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Short Communication

Stability for grain yield in sorghum [*Sorghum bicolor* (L.) Moench]

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Sorghum [*Sorghum bicolor* (L.) Moench] an important staple food crop in many parts of the world, is grown under widely different edaphic and environmental conditions. Especially the resource poor farmers of Rajasthan hardly applies fertilizers and follow agronomic practices including row spacing. Moreover, the harsh and erratic environment of Rajasthan further adds to variation in the growing conditions of the crop. Thus, the stability for grain yield becomes an important consideration for any crop improvement programme in sorghum. Therefore, in the present study an attempt has been made to identify high yielding stable genotypes of sorghum.

The phenotypic stability of 107 genotypes of sorghum comprising of 3 females, 25 males, their 75 hybrids and four checks was studied for grain yield, stover yield and other related traits under four environments. The experiment was laid out in a randomized block design with three replications in four environments. The four environments consisted of two spacings (45 × 15 and 30 × 7.5 cm) and two nitrogen levels (80 and 40 kg/ ha). Components of G x E interaction and stability parameters were computed following Eberhart and Russell model [1].

Analysis of variance revealed significant differences among environments, indicating adequate heterogeneity of environments and their suitability for evaluating the genotypes. The mean sum squares for genotypes was also significant over the environments, revealing presence of genetic variability among genotypes. The G × E interaction was significant for days to flowering, days to maturity, stem girth, flag leaf area, fourth leaf area, stover yield per plant, test weight, harvest index and grain yield per plant indicating differential response of genotypes in varying environments for these traits. The partitioning of G × E interaction in linear and non-linear component revealed significant difference in linear component for all the above nine traits. Whereas, pooled deviation (non-linear) was significant for days to flowering, days to maturity, stem girth, fourth leaf area and harvest index. Similar results have also been reported in sorghum [2, 3].

A perusal of stability parameters for grain yield per plant indicated that out of seventy five hybrids, 17 hybrids exhibited significantly superior grain yield per plant than the best parent/check (Table 1). All these hybrids also exhibited non-significant S2di, indicating their predictable performance. Out of the seventeen hybrids, 9 hybrids *viz.*, AKMS-14A × SU-934, AKMS-14A × SU-913, SUMS-IA × SU-678, AKMS-14A × SU-912, AKMS-14A × SU-905, AKMS-14A × SU-888, AKMS-14A × SU-893, AKMS-14A × SU-556 and SUMS-1A × SU-893 were average performer i.e. bi around unity (bi ≈ I) (Table 1). These hybrids therefore can be considered as suitable and will provide stable performance under different environmental conditions for higher grain yield per plant.

With respect to component traits, out of nine hybrids which exhibited high per se performance, non-significant S2di and regression coefficient around unity for grain yield, only two hybrids *viz.*, AKMS-14A × SU-888 and AKMS-14A × SU-913 also exhibited stable performance for test weight. However, none of the hybrids showed high per se and stable performance for other trait under study. Similar results have been reported in the past by other workers [2, 3]. Nevertheless, experiment has resulted into identification of certain hybrids yielding higher than checks and having stable performance over environments.

References

1. **Eberhart S. A. and Russell W. A.** 1966. Stability parameters for comparing varieties. Crop Sci., **16**: 36-40.
2. **Muppidathi N., Subbaraman N., Muthuvel P. and Rajarathiman S.** 1995. Phenotypic stability for yield and its components in grain sorghum [*Sorghum bicolor* (L.) Moench]. Madras Agric. J., **82**: 18-21.

Table 1. Abstract table of promising and stable hybrids for grain yield per plant in sorghum

S.No.	Hybrids	Stability parameters		
		Mean (g)	bi	S^2di
1.	SUMS-1A × SU-923	94.21	1.39+**	0.375
2.	AKMS-14A × SU-934	89.13	0.90**	–9.298
3.	SUMS-1A × SU-885	87.97	1.79+**	9.215
4.	AKMS-14A × SU-913	86.50	1.05**	–10.826
5.	SUMS-1A × SU-678	86.28	0.88**	–6.229
6.	AKMS-14A × SU-912	85.97	0.84**	–10.721
7.	AKMS-14A × SU-905	85.77	0.92**	–4.054
8.	AKMS-14A × SU-923	85.74	1.81++**	–8.810
9.	AKMS-14A × SU-915	85.18	1.53++**	–8.708
10.	AKMS-14A × SU-888	83.98	0.81*	10.134
11.	AKMS-14A × SU-906	83.62	1.44++**	–9.492
12.	SUMS-1A × SU-912	82.43	1.81++**	–10.014
13.	SUMS-1A × SU-941	81.85	1.24++**	–11.680
14.	AKMS-1A × SU-893	81.19	0.66**	–10.225
15.	SUMS-1A × SU-934	80.72	1.84++**	1.003
16.	AKMS-14A × SU-556	80.68	1.11**	–8.133
17.	SUMS-1A × SU-893	79.89	1.26**	4.095

*, + &**,++ bi is significantly deviating from 0 and 1 at 5% and 1% level of significance, respectively.

3. **Muppidathi N., Paramasivam K., Sivaswamy N., Rajarathinam S., Ramalingam A. and Ravikasevan R.** 1999. Stability analysis for grain yield and its component in grain sorghum [*Sorghum bicolor* (L.) Moench]. Madras Agric. J., **86**: 242-246.