CHARACTER ASSOCIATION AND PATH ANALYSIS IN RABI SORGHUM [SORGHUM BICOLOR (L.) MOENCH] [*]

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ABSTRACT

Ten parents and 45 F_1 hybrids of sorghum [Sorghum bicolor (L.) Moench] were studied in rabi season for genotypic correlations and path analysis. Grain yield showed significant positive correlation with panicle breadth, plant height and 100-grain weight in parents, while with panicle breadth, number of leaves and days to flowering in F_1 s. plant height had the highest positive direct effect on grain yield followed by days to flowering in parents. In F_1s, number of leaves had the highest direct effect followed by panicle breadth and plant height. Though days to flowering showed negative direct effect on yield in F_1s, its indirect effect through number of leaves was high, resulting in significant positive genotypic correlation. Improvement in grain yield in rabi sorghum would be possible through selection for plant height, number of leaves and days to flowering.

KEY WORDS : Sorghum, Correlation, Path analysis.

Sorghum [*Sorghum bicolor* (L.) Moench] is an important food and feed crop cultivated both in *Kharif* and *rabi* seasons in India. *Rabi* sorghum yields are stagnant for the past two decades and need a thorough genetic manipulation. A knowledge of the nature of character association through path analysis can furnish a clue to partitioning of genetic associations of a complex trait like grain yield. Such studies are limited and mostly reported by evaluating the material during *Kharif* season (Debhoikar *et al.*, 1970; Singh and Baghel, 1977). The present study was, therefore, taken up to know the nature of character association among yield components and to judge the direct and indirect effects of different yield components in parents and F_1 hybrids of sorghum grown in *rabi* season.

MATERIALS AND METHODS

The material comprised 10 parental lines of sorghum viz., SPV-232, SPV-104, M35-1, 296B, 2219B, CSV-BR, 36B, D-71396, E36-1 and CSV-5. These parents and their 45 F_1 s obtained from crossing in all possible combinations, excluding reciprocals, were grown in a randomized complete block design with three replications in *rabi* season of 1982-83. Each genotype was grown in 3 m long single row with 45 cm x 15 cm spacing. Observations were recorded on five random competitive plants in each of the parents and F_1s in each replication. Correlation coefficients were calculated at the genotypic level using the procedure given by Al-jibouri *et al.* (1958). The path-coefficient analysis was carried out as described by Dewey and Lu (1959).

RESULTS AND DISCUSSION

For most of the character pairs, genotypic correlation coefficients showed similar trend in both the parents and F_1s. (Table 1).

Grain yield had significant positive correlation with panicle breadth, plant height and 100-grain weight in parents and with panicle breadth, number of leaves and days to flowering in F_1s. In both parents and F_1s, days to flowering had significant positive correlation with number of leaves. As in the present study, Goud and Krishna

Table 1. Genotypic correlation co-efficients for parents and F₁s in sorghum

		Plant height	No.of leaves	Peduncle length	Panicle length	Panicle breadth	No.of prim- aries	No.of whorls	100 grain weight	Grain yield
Days to	P	-0.070	1.038**	-0.758*	-0.399	0.440	0.318	0.285	0.079	0.304
flowering	F₁	-0.206	0.800**	-0.806**	-0.455**	0.470**	0.685**	0.120	-0.036	0.344*
Plant	P		0.049	-0.314	-0.019	0.722*	-0.028	-0.132	0.857**	0.836**
height	F₁		-0.193	0.349*	0.073	0.303*	-0.180	-0.455**	0.814**	0.274
No.of	P			-0.924**	-0.220	0.678*	0.483	0.444	0.050	0.469
leaves	F1			-0.680**	-0.206	0.711**	0.616**	0.257	-0.049	0.579**
Peduncle	P				0.477	-0.468	-0.414	-0.238	-0.190	-0.416
length	F1				0.466**	-0.333*	-0.570**	-0.167	0.107	-0.250
Panicle	P					0.252	0.084	0.299	0.061	0.134
length	F1					-0.395**	-0.195	0.211	-0.217	-0.280
Panicle	P						0.629	0.528	1.032**	1.071**
breadth	F1						0.240	0.491**	0.209	0.952**
No.of	P							0.669*	0.050	0.349
primaries	F1							0.360*	-0.026	0.183
No.of	P								0.325	0.114
whorls	F1								-0.212	-0.434**
100 / grain	P									0.819**
weight	F1									0.207

Sastry (1974) and Reddy and Rao (1982) reported that number of leaves and days to flowering were very important in influencing the yield through higher leaf area index and leaf area duration. Plant height and panicle breadth were also important in giving high dry matter production and high grain yield. Plant height had significant positive correlation with panicle breadth and also with 100 grain weight in both the parents and F₁s which is in accordance with the reports of Shahana and Borikar (1982a). The correlation coefficients of number of leaves with panicle breadth were negative and significant in both the parents and F₁s.

Peduncle length had significant positive correlation with panicle length, while it had significant negative correlation with panicle breadth and also with number of primaries in F₁s. The association of panicle length and panicle breadth was negative and significant in F₁s. Panicle breadth had significant positive association with 100 grain weight in parents.

Path analysis revealed that in parents, plant height had high positive correlation with yield due to its high direct effect while it had mild positive correlation with yield in F₁s. (Table 2). The direct effect of days to flowering on yield was high in parents, while it had negative direct effect in F₁s. But, the indirect effect of days to flowering through number of leaves was high which resulted in significant positive correlation between days to flowering and grain yield. In parents, days to flowering itself had a high direct positive effect. In F₁s, the direct contribution of number of leaves on the yield was the highest followed by panicle breadth and plant height. This shows that height and maturity along with number of leaves influenced towards more yield. Giriraj and Goud (1983) reported high positive direct as well as indirect effects through other character viz., plant height, days to flowering and 100 grain weight on grain yield. The indirect effects of panicle breadth through plant height in parents and through number of leaves in F₁s were high, which resulted in high correlations. The