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Stability for seed yield and its components in mungbean [*Vigna radiata* (L.) Wilczek]

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Twelve genotypes of mungbean [*Vigna radiata* (L.) Wilczek] were evaluated for seven quantitative traits in three environments. Genotype x Environment interaction was found significant for all the traits. The major portion of G x E interaction was due to the linear component. Hence, the prediction of genotypic performance could be possible over environments. The genotypes TARM 18, PM 9377 and Vaibhav were found high yielding, responsive with non significant deviation mean square for most of the yield traits.

Keywords: Mungbean, Stability analysis, G x E interaction.

INTRODUCTION

Among pulses, mungbean has an important place as it contains more digestible protein than the other pulses alongwith a reasonably good yield. Mungbean is traditionally grown under diverse climatic conditions. One of the major factors responsible for low yield is lack of stability in yield as compared to cereal crops. Therefore, a study of genotype x environment interaction and stability of genotypes for yield and its components is essential to the breeders. In view of the scanty information available in mungbean, efforts were made to ascertain whether genotypes differ in their response to environment, and exhibit stability for yield and yield components.

MATERIALS AND METHODS

Twelve genotypes of mungbean were evaluated during *kharif* 2002. These genotypes were sown on three different sowing dates *viz*., 5th June, 20th June and 5th July in randomized block design with three replications. Each genotype was represented by eight rows of 4 metre long and 30 cm apart. Data were recorded on 5 random plants from each plot for days to 50 percent flowering, days to maturity, plant height (cm), pod clusters per plant, pods per plant, seeds per pod, 100 seed weight (g) and yield per plot (g). The data were subjected to stability analysis using the model of Eberhart and Russell (1966).

RESULTS AND DISCUSSION

The analysis of variance for stability (Table 1) revealed significant difference among genotypes for all characters. The significance of mean squares due to environments indicated variability among the environments. The significance of mean squares due to G x E for all the traits indicated that the genotypes interacted significantly with the environments. In case linear and non linear components of G x E interaction the magnitude of the former was higher that the latter for most of the traits. This showed that the prediction of the genotypic performance over the environments was possible for these traits. Similar results regarding seed yield in mungbean and mothbean were reported by Gupta *et al.* (19991), Pathak *et al.* (1990) and Henery and Daulay (1983).

The three parameters of stability namely (xi), regression coefficient (bi) and deviation from the regression (S^2di) have been presented in Table 2. TARM 18 gave the highest seed yield followed by PM 9377, BM 4, Vaibhav and PM 2. However PM 2 and BM 4 were unstable having significant S^2di value (Fig.1). Genotypes Vaibhav and TARM 18 were found below average (bi<1) and above average (bi>1) stable and hence were suitable for growing under poor and rich environmental conditions, respectively. Out of highest yielding genotypes only PM 9377 was found average stable and suitable for varied environmental conditions.

For 100 seed weight genotype, AKM 8802 and PM 9341 showed higher seed weight, above average response with non-significant deviation mean square and hence were specifically suitable for favourable environments. PM 9376 which recorded highest seed weight was found below average stable with bi<1 and non significant S^2di, suitable for poor environment. Whereas PM 9357 and

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Table 1. Analysis of variance (Mean squares) for stability for seven quantitative traits in mungbean

Source	d.f.	Seed yield per plot (g)	100 seed weight (g)	Seeds per pod	Pod clusters per plant	Pods per plant	Plant Height (cm)	Days to maturity
Genotype	11	$54653.64^{++@@}$	$0.99^{++@@}$	$0.27^{+@}$	$1.00^{++@@}$	$16.69^{++@@}$	72.08^{+}	$7.27^{++@@}$
Environment (E)	2	$92965.34^{@@}$	$2.34^{++@@}$	0.48^{+}	$5.86^{++@@}$	$62.63^{++@@}$	$1193.52^{++@@}$	$0.99^{@}$
G x E	22	6804.86**	$0.04^{**@@}$	0.13**	0.13**	2.75**	25.83**	0.45**
E + (G x E)	24	13984.89	0.23	0.15	0.61	7.74	123.14	0.49
Env (linear)	1	$85930.67^{@@}$	$4.68^{@@}$	$0.97^{@}$	$11.72^{@@}$	$125.26^{@@}$	$2387.05^{@@}$	$1.99^{@}$
G x E (linear)	11	8738.299	0.07	0.90	0.15	2.58	20.46	0.62
Pooled deviation	12	4465.47**	0.01	0.15**	0.11**	2.68**	28.59**	0.25
Pooled error	66	488.72	0.01	0.04	0.02	0.07	1.77	0.20

+,++ = Significant at 5% and 1% level respectively against the G x E interaction.
@,@@ = Significant at 5% and 1% level respectively against the pooled deviation.
*** = Significant at 5% and 1% level respectively against the pooled error.

Table 2: Estimates of stability parameters for quantitative characters in mungbean

Sr. No.	Genotype	Seed yield per plot (g)			100 seed weight (g)			Seeds per pod			Pod clusters per plant		
		Mean	bi	S^2di	Mean	bi	S^2di	Mean	bi	S^2di	Mean	bi	S^2di
A	Vaibhav	457.55	0.197*	-204.678	3.45	0.866	0.028	12.00	0.442	0.082	5.66	0.90	-0.011
B	TARM 18	705.55	1.698*	-348.439	3.00	0.519*	0.005	11.75	2.653*	0.067	6.46	0.54	0.018
C	PM 2	437.11	-0.068*	22766.453**	3.23	0.947	-0.010	11.66	1.086	-0.033	5.37	1.24	0.073
D	AKM8802	301.77	1.135	10.101	3.95	1.396*	-0.010	12.02	1.126	-0.037	4.53	1.63*	0.059
E	PM 9341	344.44	1.087	484.204	4.51	2.153*	0.005	12.20	0.548	-0.007	4.82	0.90	0.077
F	BPMR 145	287.33	1.108	8465.269**	3.99	0.867	0.007	11.46	-0.326	-0.044	4.84	0.60*	0.425**
G	PM 9357	297.77	0.673	6008.795**	4.26	1.006	-0.009	11.75	-0.935*	0.110	4.86	1.18	0.009
H	BM 4	498.44	-0.079*	9763.577**	3.02	0.628*	-0.009	11.51	0.605	0.391**	5.04	0.40*	0.112*
I	PM 9377	559.22	1.195	-408.179	3.07	0.811*	-0.001	11.86	1.629	-0.018	6.02	0.65	0.268**
J	Kopergaon	283.55	2.035*	887.001	3.45	0.783*	0.003	11.31	2.132	0.126	4.73	1.24	-0.012
K	PM 9378	278.33	2.214*	142.489	3.50	1.204*	-0.010	12.26	2.273	0.348**	4.93	1.31	-0.024
L	PM 9376	344.66	0.804	225.562	4.60	0.822*	-0.006	11.53	0.773	0.343**	5.22	1.37*	0.019
	Mean	399.6			3.67			11.77			5.21		
	S.E. ±	47.3	0.5		0.06	0.15		0.27	1.38		0.23	0.33	

Table 2 : Contd..............

Sr. No.	Genotype	Pods per plant			Plant height (cm)			Days to maturity		
		Mean	bi	S^2di	Mean	bi	S^2di	Mean	bi	S^2di
A	Vaibhav	19.60	0.159*	2.646**	65.93	0.674	59.47**	68.44	-0.668*	-0.201
B	TARM 18	20.73	0.896	0.751**	57.66	0.836	115.16**	65.11	-1.668*	-0.146
C	PM 2	17.77	1.348	0.132	67.86	1.024	0.820	66.88	3.660*	1.189*
D	AKM8802	14.04	1.216	0.075	56.73	1.444*	52.10**	65.33	-1.001*	-0.145
E	PM 9341	16.20	0.744	1.862**	69.13	0.939	-1.57	68.55	-1.334*	0.021
F	BPMR 145	15.20	0.620	4.713**	67.11	1.312	4.23	68.88	3.666*	-0.144
G	PM 9357	15.28	1.408	0.607**	62.68	0.556*	8.55*	68.55	2.666	0.023
H	BM 4	19.04	1.380	0.533*	62.65	1.334	9.36*	66.00	0.999	-0.145
I	PM 9377	20.62	0.233*	1.935**	64.73	0.500*	28.20**	65.33	0.999	-0.145
J	Kopergaon	14.93	1.810*	8.421**	55.00	1.277	-0.76	65.22	2.666*	-0.200
K	PM 9378	16.60	0.931	1.195**	69.75	1.223	44.98**	68.66	1.999	0.689*
L	PM 9376	15.33	1.256	8.382**	62.82	0.882	-1.85	67.33	0.001	-0.201
	Mean	17.11			63.50			67.02		
	S.E. ±	1.15	0.50		3.78	0.37		0.35	1.22	

*, ** = Significant at 5% and 1% level respectively.

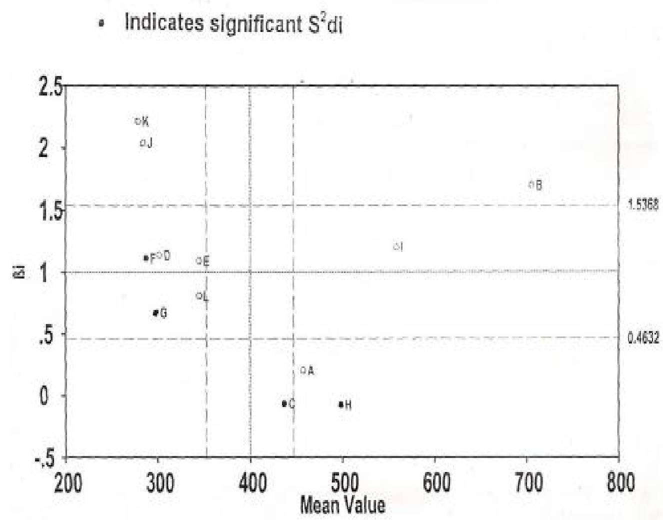

Fig. 1 : Relation os Seed yield per plot and stability

BPMR 145 possessed high mean, unit regression and non significant S^2di and were thus ideally stable genotypes for this trait. TARM 18, PM 9377 and Vaibhav which were having non significant deviations M.S. for yield, also were so for number of seeds per pod. TARM 18 was found above average stable (bi>1). However, genotypes PM 9377, Vaibhav, Pm 9341 and AKM 8802 were found stable for this trait. For pods per plant most of the genotypes were found unstable due to significant S^2di. Only two genotypes, PM 2 and AKM 8802 were found stable for number of pods per plant. The genotypes TARM 18 and Vaibhav were found average stable for the pod clusters per plant with unit regression and non significant S^2di. However, PM 9377 with high number pod clusters was found unstable. Genotypes Kopergaon and PM 9376 recorded lesser plant height, unit regression coefficient (bi=1.00) and non significant S^2di value. These genotypes were suitable for wider adaptation. PM 9377 and BM 4 took minimum time in maturity, unit regression and least deviations from regression and hence were considered to be stable. However, TARM 18 and Kopergoan were found below average stable (bi<1) and above average stable (bi>1) for this trait, respectively.

Present study revealed that the major portion of genotype x environment interaction was attributed to linear component for most of the traits indicating thereby prediction on genotype performance in different environments was possible. The stability parameters indicated that the genotypes TARM 18, PM 9377 and Vaibhav were found high yielding, responsive with non significant deviation mean square for most of the yield traits. These genotypes may be exploited for evolving high yielding and stable genotypes of mungbean.

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