Journal of Crop and Weed, 5(1):174-177 (2009)

Performance of some elite mungbean [*Vigna radiata* (L.) Wilczek] mutant families in M_7 generation

K. K. SARKAR, A. MAJI AND S. S. ROY

Department of Plant Breeding, Faculty of Agriculture
Bidhan Chandra Krishi Viswavidyalaya
Mohanpur-241252, Nadia, West Bengal

ABSTRACT

Gamma ray induced suspected variants from M_6 generation of mungbean cv. K851 were evaluated for yield and its attributing traits with estimation for different genetic parameters. Eleven mutant families along with control were considered in the present investigation. The different traits considered were plant height, number of branches per plant, days to first flowering, number of pods per plant, number of seeds per pod, pod length, pod breadth, test weight, harvest index and yield per plant for evaluation of mutant families. Different genotypic parameters like, heritability, genetic advance, phenotypic and genotypic coefficient of variation were also estimated to define the nature of genetic control over the traits. The experiment was laid out in RBD design with three replications during pre kharif 2007. Most of the treatments except, number of branches per plant showed little environmental influence. From the estimation genetic parameters it was found that number of pods per plant, harvest index and yield per plant were predominantly governed by additive gene effect whereas, other traits were controlled by either dominance or higher level of genetic interaction. Two highly yielding mutant families were identified with concomitant improvement for number of pods per plant and harvest index and these can be forwarded in further advanced generation to develop stable high yielding mutants.

Key words : Genetic gain, gammaray, munghen, mulation breeding and heritability

Mungbean [*Vigna radiata* (L.) Wilczek] is an important short duration protein rich pulse crop in India. Such an important crop received very little attention towards genetic improvement due to scarcity of genetic variability within the existing germplasm. Mutation breeding has been considered to increase genetic variability to support the space of genetic improvement in this crop (Malik, 1988). Considerable evidences are there for induction of mutation in quantitative traits and significant genetic gain obtained through selection. In the present investigation, an attempt had been made to broaden variation spectrum through gamma ray irradiation. The irradiated materials were advanced upto M_3 generation for identification of some desirable variants which were successively forwarded to M_6 generation and eleven most elite families were considered for evaluation in M_7 generation in respect of yield and yield attributing traits. The performance of two families (S_4 (1) and S_8) was found to be most outstanding for yield as well as for harvest index and number of pods per plant.

MATERIALS AND METHODS

The eleven different families considered for evaluation in M_7 generation were showed in table 1 with their desirable traits. The different traits like, plant height (cm), number of branches per plant, days to first flowering, number of pods per plant, number of seeds per pod, pod length (cm), pod breadth (cm), test weight (g), harvest index and yield per plant (g) were considered for evaluation and the experiment was laid out in RBD design with three replications in the *pre kharif* 2007. The date of planting of the crop was 21.03.2007 and standard cultural practices were followed. The data recording were done from 10 plants from each replication considering those eleven mutant families along with control and calculated their average value for each trait. The analysis was done following Al-jibouri (1958) and Singh and Chowdhury (1985).

RESULTS AND DISCUSSION

There is significant presence of variation for yield and its attributing traits. Mean performance of different genotypes for ten different characters were presented in the Table 3. Narrow range of difference between GCV and PCV were evident for all the traits except, number of branches per plant and this may be due to little environmental influence upon the traits and may provide ample scope for direct selection. Singh *et al*. (2001) studied the extent of genetic variation in the characteristic of mungbean cv. PS-16 following mutagenesis with gamma rays, EMS and epichlorohidrin and observed that estimates of genetic parameters showed higher values of phenotypic and genotypic coefficient of variation for number of pods per plant. A high heritability estimates in quantitative characters was found to be useful for suitable selection. High heritability accompanied by high genetic advance (Table 4) was observed for number of pods per plant, harvest index and yield per plant. Thus it can be suggested that the traits were predominantly controlled by additive gene action and simple pure line selection may favourably improve these trait. Khan (1987) observed genotypic coefficient of

variation and genetic advance for plant height, number of pods and total plant yield increased considerably in the bushy mutants. Whereas, other traits that had medium heritability with low genetic advance were considered to be influenced by higher level of gene interaction and care should be taken following complex breeding strategy like, population improvement method.

REFERENCES

Al-jibouri, H.A., Millar, P.A. and Robinson, H.F. 1958. Genotypic and environmental variances in and upland cotton cross of inter-specific origin. *Agron. J.*, **50:** 633-37

Khan, I. A. 1987. Effect of selection for improvement of quantitative characters in irradiated population of mungbean [*Vigna radiata*(L.) Wilczek]. *J. Nucler Agric. Biol.*, **16**: 5-8

Malik, I.A.1988. High yielding and early maturing mutants mungbean. *Mutation Breeding Newsletter*, **32:** 7-8

Singh, R.K. and Choudhury, B.D. 1985. Biometrical methods in Quantitative Genetic Analyses Kalyani Publishers, pp. 224-52.

Singh,G., Sareen,P.K., Sahran,R.P., Singh, A., Singh, G. and Singh, A. 2001. Induced variability in mungbean. *Indian J. Genet. Pl. Breed.*, **61**:281-82

Table 1: Selected probable mutants from M_6 (cv. K 851)

Sl. No.	Selection number used in M_7	Improvement in traits
1.	S_9 (2)	This parent shows reduced plant height compared to control and shows highly dense populated branches and early maturity and more number of pods per plant.
2.	S_9 (1)	Significantly decrease in plant height and increase in pod length.
3.	S_1 (1)	A significant decrease in plant height and increase in pod length.
4.	S_4 (1)	A significant increase in seed yields as compared to control.
5.	S_3 (1)	A significant decrease in plant height and increase in test weight.
6.	S_6 (1)	A significant increase in plant height and also in yield per plant.
7.	S_7 (1)	This parent shows synchronous maturity and tallest and erect type families among all the families under studied.
8.	S_3 (2)	Significant reduction in plant height and increase in number of number of branches per plant and early maturity.
9.	S_{10}	This parent shows a significant increase in number of branches per plant, number of pods per plant and 1000 seed weight as compared to control.
10.	S_8	A significant in harvest index and yield per plant.
11.	S_5 (1)	This parent shows a significantly decrease in plant height, sterility and high harvest index.

Table 3: Mean performance of eleven suspected gamma rays induced mutants of mung beam along with control (cv. K-851 in M_7 generation

Sl. No.	Genoptypes	Plant height (cm)	No. of branches plant	Days to flowering	No. of pods plant	No. of seeds pod	Pod length (cm)	Pod breadth (cm)	Test weight (g)	Harvest index	Yield plant (g)
1.	**S_1(1)**	58.17	2.22	43.67	45.27	11.37	7.97	0.47	42.55	31.68	21.89
2.	**S_4 (1)**	57.54	1.92	46.33	39.25	11.47	8.00	0.47	41.55	35.90	18.69
3.	**S_3 (1)**	55.77	2.32	46.67	46.92	11.97	8.10	0.46	40.10	37.82	22.55
4.	**S_9 (2)**	53.12	2.32	45.67	51.67	11.43	7.73	0.45	37.91	38.63	22.27
5.	**S_6 (1)**	60.25	1.75	46.00	34.53	11.87	7.47	0.46	36.71	30.69	15.09
6.	**S_7 (1)**	61.43	1.87	47.33	65.21	11.57	7.43	0.47	35.70	39.72	26.95
7.	**S_9 (1)**	55.14	1.96	43.67	49.08	11.20	7.43	0.46	36.76	34.25	20.21.
8.	**S_3 (2)**	56.18	2.42	44.33	45.17	11.77	7.83	0.46	38.44	33.61	21.15
9.	**S_{10}**	56.00	2.25	45.00	39.67	11.47	7.77	0.47	40.32	61.05	18.34
10.	**S_8**	58.53	2.47	43.67	46.00	11.63	7.63	0.45	35.18	35.38	18.85
11.	**S_5 (1)**	52.78	2.33	45.00	21.52	9.53	7.55	0.46	42.83	18.05	9.27
12.	**Control**	57.58	1.75	45.00	36.33	11.53	7.52	0.46	39.82	31.44	16.52
	CV	**1.669**	**12.883**	**1.560**	**9.648**	**2.885**	**2.457**	**1.736**	**5.042**	**9.209**	**10.012**
	SEm	**0.775**	**0.224**	**0.575**	**3.417**	**0.268**	**0.154**	**0.006**	**1.605**	**2.495**	**1.579**
	LSD (P=0.05)	**1.608**	**0.4649**	**1.194**	**7.088**	**0.557**	**0.320**	**0.013**	**3.329**	**5.175**	**3.274**

Table 2 : Analysis of variance for eleven probable mutants of mung beam (cv. K-851)along with the control in M_7 generation

Source of variance	d.f.	Plant height (cm)	No. of branches plant	Days to flowering	No. of pods plant	No. of seeds pod	Pod length (cm)	Pod breadth (cm)	Test weight (g)	Harvest index	Yield plant (g)
Replication	2	5.285	0.007	0.195	199.780	0.206	0.061	0.002	0.531	61.593	53.382
Treatment	11	20.142*	0.207*	4.573**	338.356**	1.175**	0.163**	N.S.	20.349**	96.148**	59.032**
Error	22	0.901	0.075	0.497	17.522	0.108	0.036	0.000	3.865	9.339	3.739

*, ** significant at P=0.05 and P=0.01 level, respectively. NS= Nonsignificant

Table 4 : Variability and genetic parameters in ten different characters of M_7 generation in many beam

Sl. No.	Characters	Grand Mean	Range	Variance		G.C.V.	P.C.V.	h^2	G. A.	G.A. as % of mean
				Genotype	Phenotype					
1.	Plant height (cm)	56.87	52.78 – 61.43	6.413	7.315	4.45	4.76	87.7	4.88	8.58
2.	No of branches / plant	2.13	1.75 – 2.47	0.044	0.119	9.85	16.22	36.9	0.26	12.20
3.	Days to flowering	45.19	43.67 – 46.47	1.358	1.855	2.58	3.01	73.2	2.05	4.53
4.	No of pods / plant	43.38	21.52 – 65.21	106.94	124.46	23.84	25.72	85.9	19.75	45.52
5.	No of seeds / pod	11.40	9.53 – 11.97	0.078	3.983	5.23	5.97	76.7	1.08	9.47
6.	Pod length (cm)	7.70	7.43 – 8.10	0.0425	0.0783	2.68	3.63	54.3	z0.31	4.02
7.	Pod breadth (cm)	0.46	0.45 – 0.47	0.000015	0.00064	0.87	1.94	20.0	0.00	0.00
8.	Test weight (g)	38.99	35.18 – 42.83	16.484	20.349	6.01	7.85	58.7	3.70	9.48
9.	Harvest index	33.18	18.05 – 39.72	28.936	38.276	16.21	18.64	75.6	9.63	29.02
10.	Yield/plant (g)	19.31	9.27 – 26.95	18.431	22.171	22.23	24.38	83.1	8.06	41.73

GCV = Genotypic coefficient of variation, PCV = Phenotypic coefficient of variation, h^2 = heritability, G.A. = genetic advance.