



STUDY OF GENETIC PARAMETERS AND THEIR VARIABILITY IN SORGHUM [*SORGHUM BICOLOR* (L.) MOENCH] GENOTYPES

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ABSTRACT

Thirty-three genotypes of *kharif* sorghum were evaluated and correlation coefficient was estimated for the grain and the yield contributing traits. Correlation studies revealed that the plant weight exhibits positive and highly significant association with yield per plant followed by 1000-seed weight and days to 50 % flowering indicating the role of effects in yield per plant. Plant weight and days to 50 % flowering showed positive and highly significant genotypic correlation with 1000-seed weight. Panicle length and leaf length and was highly significant with number of grains per panicle. Leaf width, plant height, maturity period and 50 % flowering period is highly significant with number of leaves per plant. Plant height and 50 % flowering period is highly significant with leaf width. Further, 50 % flowering period was highly significant with plant weight and plant height.

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Keywords: Genotypic correlation, sorghum, genotypes, *kharif*.

INTRODUCTION

India is a significant producer of sorghum worldwide. Prior to the green revolution, it was the second-largest crop; however, with the green revolution, it is now third on the list of food grains, after rice and wheat. India accounts for 34% of the world's total sorghum production area and produces 17% of it. In comparison to Argentina (5.09 t ha⁻¹), China (3.6 t ha⁻¹), and Mexico (3.47 t ha⁻¹), India's sorghum productivity is lower (0.876 kg ha⁻¹). The classification of sorghum includes the following: family Graminae, subfamily Poaceae, tribe Andropogonae, genus Sorghum, and species *Sorghum bicolor*. A complex character, yield is dependent on numerous separate contributing characters.

The level of genetic variability, heritability, and genetic advancement in the base population determines how much the sorghum production may

be improved. Additionally, knowledge of the nature of the relationship between yield and its constituent parts aids in the simultaneous selection of a number of characters linked to yield improvement (Mahajan et al., 2011). Correlation analysis has frequently been used to analyze the relationship between characteristics in order to identify the nature and significance of these relationships. The purpose of this study is to describe the relationships between various sorghum growth characteristics and yield components in order to identify those that might influence yield.

MATERIAL AND METHODS

was conducted at Experimental Field, School of Agriculture, GEHU, Uttarakhand-247662, India. It is situated at 30.134585° latitude and 77.884375° longitude. The experimental material comprised of 30 germplasms along with 3 check varieties (Table 1). The material was sown in Randomized Block Design (RBD).

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Each genotype was sown in three rows, 5m long at 30 x 45 cm apart. Five plants in each accession were selected for data recording of qualitative and quantitative traits. The data on 50% flowering (days) was recorded during the panicle emergence stage. Leaf length (cm) and leaf width (cm) were measured during the physiological maturity stage. The number of leaves, plant height (cm), panicle length (cm) was measured during the

physiological maturity stage. Plant weights (g/5 plant) of stem were measured after harvesting. The 1000-seed weight (g) was measured after threshing, number of seeds per panicle was counted after threshing and yield per plant was measure after threshing and counting of seeds per plant. The formulas proposed by Dewey and Lu (1959) were used to calculate the genotypic correlation coefficients.

Table 1: List of all genotypes of sorghum.

SN. No.	Collector No	IC No	Vernacular name	District	State
1	ESRK 2	IC 597602	Jowari	Almora	Uttarakhand
2	ESRK 4	IC 597604	Bajra	Almora	Uttarakhand
3	ESRK 19	IC 597618	Jonnel	Rudraprayag	Uttarakhand
4	ESRK 20	IC 597619	Jonnel	Rudraprayag	Uttarakhand
5	ESRK 22	IC 597621	Jowar bajra	Chamoli	Uttarakhand
6	ESRK 26	IC 597625	Jowari	Chamoli	Uttarakhand
7	ESRK 27	IC 597626	Jowari	Almora	Uttarakhand
8	ER 33	IC 0585167	Jondi	Chitrakut	Uttar Pradesh
9	ER 34	IC 0585168	Jodali	Banda	Uttar Pradesh
10	ER 35	IC 0585169	Chara	Banda	Uttar Pradesh
11	ES 1	IC 333346	Deshi	Kanpur	Uttar Pradesh
12	ES 2	IC 333347	Deshi	Hardoi	Uttar Pradesh
13	ES 4	IC 333349	Deshi	Kanpur	Uttar Pradesh
14	ES 5	IC 333350	Deshi	Kanpur	Uttar Pradesh
15	ES 6	IC 333351	Deshi	Kanpur	Uttar Pradesh
16	ES 7	IC 333352	Deshi	Kanpur	Uttar Pradesh
17	ES 17	IC 333362	Deshi	Kaushambi	Uttar Pradesh
18	ES 19	IC 333364	Deshi	Kaushambi	Uttar Pradesh
19	ES 22	IC 333367	Deshi	Kaushambi	Uttar Pradesh
20	ES 23	IC 333368	Deshi	Kaushambi	Uttar Pradesh
21	ES 26	IC 333371	Deshi	Allahabad	Uttar Pradesh
22	E 33	IC 333391	Deshi	Banda	Uttar Pradesh
23	E 34	IC 333392	Deshi	Banda	Uttar Pradesh
24	E 36	IC 333394	Deshi	Banda	Uttar Pradesh
25	E 37	IC 333395	Deshi	Banda	Uttar Pradesh
26	E 38	IC 333396	Deshi	Banda	Uttar Pradesh
27	E 39	IC 333397	Deshi	Banda	Uttar Pradesh
28	E 101	IC 415792	Sabet deshi	Kanpur Dehat	Uttar Pradesh
29	E 102	IC 415793	Sabet deshi	Kanpur Dehat	Uttar Pradesh
30	E 143	IC 415834	Bani	Lucknow	Uttar Pradesh
C1	CSV 15	Check			
C2	CSV 21F	Check			
C3	CSV 41	Check			

RESULT AND DISCUSSION

The most important trait, total yield per plant had exhibited highly significant and positive genotypic correlation coefficient with plant weight (1.00**), 1000-seed weight (0.983**) and 50 % flowering period (0.447**) while number of grains per panicle (-0.374**) was highly significant and negative genotype

correlation coefficient. 1000-seeds weight was highly significant and positive genotypic correlation coefficient with plant weight (0.983**) and 50 % flowering period (0.495**) while number of grains per plant (-0.535**) was negatively correlated. Number of grains per panicle was positively highly significant with panicle length (0.323**) and leaf length

Table 2: Genotypic Correlations Matrix.

	Days to 50% flowering	Days to maturity	Plant Height (cm)	Plant Weight (g)	Leaf length (cm)	Leaf width (cm)	No. of leaves / plant	Panicle length (cm)	No. of grains/ plant	1000-seed weight(g)
Days to 50% flowering										
Days to maturity	0.095									
Plant Height (cm)	0.429**	0.088								
Plant Weight (g)	0.461**	0.147	0.088							
Leaf length (cm)	-0.052	-0.194	-0.107	-0.123						
Leaf width (cm)	0.786**	-1.095**	0.384**	0.130	-0.593**					
No. of leaves / plant	0.538**	0.288**	0.604**	-0.058	-0.127	0.503**				
Panicle length (cm)	-0.676**	-0.265**	-0.118	-0.099	-0.583**	-0.133	-0.413**			
No. of grains/panicle	-0.365**	-0.221*	-0.207*	-0.375**	0.282**	-0.012	-0.159	0.323**		
1000-seed weight (g)	0.495**	0.173	0.119	0.983**	-0.172	0.060	-0.015	-0.117	-0.535**	
Yield / plant	0.447**	0.145	0.082	1.000**	-0.121	0.130	-0.064	-0.090	-0.374**	0.983**

(0.282**) while negative correlation was observed with plant weight (-0.375**), 50 % flowering period (-0.365**) and significant with plant height (-0.207*) and maturity period (-0.221*). Panicle length is negatively correlated with leaf length (-0.583**), number of leaves per plant (-0.413**), maturity period (-0.317**) and 50 % flowering period (-0.676**). Number of leaves per plant is highly significant with maturity period (0.288**) followed by plant height (0.604**), leaf width (0.503**) and 50 % flowering period (0.538**). Leaf width is highly significant with 50 % flowering period (0.786**), plant height (0.384**) while negatively correlated with maturity period (-1.095**) and leaf length (-0.593**). Plant weight is highly significant with 50 % flowering period (0.461**). Plant height is also highly significant with 50 % flowering period (0.429**). These results were consistent with previous reports on sorghum traits (Reddy, 2002; Prabhakar, 2003; Patil et al., 2004; Iyanar et al., 2001).

CONCLUSION

From the result, it could be concluded that there were

most of the traits evaluated were positively associated among themselves and could be improved simultaneously. It further concluded that characters such as plant weight, 1000-seed weight, and leaf width exhibit highly significant and positive genotypic correlation with yield per plant.

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