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VARIABILITY STUDIES IN INDUCED MUTANTS IN MUNG BEAN*

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ABSTRACT

The present investigation embodies the results of variability in induced mutants in greengram cultivar K-851 exposed to X-rays, ethylmethane sulphonate, diethyl sulphate at various doses singly and in combination. Variance due to progenies were significant for all the traits viz. pod length, No of seeds/pod and 100 seed weight. Negative shift in mean values for all the characters except for the grains per pod and 100 seed weight was observed. However, increase in components of genotypic and phenotypic variance, genotypic coefficient of variation, heritability and genetic advance was observed in low to high range for pod length and grains per pod while low to mederate for 100 seed weight. The changes observed were not mutagen and dose specific.

INTRODUCTION

The information regarding the possibilities of induction of mutation through physical and chemical mutagen for creating new variability in greengram are rare except for a few reports on sensitivity studies (Santos, 1965, Murray and NewCambe, 1970).

The present study was undertaken to get information on induction of variability in three characters viz. pod length, grain per pod and 100 seed weight.

MATERIALS AND METHODS

The dry seeds of the cultivar K-851 was exposed to 15 and 20 KR X- rays. Untreated control and irradiated seeds were presoaked for 12 hrs. and then treated with EMS (0.1 and 0.2%) and DES (0.05 and 0.1%) for two hours at 26 + 1° c. The treated seeds along with untreated control were sown in the field in randomized block design with four replications to raise M_1 generation in July, 1986. From M_1,. Twenty seeds from each selected plant from each treatment were sown in a row for each replication with a spacing of 45X15 cm in compact family block design with two replication in February, 1987

Observations were recorded for pod length, grains per pod and 100 seed weight. Mean, phenotypic range, variance due to progeny, variance components (Johnson et.al. 1955), genotypic coefficient of variability (Burton, 1952), heritability and genetic advance (Allard, 1960) for mentioned characters were analysed.

RESULTS AND DISCUSSION

The single and combined treatments showed bidirectional change in phenotypic range for all the traits. Mean values were shifted in negative direction for pod length (Table 1) in all the treatments. This trend was also observed for grains per pod (Table 2) and 100 seed weight (Table 3) except few treatments where it showed positive shift. Negative mean shift was recorded by Swarup and Gill (1968) in French bean for above characters. For mean shift, Gregory (1965) assumed that the shift in the means in irradiated population was because of the differences in the magnitude of the induced individual changes. This could also be due to elimination of bad gene for increasing mean value while the decrease may be due to lethal effect of higher doses of radiation on genotype according to Scossiroly *et al.*, (1966).

Variance is considered to be most dependable statistical measure of mutagenic effect by polygenes. Variance due to progenies within mutagenic treatments in M^2

1. * Part of M.Sc.(Ag) thesis submitted by senior author to Gujarat Agricultural University, Sardar Krishinagar.

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able 1. Phenotypic range, mean, variance due to progeny, components of variance, genotypic coefficient of variability, heritability and genetic advance for pod length, in M_2 generation of greengram, cv.K-251.

Treatment	Phenotypic range	Mean	±	S.Em.	Variance due to progenies	Variance components			GCV	Heritability	Genetic advance
						Genotypic	Phenotypic	Error			
ontrol	6.95 - 8.31	7.68	±	0.27	0.19	0.01	0.17	0.15	1.78	0.11	1.22
X-rays 15 KR.	6.84 - 8.74	7.51	±	0.42	0.54	0.09	0.45	0.35	4.05	0.20	3.78
-rays 20 KR.	6.58 - 8.52	7.53	±	0.22	0.30**	0.10	0.20	0.10	4.24	0.49	6.16
EMS 0.1%	6.42 - 8.30	7.43	±	0.30	0.32	0.06	0.25	0.19	3.54	0.26	3.78
EMS 0.2%	5.90 - 8.18	6.97	±	0.25	0.49**	0.18	0.31	0.13	6.08	0.57	9.51
X-rays 15 KR + EMS 0.1%	5.95 - 8.97	7.41	±	0.37	0.74**	0.23	0.51	0.27	6.54	0.45	9.12
X-rays 20 KR + EMS 0.1%	5.89 - 8.70	7.13	±	0.25	0.73**	0.29	0.43	0.13	7.66	0.68	13.11
X-rays 15 KR + EMS 0.2%	5.00 - 8.53	7.07	±	0.32	1.51**	0.65	0.85	0.20	11.41	0.75	20.47
X-rays 20 KR + EMS 0.2%	5.70 - 8.17	7.03	±	0.38	0.99**	0.35	0.64	0.29	8.45	0.54	12.89
X-rays 15 KR + EMS 0.05%	6.89 - 7.83	7.41	±	0.19	0.14	0.03	0.11	0.07	2.56	0.29	2.78
X-rays 20 KR + EMS 0.05%	6.11 - 7.97	7.28	±	0.30	0.50**	0.16	0.34	0.18	5.54	0.47	7.84
X-rays 15 KR + EMS 0.1%	6.61 - 7.95	7.43	±	0.24	0.18	0.03	0.15	0.11	2.47	0.22	2.41
X-rays 20 KR + EMS 0.1%	6.35 - 8.45	7.59	±	0.25	0.55**	0.21	0.34	0.13	6.07	0.61	9.86
)ES 0.05%	6.69 - 8.63	7.53	±	0.40	0.46	0.07	0.39	0.32	3.54	0.18	3.10
ES 0.1%	6.75 - 8.15	7.56	±	0.26	0.24	0.05	0.19	0.13	2.96	0.26	3.13

Significant at 0.05 per cent
* Significant at 0.01 per cent.

ble 2. Phenotypic range, mean, variance due to progeny, components of variance, genotypic coefficient of variability, heritability and genetic advance for grains per pod in M_2 generation of greengram, cv. K-851.

Treatment	Phenotypic range	Mean	±	S.Em.	Variance due to progenies	Variance components			GCV	Heritability	Genetic advance
						Genotypic	Phenotypic	Error			
ontrol	7.40 - 10.00	9.09	±	0.61	0.80	0.02	0.77	0.75	1.71	0.03	0.62
-rays 15 KR.	6.40 - 10.60	8.94	±	0.88	1.73	0.08	1.64	1.56	3.20	0.04	1.47
-rays 20 KR.	8.30 - 10.90	9.38	±	0.44	1.04*	0.32	0.72	0.39	6.84	0.45	8.39
MS 0.1%	8.40 - 10.50	9.44	±	0.47	0.73	0.13	0.59	0.45	3.92	0.23	3.87
MS 0.2%	6.30 - 10.00	8.43	±	0.74	1.72	0.29	1.52	1.22	6.48	0.19	5.91
-rays 15 KR + EMS 0.1%	7.40 - 10.30	8.91	±	0.59	0.84	0.07	0.77	0.70	2.98	0.09	1.85
X-rays 20 KR + EMS 0.1%	6.12 - 9.70	8.38	±	0.40	1.74**	0.71	1.03	0.32	10.06	0.68	17.19
X-rays 15 KR + EMS 0.2%	4.50 - 10.12	8.26	±	0.61	3.73**	1.49	2.24	0.75	14.77	0.66	24.79
X-rays 20 KR + EMS 0.2%	6.87 - 10.40	8.31	±	0.66	3.22**	1.17	0.04	0.87	13.03	0.57	20.32
X-rays 15 KR + EMS 0.05%	8.00 - 10.00	8.96	±	0.41	0.51	0.08	0.43	0.35	3.19	0.18	2.86
X-rays 20 KR + EMS 0.05%	7.60 - 10.35	9.07	±	0.64	1.28	0.19	1.08	0.89	4.86	0.17	4.23
X-rays 15 KR + EMS 0.1%	7.30 - 10.37	8.77	±	0.64	1.25	0.21	1.04	0.83	5.23	0.20	4.84
X-rays 20 KR + EMS 0.1%	7.14 - 10.60	9.06	±	0.55	2.40**	0.89	1.51	0.62	10.43	0.58	16.50
DES 0.05%	7.10 - 11.60	8.60	±	0.87	2.23	0.23	1.99	1.75	5.65	0.11	4.00
DES 0.1%	8.30 - 10.30	9.17	±	0.42	0.73	0.13	0.59	0.45	3.97	0.22	3.86

* Significant at 0.05 per cent
** Significant at 0.01 per cent.

able 3. Phenotypic range, mean, variance due to progeny, components of variance, genotypic coefficient of variability, heritability and genetic advance for grains per pod in M_2 generation of greengram, cv. K-851.

Treatment	Phenotypic range	Mean	±	S.Em.	Variance due to progenies	Variance components			GCV	Heritability	Genetic advance
						Genotypic	Phenotypic	Error			
ontrol	4.16 - 4.98	4.71	±	0.14	0.07	0.01	0.06	0.04	2.74	0.27	2.96
-rays 15 KR.	4.06 - 5.05	4.60	±	0.19	0.12	0.02	0.10	0.77	3.51	0.25	3.64
X-rays 20 KR.	4.05 - 5.11	4.54	±	0.17	0.14	0.04	0.10	0.06	4.51	0.40	5.93
EMS 0.1%	4.26 - 5.14	4.65	±	0.17	0.09	0.02	0.07	0.05	3.13	0.25	3.03
EMS 0.2%	3.74 - 5.48	4.70	±	0.27	0.34*	0.09	0.25	0.15	6.54	0.37	8.21
X-rays 15 KR + EMS 0.1%	4.20 - 5.03	4.54	±	0.19	0.08	0.01	0.08	0.07	1.49	0.05	0.65
X-rays 20 KR + EMS 0.1%	4.03 - 5.21	4.59	±	0.20	0.21	0.06	0.15	0.08	5.53	0.34	5.97
X-rays 15 KR + EMS 0.2%	4.18 - 5.28	4.60	±	0.21	0.16	0.03	0.13	0.09	4.17	0.28	04.56
. -rays 20 KR + EMS 0.2%	4.04 - 5.41	4.61	±	0.26	0.21*	0.07	0.21	0.13	6.05	0.36	7.50
X-rays 15 KR + EMS 0.05%	4.90 - 5.13	4.70	±	0.17	0.11	0.02	0.08	0.06	3.45	0.30	3.89
X-rays 20 KR + EMS 0.05%	3.61 - 5.62	4.73	±	0.24	0.29	0.08	0.20	0.12	6.15	0.41	8.15
X-rays 15 KR + EMS 0.1%	4.38 - 5.22	4.67	±	0.15	0.10	0.02	0.07	0.05	3.43	0.33	4.12
X-rays 20 KR + EMS 0.1%	4.00 - 5.54	4.81	±	0.27	0.36*	0.10	0.25	0.15	6.76	0.41	8.98
)ES 0.05%	4.24 - 5.11	4.61	±	0.18	0.10	0.01	0.08	0.07	2.78	0.19	2.67
ES 0.1%	4.29 - 5.07	4.70	±	0.16	0.07	0.01	0.06	0.05	2.11	0.14	1.67

Significant at 0.05 per cent
Significant at 0.01 per cent.

generation was significant for all the characters in majority of the combined treatments and some of the individual treatments (Table 1-3). Khan (1985) also found that combined treatments were most effective.

Induced variation comprises both genetic components and non-genetic variation. The heritable and fixable portion would be of practical significance. The genotypic and phenotypic variances, estimates G.G.V., heritability and genetic advance increased for pod length (Table 1), grains per pod (Table 2) and 100 seed weight (Table 3) considerably in many of the combined as well as single treatments. These parameters showed low to high range for pod length and grains per pod but low to moderate in case of 100 seed weight. Sheriff and Veeraswamy (1977) observed high estimates of GCV and genetic advance for 100 seed weight. The above genetic parameters were not mutagen and dose specific and also varied from trait to trait which are in accordance with the results of Khan (1981).

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STUDIES ON CERTAIN ASPECTS OF SEED PROCESSING OF BAJRA HYBRID SEED

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ABSTRACT

Threshing the earheads of KM 2 bajra hybrid at 10, 15, 20 and 25 + 0.5 per cent seed moisture levels in a mechanical thresher resulted in significant differences in the extent of mechanical damage to the seeds. Seeds extracted at 15 or 20 + 0.5 per cent moisture recorded the least damage, higher germination and more seedling vigour than those at 10 or 25 + 0.5 per cent.

INTRODUCTION

Separating the seed from the mother plant is the primary operation carried out following harvesting of a seed crop. The methods and conditions of threshing of the earheads largely determine the extent of mechanical damage to the seed (Kantor and

[Seed Technol] 2. Dean A riculture) (Retd) TNAU, Coimbatore - 3