

Short Communications

Study of Character Associations in Forage Sorghum*

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Genetic variability is a prerequisite for initiating appropriate breeding procedures in the crop improvement programmes. For efficient and successful breeding programme, information on the association between any two characters that become apparent by the study of genetic association is helpful to a plant breeder during selection as it would be possible to bring about a genetic advance in the economic character by selecting the other character of a pair. To study the genetic associations of forage yield with a number of other quantitative traits in *Sorghum bicolor* (L). Moench twenty-one genotypes comprising six parents viz. Rio, Vidisha, IS 4776,

IS 6953, Sel-512 and IS 3241 and their fifteen single crosses, produced in a diallel fashion ignoring reciprocals, were grown each in a single-row plot of 2 m length spaced at 30 cm apart in a randomized-block design replicating thrice during *kharif* 1977. Five competitive plants were redomly selected and were used for recording the observations on green (X_1) as well as dry forage yield (X_2), days to 50 per cent flowering (X_3), plant height (X_4), number of intact leaves per plant (X_5), stem diameter (X_6), flag leaf area (X_7), total soluble solids (X_8), and leaf-stem ratio (X_9). The data including transformed values for T.S.S. and leaf-stem ratio were averaged over plot mean basis and were fed to 12 TDC computer for statistical analysis.

Highly significant differences were observed for all the characters studied (Table 1). The values for genetic co-

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TABLE 1

Mean values and other parameters of variation.

Chara	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9
1	560.33	147.02	74.33	301.33	11.87	1.44	116.08	11.33	37.87
2	760.33	189.61	110.00	250.00	11.40	1.62	177.70	7.37	38.82
3	660.00	151.35	77.00	270.00	9.00	1.51	204.69	6.90	33.21
4	585.99	142.03	62.67	246.33	10.40	1.65	211.74	7.57	33.67
5	688.33	177.34	78.67	204.33	12.47	1.54	175.65	7.80	43.72
6	148.33	31.69	57.67	236.33	5.37	1.07	95.04	3.20	32.00
1 x 2	1285.66	347.23	76.67	323.33	14.40	2.39	238.45	8.57	34.19
1 x 3	956.33	239.14	72.00	335.67	12.53	1.74	176.40	7.40	31.35
1 x 4	907.66	234.10	67.33	293.33	12.73	1.63	171.32	39.27	34.06
1 x 5	1100.66	258.32	71.00	322.00	12.73	1.94	201.11	7.87	35.24
1 x 6	580.99	152.30	58.33	268.99	11.40	1.39	264.35	5.67	30.74
2 x 3	893.33	235.80	76.00	274.67	9.87	1.73	266.73	6.57	31.47
2 x 4	932.00	246.98	71.33	280.67	15.67	1.69	175.83	7.83	35.89
2 x 5	845.66	223.56	75.33	265.33	12.90	2.27	195.02	6.60	38.04
2 x 6	718.33	185.16	73.67	340.00	11.20	1.64	167.77	7.03	34.03
3 x 4	993.66	272.23	66.00	303.33	12.73	1.88	200.48	7.87	41.12
3 x 5	718.33	179.13	72.00	186.00	10.07	1.50	205.40	5.57	35.65
3 x 6	508.00	119.84	65.00	294.99	9.53	1.35	187.08	5.17	35.05
4 x 5	1120.66	321.03	65.33	279.33	10.00	1.94	218.83	7.33	34.28
4 x 6	451.66	124.16	56.00	247.00	9.67	1.15	275.80	6.07	29.26
5 x 6	392.33	92.87	60.00	231.33	9.00	1.05	175.52	2.60	28.63
CD at 5%	179.59	48.52	4.38	40.61	2.31	0.31	41.18	2.08	5.08
GCV	35.15	38.11	15.54	11.51	18.43	19.28	20.26	25.28	19.04
PCV	38.02	41.04	15.60	14.49	22.25	22.37	24.32	31.17	13.72
ECV	14.50	15.22	3.68	8.81	12.84	11.34	12.90	18.23	10.32

efficient of variation (GCV) ranged from 9.04 (leaf-stem ratio) to 38.11 (dry forage yield). High GCV was noticed for forage yield and T.S.S. Barring leaf-stem ratio, all characters had higher GCV than ECV indicating that selection would be quite effective if the material is advanced to segregating stage.

The success of direct selection depends largely upon the extent of the genetic variability and inherent association among characters. Positive association between the characters results in correlated response. Significant and positive correlations at both, ge-

notypic and phenotypic levels were observed of forage yield with plant height, number of intact leaves per plant, stem diameter and T.S.S. content (Table 2). Positive association of forage yield with plant height has also been reported by Swarup and Chaugale (1962), Rohewal *et al* (1964), Naphade (1972), Paroda *et al* (1975) and Singhania *et al* (1977). But the findings of Gopalan and Balasubramanian (1978) are at variance with the above observations. Such variations could be attributed to the genetic makeup of the material under study. Inter-relationship of leaf-stem ratio with

TABLE 2

Phenotypic (P) and Genotypic (G) correlation coefficients for different pairs of characters in forage sorghum.

Character	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9
X_1	—	0.980**	0.334	0.460*	0.634**	0.755**	0.287	0.490*	0.241
X_2	0.993**	—	0.287	-0.441*	0.626**	0.769**	0.99	0.490*	0.238
X_3	0.347	0.299	—	-0.017	0.298	0.342	-0.101	0.321	0.409
X_4	0.629**	0.583**	0.054	—	0.394	0.491*	0.070	0.262	-0.157
X_5	0.791**	0.774**	0.374	0.439*	—	0.632**	0.175	0.500*	0.273
X_6	0.841**	0.886**	0.408	0.506*	0.722**	—	0.156	0.482*	0.286
X_7	0.348	0.373	-0.130	0.060	0.177	0.109	—	-0.101	-0.196
X_8	0.623**	0.616**	0.404	0.548*	0.778**	0.796**	-0.009	—	0.411
X_9	0.331	0.337	0.589**	-0.023	0.612**	0.605**	0.376	0.376	—

Upper and lower values from diagonal space represent ' r_P ' and ' r_G ' respectively.

*, **: $p=0.05$ & 0.01 .

days to flowering, number of intact leaves, stem diameter and T.S.S. was significant at phenotypic level only.

All characters had shown non-significant association with flag leaf area which is akin to the findings of Naphade (1972). Paroda *et al* (1975) and Singhanian *et al* (1977) have reported leaf area and their components viz. leaf length and leaf width having strong and significant positive correlation with forage yield attributes. Days to flower showed positive and significant genotypic correlation with leaf-stem ratio. High T.S.S. content could be expected in the genotypes having high mean values for forage yield and its components since it has manifested strong significant correlations with those characters (Singhanian *et al*, 1977).

In the present investigation, leafiness showed positive and significant relationship with forage yield and yield components. Its improvement in the present-day high yielding forage varieties would prove a better morphologi-

cal attribute for furtherance of the nutritive value. Leafiness is regarded as the sole criterion of voluntary intake for cattle. Paroda (1973) also considered the required attributes in an ideal plant type of forage, to be leafiness for increased palatability and intake, low toxic constituents, better digestibility, stability for high dry matter production, good regeneration, resistance to diseases and insect pests, better seed production and above all its suitability for a specific farming system. Accordingly, information obtained from the present study would be quite useful to breed for the better plant type.

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