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PHENOTYPIC STABILITY IN FOXTAIL MILLET (*SETARIA ITALICA* L.)

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ABSTRACT

Thirty genotypes of foxtail millet were tested in four different environments. The results were analysed on the basis of stability parameters for days to flowering, maturity and plant height. Highly significant mean squares were observed for genotypes, genotype x environment and environment (linear). CZS-5 and SN-6 were the most stable genotypes with respect to flowering, SN-27 was highly stable for maturity, and SIC-9 for plant height. It indicates that there is no correlation among these parameters.

Key words: Foxtail millet, *Setaria italica*, phenotypic stability.

Assessment of genotype x environment interaction is assuming importance in crop breeding programmes for evaluating varieties for their adaptability. The basic information on this important minor millet is limited. Therefore, the present study is an attempt to evaluate 30 genotypes of *Setaria italica* L. in four different environments for their stability.

MATERIALS AND METHODS

The experimental material comprised 30 genetically diverse genotypes of foxtail millet, collected from different sources, were grown under four environments. The experiment was conducted in randomized block design with three replications at Udaipur during 1985 and 1986. Each plot had two rows of 4 m length with row-to-row and plant-to-plant distances 22.5 and 5 cm; observations were recorded for days to flowering, days to maturity, and plant height. Analysis was carried out as suggested by Eberhart and Russell [1].

RESULTS AND DISCUSSION

Pooled analysis of variance clearly indicated highly significant mean differences between genotypes for all the characters, revealing the presence of sufficient genetic

variability (Table 1). The significant E+ (G x E) interaction, indicated that these metric traits to be unstable. The mean squares due to environment (linear) were highly significant and exhibited differences between environments. Linear and nonlinear components were present in G x E interactions. However, the predictable component was nonsignificant and unpredictable component was significant for all the characters. Tyagi et al. [2] also reported significant nonlinear component of G x E interaction for one or other grain yield attributes.

Table 1. Pooled analysis of variance for different characters in foxtail millet

Source	d.f.	Mean sum of squares		
		days to flowering	days to maturity	plant height
Genotypes (G)	29	110.1**	163.0**	359.7**
Environment + (G x E)	90	52.1**	52.0**	156.6**
Environment (linear) (E)	1	3778.1**	2745.8**	5327.2**
Genotype x environment (linear)	29	7.9	16.3	83.7
Pooled deviation	60	11.4**	24.3**	105.7**
Pooled error	232	3.0	3.9	8.5

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

The mean performance ($\overline{X}$), regression coefficient (bi), and deviation from regression (S^2di), components of G x E interactions for 30 genotypes are presented in Table 2.

On the basis of individual parameters of stability ($\overline{X}$, bi and S^2di), it is evident that the genotypes CZS-5 and SN-6 had early flowering with average responsiveness and least deviation. Therefore, these cultivars might flower earlier in average environment. The linear component was nonsignificant, whereas the nonlinear component was significant for few genotypes. These results indicate that a major part of G x E interaction was made of nonlinear component and prediction of performance was not possible for this trait. These results are in agreement with those of Nwasike and Abed [3].

The genotypes SIA-2574, SIA-1140, TNAU-46 and TNAU-81 had high mean ($B < 1$) and nonsignificant S^2di, and therefore might show prolonged maturation under poor environment. Some genotypes showed significant S^2di, revealed instability, and fluctuated with change in the environments. The genotype SN-27 could be a good donor parent of stability in crosses with genotypes which are high yielders but late in maturity.

Taking all the parameters of stability into account, 17 genotypes had greater plant height as compared to population mean ($\overline{X}$=117.62). The highest plant height was recorded in SIA-2566 (131.7 cm). The variety Chitra had average linear response and nonsignificant S^2di, indicating wider adaptability under average environments. Three lines, S-102, SIC-24 and SIC-27, may grow tall in favourable environments, while SIA-1135, CZS-46, T-43 and SN-6 are likely to have dwarf plants in poor environment.

Table 2. Stability parameters for days to flowering, days to maturity and plant height in foxtail millet

Genotypes	Days to flowering			Days to maturity			Plant height, cm		
	$\bar{X}$	bi	S^2_{di}	$\bar{X}$	bi	S^2_{di}	$\bar{X}$	bi	S^2_{di}
SIA-2574	58.1	0.62	–0.71	91.4	0.00	0.86	123.2	0.35	–0.11
Chitra	59.9	1.57	1.22	95.7	1.02	1.24	121.8	1.06	0.81
SIA-2573	60.2	0.95	0.05	91.4	0.89	19.93**	119.8	0.54	5.04
SIA-1142	58.1	0.80	0.54	91.8	0.73	0.90	122.9	0.43	2.38
S-102	48.7	1.34	2.88*	79.6	1.56	–1.45	104.6	2.11	3.49
SIA-2571	55.7	0.88	37.38**	88.2	0.29	19.97**	129.6	0.46	–0.12
SIC-24	49.6	1.14	43.65**	84.8	0.92	16.43**	116.9	1.33	3.01
SIA-1135	49.3	0.80	1.48	79.3	1.30	–1.21	109.6	0.10	0.90
SIC-23	46.5	0.63	3.61*	78.2	1.91	5.09	99.4	2.02	19.35**
CZS-5	46.2	1.03	3.54	77.6	1.47	3.03	104.5	0.45	8.76*
SIC-27	58.2	0.94	–0.21	90.1	0.87	34.29**	128.0	1.54	6.39
SIC-8	60.7	0.84	1.73	92.7	0.37	1.32**	125.7	1.30	5.81*
SIA-2566	60.0	0.78	1.13	92.2	1.06	31.94**	131.7	1.07	5.71
SIC-9	58.8	1.08	0.77	92.2	0.47	4.54*	114.8	1.08	2.03
TNAU-46	55.5	1.35	0.79	95.2	0.90	0.86	130.5	0.09	12.00**
K-221-1	55.1	1.25	72.31**	93.3	1.41	100.68**	130.8	1.87	8.02**
SIC-4	53.9	1.28	17.03**	90.8	1.04	1.50	127.9	1.55	109.78**
TNAU-81	58.1	1.04	1.12	95.2	0.91	2.80	118.6	0.89	9.52*
BS-3	58.8	1.44	0.77	86.1	0.78	80.77**	126.2	0.05	–0.01
CZS-46	49.9	0.80	4.67**	82.9	0.67	140.93**	117.2	0.87	–2.12
RAU-7	52.2	1.39	9.53**	79.5	1.66	0.17	111.1	1.25	126.57**
SIC-1	59.7	0.70	5.72**	91.2	0.56	30.41**	119.7	1.75	103.38**
SIA-2567	58.9	0.84	2.88**	90.3	0.74	17.38**	128.3	0.74	–1.20
TNAU-57	60.6	0.80	0.92	94.2	1.04	11.90**	120.8	2.06	23.79**
TNAU-43	58.8	0.90	2.238**	90.0	1.29	92.64	110.5	1.46	8.28**
T-43	49.6	0.83	3.23*	81.2	1.22	51.05**	112.6	–0.18	–0.94
SN-80	47.3	1.12	3.00*	78.0	1.34	1.15	105.6	0.44	39.92**
SN-6	47.7	0.99	1.26	78.2	1.31	–0.68	105.9	0.25	0.67
SN-27	47.2	0.89	9.80**	79.5	1.02	1.33	107.9	1.30	2.08
SN-60	47.2	0.86	3.48*	79.4	1.12	3.87	109.0	0.66	17.08**

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

REFERENCES

1. S. A. Eberhart and W. A. Russell. 1966. Stability parameters for comparing varieties. Crop Sci., 6: 36–40.
2. C. S. Tyagi, R. S. Paroda and S. Lal. 1979. Genotype x environment interaction for tiller and ear number and ear length in pearl millet. Crop Improv., 6: 110–119.
3. C. C. Nwasike and S. M. Abed. 1981. Variety x environment interaction in pearl millet. Z. Pflanzenzuchtg., 87: 133–138.