.045	0.031	0.200	0.380**	0.250
Number of leaves	0.150	-0.339*	0.324*	-0.087	0.551**	0.340*	0.120	-0.013
Ear length	0.155	-0.071	-0.240	0.103	0.004	-0.120	0.008	0.171
Ear weight	0.850**	0.843**	0.812**	0.866**	0.930**	0.920**	0.850**	0.901**
100 grain weight	0.730**	-0.110	0.192	0.130	-0.011	0.302*	0.270	-0.025

*Significant at 5 per cent level   **Significant at 1 per cent level

significant correlation was seen for ear length with number of leaves in 2760 B, 100 grain weight with plant height in Usilampatti-2 and 100 grain weight with ear weight in CO.24. This indicates that the strength of association and the direction of correlation vary independently in parents and its F2 cross combinations.

Ear length with plant height in cross C and its parent, CO.24 showed significant negative correlation; 100 grain weight with plant height in cross B and its parental type 2219 B, 100 grain weight with number of leaves in cross A and its parental type 2219 B, 100 grain weight with ear length in cross B and its parent, grain yield with number of leaves in cross A and its parent SPV 351 and grain yield with 100 grain weight in cross A and its parental type 2219 B showed significantly positive correlations. It indicated, such positive and negative correlation coefficient in crosses is due to their parental genetic association.

The yield was found to be significantly and positively associated with plant height in cross B, number of leaves in parents CO 24, SPV 351 and cross A, ear weight in all five parents and three F2 crosses and 100 grain weight in 2219 B and cross A. The positive and significant association of plant height with seed yield was confirmed by previous workers like Sindagi et al (1970), Kukadia et al (1980) and Srihar and Nagur (1980). Liang et al. (1969) also observed positive and significant association of number of leaves with seed yield in two segregating populations and in pure lines of grain sorghum. Kukadia et al. (1980), Sri hari and Nagur (1980) and Reddy and Nagur (1981) also reported strong and positive association of 100 grain weight with grain yield.

The correlation studies indicated that the grain yield is positively related to ear weight in all the three F2 cross combinations and in their parents. So ear weight has definite correlation with grain yield. Liang et al. (1969), Panchal et al.

(1979), Kukadia et al (1980) Srihari and Nagur (1980) and Reddy and Nagur (1981) also noticed positive and significant association of ear weight with seed yield.

But for other characters, the trend was not uniform. In some cases, the number of leaves and 100 grain weight were associated with grain yield, in other cases no definite correlation could be identified. The number of leaves was found to possess negative correlation with grain yield in 2760 B. Negative correlation between ear length and plant height was found in CO.24 and cross C. Therefore it is better to place a greater reliance on ear weight than on ear length for selection. In cross C, the correlation between number of leaves and plant height was negative. Therefore plants with shorter height with more number of leaves can be selected in cross C. This could be an efficient converter of energy source into products as the growth is limitted and photosynthates are trans mitted to grain formation rather than for plant growth.

REFERENCES

GOULDEN, C. H. 1952. *Methods of statistical analysis* John Wiley and Sons, Inc., New York.

KUKADIA, M. V., K. B. Desai and S.B.S. TIKKA 1980. Genetic association in grain sorghum *Sorghum News Lett.*, 23 : 21.

LIANG, G. H. L., L. B. OVERLAY and A. J. CASADY. 1969. Inter relations among agronomic characters in grain sorghum. *Crop Sci.*, 9 : 249-302.

PANCHAL, H. C., K. B. DESAI nad S.B.S. TIKKA, 1979. Estimation of heritability through parent-offspring regression analysis in sorghum; *Sorghum News Lett.*, 22 : 16-17.

REDDY, K. K. N. and T. NAGUR. 1981. Correlation studies between yield and yield components in sorghum. *Sorghum News Lett.*, 24 : 18.

SINDAGI, S. S., V. SWARUP and D. SINGH 1970. Variation and heritability of some quantitative characters in F₂ progenies of intervarietal crosses of sorghum. *Indian J Genet.*, 30 : 660-664.

SRIHARI, A. and T. NAGUR. 1980. Association between yield and yield components and multiple regression analysis in sorghum *Sorghum News Lett.*, 23 : 10-11.