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PHENOTYPIC STABILITY IN MUNGBEAN

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ABSTRACT

Ten promising genotypes of mungbean were evaluated for yield and its components for three years. Genotype x environment component was significant for all the characters studied indicating the genotypes had divergent linear response to environmental changes. Non-predictable component of clusters per plant and predictable component (linear) for grain yield indicated that the genotypes responded non-linearly to the change of environments. Stability parameters revealed that among the genotypes studied, Co 4 exhibited high mean grain yield, number of clusters per plant, length of pod and number of seeds.

KEY WORDS : Mungbean, Interaction, Linear Response, Stability.

It is necessary to screen and identify phenotypically stable genotypes which could perform more or less uniformly under different environmental conditions. Therefore, data on grain yield and its components obtained on ten promising lines of mungbean were subjected to stability analysis to obtain information on genotypes x environment interaction.

MATERIALS AND METHODS

Ten promising genotypes of mungbean were evaluated from 1986-87 to 1988-89 in a randomised block design with three replications at the Regional Research Station, Kovilangulam, Tamil Nadu. Observations were recorded on five randomly selected plants in each cultivar and in each replication for number of clusters per plant, number of pods per cluster, length of pod, number of seeds per pod and grain yield per hectare. Phenotypic stability was estimated according to Eberhart and Russell (1966).

RESULTS AND DISCUSSION

The analysis of variance for phenotypic stability is presented in Table 1. The sum of squares due to genotypes were significant for all the characters except number of clusters per plant indicating that the genotypes were diverse in nature except for number of clusters (Deswal and Sangwan, 1985). The mean sum of squares due to environment were non-significant for grain yield. It elucidates that influence of the environment over genotypes for grain yield was in lesser extent whereas years influenced widely the performance of other characters.

The genotypes x environment component was significant for all the characters studied. This indicated that the genotypes had divergent linear

Table 1. Stability analysis of variance for phenotypic stability in respect of yield and yield components.

Source	df	Mean sum of squares				
		Grain yield	Number of clusters per plant	Number of pods per cluster	Length of pod	Number of seeds per pod
Genotypes (G)	9	61058.492**	2.363	0.3867**	0.332**	0.432**
Environment (E)	2	11054.393	9.920**	1.130**	4.500**	2.970**
Genotype & Environment	18	2336912.100**	100.040**	64.300**	158.540**	400.857**
Envi + (G x E)	20	37136.499	1.9027	0.523	0.781	0.586
Environment (Linear)	1	5997.830	19.840**	1.740**	8.390**	4.820**
Genotype x Envi (Linear)	9	26391.597	0.850	0.598	0.307	0.160
Pooled deviation	10	50820.780**	1.060	0.333**	0.447**	0.546**
Pooled error	60	4124.390	1.230	0.097	0.033	0.070

*, ** Significant at 5 per cent and 1 per cent levels respectively.

Table 2. Stability parameters of yield and yield components

Genotypes	Grain yield			No. of clusters per plant			No. of pods per cluster			Length per pod			No. of seeds per pod		
	$\overline{X}$	b	Sd^2	$\overline{X}$	b	Sd^2	$\overline{X}$	b	Sd^2	$\overline{X}$	b	Sd^2	$\overline{X}$	b	Sd^2
NPRG.1	871.8	-0.1389	14207.569*	5.0	1.4013	11.768**	5.2	1.6807	0.401*	7.2	1.7312	0.196**	10.5	0.9611	0.422*
NPRG.2	778.1	5.9597	56235.607**	5.2	1.1191*	-1.254	5.3	1.6807	0.188	6.9	-0.3087	0.264**	10.5	1.6185	0.616**
NPRG.3	825.5	11.3908*	9429.598*	4.6	0.8973	1.283	4.5	0.4865	-0.027	7.1	1.7422	0.604**	10.9	-0.2023	0.166
Sel.11	749.0	-4.9219	18836.753*	4.8	0.1462	-0.416	5.6	2.2114	0.241	7.1	1.0806	0.118*	10.8	0.0674	0.134
Sel.13	863.6	-8.9318	3737704.80**	5.3	0.9023	-1.248	4.9	-1.5038**	-0.232	6.6	1.0255	0.103*	11.2	1.3826	0.416*
KM.2	892.4	8.1250	12326.061	6.2	1.6534	0.224	4.8	0.6067	0.347*	6.2	-0.0441	0.315	11.1	0.3372	0.349*
Pusa 103	871.4	-5.8920	52172.694**	5.6	2.0970*	-0.854	5.1	3.9363*	0.403*	6.8	1.5106	0.947*	10.4	1.1128	0.536**
Pusa 104	762.8	-0.8654	12771.991*	5.2	0.7460	-1.144	4.7	0.2211	1.169**	6.6	1.0365	0.382**	11.3	0.6744	0.620**
Co 4	975.8	3.1685	3113237.401**	7.1	1.1342	6.108*	5.0	-0.4423	1.136**	7.3	0.7608	0.092*	11.4	0.4215	1.151**
T 44	447.2	1.9608	39700.528**	3.8	0.0958**	-1.072	4.4	-1.4153**	-0.226	6.6	0.0992	1.108**	11.3	1.7535	0.346*
Mean	803.8			5.3			4.9			6.9			9.8		
S.E. (M)	159.4			0.72	0.730		0.40	1.2136		0.47	0.7021		0.52	0.9630	

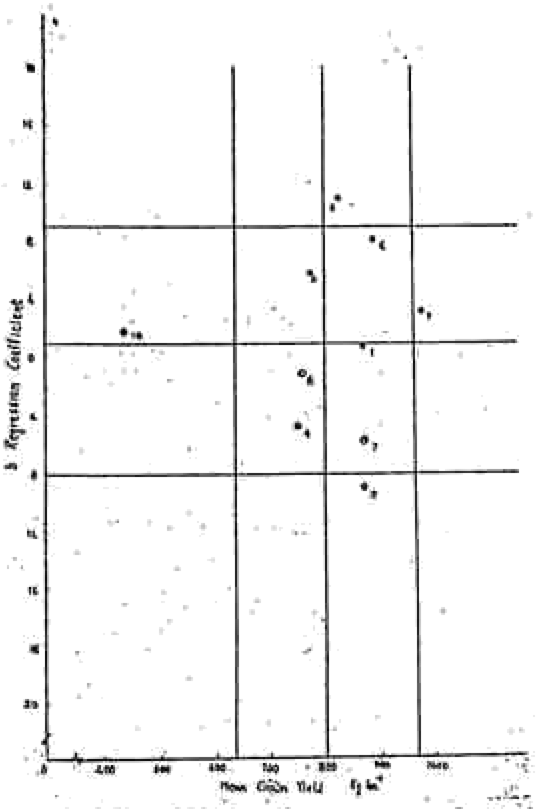

Fig. 1 **Stability of 10 Mung bean genotypes for grain yield kg^{-1}**

response to environmental changes. The pooled deviation was highly significant for all the characters studied except number of clusters per plant indicating that the response of genotypes taken for this study was not predictable and non-linear component played an important role in the development of these characters under dry land conditions. Bhatade and Bhale (1983) and Kandasamy *et al.* (1985) reported similar results in cotton and cowpea respectively. Non predictable component of clusters per plant and predictable component (linear) for grain yield indicated that the genotypes responded non linearly to the change of environments.

The mean performance (x), the regression coefficient (b) and the deviation mean square (Sd^{-2}) for different characters are presented in Table 2. The stability parameters of KM2, NPRG.1 and 2, Pusa 103 and 104 and Sel.11 (Fig.1) revealed that they were stable for grain yield. They were less sensitive to environmental changes. The entry NPRG 3 is suitable for favourable environment whereas Sel.13 is suitable for unfavourable environments.

Co 4 recorded the highest grain yield (975 kg/ha). The regression co-efficient did not significantly deviate from unity indicating that entry Co 4 does not show any response to change of environment. But its stability parameter (Sd^{-2}) revealed that it is suitable for favourable environments. For number of clusters per plant, considering the stability parameters (b), Sd^{-2}, the entries NPRG 2 and Se113 were stable for change of environments. The high and significant 'b' value suggested that entry Pusa 103 is highly suitable for favourable environment. The remaining entries NPRG 1 and 3, Sel.11, KM 2, Pusa 104, Co 4 and T-44 were suitable for unfavourable environments. With regard to pods per cluster, the entries showed stability for change of environments. The stability parameters (b) Sd^{-2}, revealed that the entries NPRG 1 and 2, Sel 11 and Pusa 103 produced more number of pods per cluster under favourable environmental conditions. The remaining entries produced high number of pods under unfavourable environments.

For length of pod, the entries namely NPRG 1 and 3 and Pusa 103 had b>1 value and significant Sd^{-2} value suggested that the expression of length of pod will be maximum under favourable environments. The other remaining entries expressed well for length of pod in unfavourable environments. The entries Co.4, NPRG 1 and 2 Se.13 produced more number of seeds per pod under favourable environmental conditions. The remaining entries NPRG 3, Sel.11, KM2, Pusa 103 and 104 produced more number of seeds under unfavourable environments. Among the genotypes, Co.4 exhibited high mean grain yield, number of clusters per plant, length of pod and number of seeds. KM2 was less affected for grain yield across the environments.

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