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STABILITY ANALYSIS FOR GRAIN PROTEIN CONTENT IN *RABI* SORGHUM

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ABSTRACT

In an experiment conducted over three *rabi* environments, the genotypes E 36-1, Afzalpur local and AGP-280 proved to be more stable for grain protein content with their average response (b_i = 0.94, 1.108 and 1.18, respectively) and least mean square deviation (S^2d_i=-0.387, 0.181 and 0.29, respectively) with significantly higher grain protein content than the experimental mean (12.896%) among the 31 rabi sorghum genotypes, representing the locals of northern Karnataka and eight African germplasm lines obtained from ICRISAT. The genotypes RJ-16, SPV-488 and Bhogapur local had higher magnitude of b-values (>1.3) with more than 13.45 per cent grain protein content, indicating their suitability to high yielding conditions.

KEY WORDS : Stability parameters, Grain protein content, G x E interaction

After witnessing a quantum jump in grain sorghum production, with the spread of hybrids and high yielding varieties over large area, especially in the northern Karnataka during post-monsson season (*rabi*), it has now become imperative to initiate research work on quality improvement. Although protein content of individual lines and varieties has been studied extensively, information is lacking with hardly any references on stability analysis of grain protein content in sorghum. The present study furnishes data on the stability of grain protein content of 31 *rabi* sorghum genotypes over three *rabi* environments.

MATERIALS AND METHODS

The study comprised of 31 *rabi* sorghum genotypes of northern Karnataka representing locals from Gulbarga, Bidar, Dharwad and Bijapur and eight African Germplasm lines (from ICRISAT). The experiments were carried out under three *rabi* environments viz., *rabi* 1990-91 and 1991-92 at ARS Dharwad Farm and *rabi* 1991-92 at MRS Dharwad. The experiments were conducted in RBD with three replications, wherein each genotype was grown in two lines of 4 m length, with the spacing of 45 cm x 15 cm. Recommended package of practices was followed. Two of the five plants randomly selected in each of the replications for recording observations were used for estimation of grain nitrogen using Micro-kjeldahl method and a factor of 6.25 was used to calculate crude protein content of grain (AOAC, 1975). The means of each environment were used to estimate stability parameters viz., mean (X), regression coefficient (b_i) and mean square deviation (S^2d_i) to assess the stability of the trait, following the Eberhart and Russell (1966) model.

RESULTS AND DISCUSSION

Study on G x E interaction leads to successful evaluation of stable genotypes, which could be used further in breeding programmes. The linear slope is considered as a measure of stability. Eberhart and Russell (1966) emphasised the need of considering both linear (b_i) and non-linear (S^2d_i) components of genotype-environment interaction in judging stability of genotypes. Breeze (1969) advocated that linear regression could only simply be regarded as a measure of response of a particular genotype, whereas the deviation around the regression line is considered as measure of stability, the least deviating genotypes being the most stable. Accordingly it could be possible to judge the stability of protein content of different genotypes under the study.

The mean sum of squares as revealed by the ratio of MS1/MS2 (MS due to variety/MS due to remainder) was significant (Table-1) indicating considerable differences among the mean values. Significant differences due to environments (joint

Table 1. G x E anova for grain protein content

Source	df	F-value	Sig.
Genotypes	30	2.242	**
Env. (Joint interaction)	2	331.212	**
Env. x Genotype	60	1.270	**
Heterogeneity from regression	30	1.150	**
Remainder	30	1.386	**
Error	180	0.898	*

* and ** Significant at 5% and 1% levels, respectively.

regression) indicated adequate heterogeneity among the environments and their suitability for evaluating the genotypes. Kambal and Mahmoud (1978) reported the variety x site and variety x year interactions were highly significant for grain yield for 16 varieties grown at three sites. Similar results of genotype and environment interaction being highly significant for grain yield was reported by Desai *et al.* (1979) and Saxena and Dabholkar (1982).

The variety E 36-1, Afzalpur local and AGP-289 proved to be more stable with their average responses (b_i=0.94, 1.106 and 1.18 respectively) and least deviations around the regression (S^2d_i=-0.387, 0.101 and 0.29 respectively) with significantly higher grain protein content (14.18%, 13.78% and 13.99% respectively) than experimental mean (12.896%). The genotypes RJ-16, SPV-488 and Bhogapur local were found to be more suitable to high yielding conditions, since their b-values were high (>1.3) with more than 13.45 per cent grain protein content (Table-2).

Table 2. Stability parameters for grain protein content in *rabi* sorghum

Sl No.	Varieties	Mean	S^2d_i	b_i
1	AGP-182	11.97	-0.083	0.685
2	AGP-246	11.50	-0.370	0.650
3	AGP-289	13.99	0.291	1.183
4	AGP-344	11 74	0.681	0.846
5	AGP-436	13.40	7.403*	0.912
6	AGP-443	14.03	0.158	1.232
7	AGP-456	12.04	-0.422	0.867*
8	AGP-457	13.95	0.242	0.710
9	A-1	12.51	1.963	0.779
10	H-1	12.62	1.610	1.116
11	M 35-1	11.76	1.468	1.025
12	E 36-1.	14.18	-0.387	0.940
13	SPV-488	13.74	0.925	1.442
14	SPV-913	12.64	-0.329	0.789
15	M 148-138	11.08	1.716	0.778
16	Afzalpur local	13.75	0.181	1.106
17	Devadurga local	12.28	5.590*	1.028
18	GRS-1	12.90	4.221	0.871
19	Bilegund	13.22	0.035	0.621
20	Basavanapada	12.36	-0.240	1.062
21	Bhogapur local	13.45	0.134	1.351
22	NM-6	11.74	-0.289	0.700
23	Nagai maldandi	13.98	1.131	0.805
24	5-4-1	12.78	-0.423	1.184*
25	Phul mallige	12.94	-0.289	1.220
26	Kempgund	13.04	0.845	1.151
27	RJ-14	13.92	1.341	1.141
28	RJ-16	13.84	-0.132	1.468
29	RJ-12	13.05	-0.421	1.017
30	SPV-86	12.28	1.635	1.111
31	CSH-12R	13.12	0.230	1.215

Grand mean = 12.896

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