Madras Agric. J., 82(4): 268-271 April, 1995
https://doi.org/10.29321/MAJ.10.A01182

GENETIC VARIABILITY AND CHARACTER ASSOCIATION IN SOME EXOTIC COLLECTION OF GREEN GRAM

H.K. BORAH AND M.H. HAZARIKA
Department of Plant Breeding and Genetics,
Assam Agricultural University, Jorhat 785 013,, Assam

ABSTRACT

Studies on different genetic parameters namely, genotypic and phenotypic variances, genetic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), haritability and genetic advance were conducted on 112 exotic genotypes of green gram *Vigna radiata* (L.) Wilczek). High estimates of genotypic variances were recorded only for plant height and number of pods per plant. High estimates of heritability along with high genetic advance and GCV values were observed for the plant height. number of pods per plant, seed yield per plant, number of clusters per plant, number of secondary branches per plant and number of primary branches per plant, days to 50 per cent flowering and days to maturity exhibited low estimates of genetic advance. Seed yield per plant was associated significantly with almost all the yield attributing characters, indicating that selection for these characters will help in identifying high yielding varieties of green gram.

KEY WORDS : Green gram, Character Association, Genetic Variability

Success of any crop improvement programme essentially depends upon the nature and magnitude of the genetic variability present in the crop. Greater the diversity in a crop species, better are the chances of evolving promising and desired types. A detailed study on the extent of variability in different characters associated with yield and a knowledge on the nature of their heritability in relation to their contribution towards yield are the prime requisites for an efficient plant breeding programme. With this aim, the present investigation was carried out in some exotic collection of green gram *(Vigna radiata* (L.) Wilczek) genotypes to estimate variability in different parameters.

MATERIALS AND METHODS

The present investigation was conducted during *kharif* 1987 at the Assam Agricultural University Research Farm, Jorhat with 112 genotypes of green gram collected from AVRDC, Taiwan.

The experiment was laid out in an augmented design with the entries being replicated thrice. Each entry was grown in a 2 row plot of 3m length with a plant to plant and row to row distance of 10 cm and 30 cm respectively. Ten plants were selected at random in each of the entries in each replication and data on ten characters *viz,* days to maturity, plant height (cm), number of primary and secondary branches, number of clusters per plant, number of pods per plant, pod length, number of seeds per pods, 100 seed weight and seed yield per plant were recorded. Correlations "(Miller *et al.*, 1958), variability (Burton, 1952) and heritability in broad sense and genetic advance (Johnson *et al.*, 1955) were worked out.

RESULTS AND DISCUSSION

The analysis of variance revealed that the genotypes differed significantly for all the characters indicating the presence of wider variability (Table 1).

The mean, genotypic and phenotypic variability, genetic and phenotypic coefficient of variations, heritability, expected genetic advance and genetic gain are presented in Table 2. A wide range of phenotypic variation in plant height, grain yield, cluster of pods per plant, pod length, seeds per pod etc. were reported in green gram by Bhargava *et al.* (1966) and Joshi and Kabaria (1973). The estimates of genotypic coefficient of variation and phenotypic coefficient of variation provide a better comparison of the characters regarding the extent of genetic variation. The estimates of GCV in comparison to respective PCV indicated that variation was present for the characters, number of secondary branches per plant, seed yield per plant, number of cluster per plant, number of pods per plant and number of primary branches per plant indicating that selection for these traits will be much effective. Similar findings were also reported by Giriraj (1973) and Joshi and Kabaria (1973) in green gram.

Table 1. Estimates of genotypic variance (σ2g), phenotypic variance (σ2p) environmental variance (σ2 e), heritability in broad sense (h2), genetic advance (GA), genetic advance as per cent of mean (GA as % of mean), genotypic coefficient of variation (GCV) and phenotypic co-efficient of variation (PCV) of green gram genotypes.

Characters	Estimates									
	Mean	Range	σ^2g	σ^2p	σ^2e	$h^2\%$	GA	GA (% of mean)	GCV (%)	PCV (%)
Seed yield per plant (g)	4.40	1.53-9.26	2.88	2.94	0.06	97.96	3.45	78.41	38.57	38.97
Plant height (cm)	59.84	32.11-91.44	138.37	147.10	8.73	94.07	23.50	39.30	19.66	20.28
Days to 50% flowering	42.01	39.0-45.6	1.08	1.58	0.50	68.35	1.77	4.21	2.47	2.99
Days to maturity	67.1	65.6-70.0	0.68	0.82	0.14	82.93	1.54	2.29	1.23	1.35
Number of primary branches per plant	4.24	2.10-7.43	1.03	1.09	0.07	94.08	2.03	47.88	23.98	24.62
Number of secondary branches per plant	3.53	1.10-8.20	1.96	2.03	0.07	96.69	2.85	80.74	39.69	40.36
Number of clusters per plant	5.66	2.65-11.15	2.56	2.71	0.15	94.50	3.20	56.54	28.27	29.08
Number of pods per plant	16.49	6.25-30.63	21.07	25.26	4.19	83.40	8.59	52.12	27.84	30.50
Pod length (cm)	9.10	6.73-13.01	1.05	1.18	0.13	89.14	1.99	21.89	11.27	11.94
Number of seeds per pod	10.93	8.20-15.73	2.97	3.06	0.09	97.06	3.50	32.02	15.77	16.00
100 seed weight (g)	3.74	2.25-5.25	0.73	0.74	0.0007	99.86	1.75	45.69	22.31	22.46

Burton (1952) suggested that genotypic coefficient of variation along with heritability estimates would give a better idea about the efficiency of selection. In the present study, the heritability estimates were high for all the characters except days to 50 per cent flowering for which the estimate was moderately high indicating that selection could be effective for these characters. In the present study, highest (99.86%) heritability was recorded for 100 seed weight and lowest (68.35%) for days to 50 per cent flowering. High heritability estimates for different characters in green gram were also reported in earlier studies (Chaudhury *et al.*, 1982). However, for reliable selection high heritability of a character need to be accompanied by high genetic advance (Johnson *et al.*, 1955) because such characters are mostly controlled by additive gene action (Panse, 1957). In the present study, plant height, seed yield per plant, number of secondary branches per plant, number of pods per plant and number of seeds per pod exhibited considerably high heritability coupled with high genetic advances. From this consideration it could be inferred that simple selection will be effective for these characters. Similar findings were also reported by Giriraj (1973) in green gram. The characters, days to 50 per cent flowering and days to maturity was accompanied by low estimates of genetic advance and high estimates of heritability, which may be

Table 2. Analysis of variance for seed yied and other ancillary characters

Source	df	Mean square										
		Plant height (cm)	Days to 50% flowering	Days to maturity	No. of primary branches per plant	No. of secon dary branches per plant	No. of pods clusters per plant	No. of pods per plant	Pod length (cm)	No.of seeds per pod	Seed yield per plant	100 seed weight (gm)
Replication	2	7.5	5.93	7.28	0.99	0.47	2.70	6.85	1.20	0.43	1.45	0.13
Treatment	111	423.9**	3.75**	2.18**	3.17**	5.96**	7.83**	67.39**	3.28**	9.01**	8.69	2.20**
Error	222	8.73	0.50	0.14	0.07	0.07	0.15	4.19	0.13	0.09	0.06	0.007
	SEd	2.41	0.58	0.30	0.21	0.21	0.31	1.67	0.29	0.24	0.23	0.02
	CD 0.005	4.72	1.14	0.59	0.41	0.41	0.62	3.28	0.57	0.47	0.45	0.04

** Significant at 0.01 level of probability

Table 3. Phenotypic (P), genotypic (G) and environmental correlation (E) between various yield attributing characters in green gram genotypes.

Characters		Plant height	No of Primary branches per plant	No of secondary branches per plant	No of characters per plant	No of pods per plant	Pod length	No of seeds per pod	100 seed weight
Seed yield	P	0.2866**	0.3036**	0.2730**	0.8055**	0.8028**	0.0289	0.8973**	0.8435**
per plant	G	0.3042**	0.2804**	0.2851**	0.8387**	0.8896**	0.0362	0.9221**	0.8621**
	E	-0.1599	0.9935**	-0.1735	-0.0477	-0.0112	-0.0977	-0.0884	0.1562
Plant height	P		0.2824**	0.0647	0.8239**	0.6296**	0.0294	0.0398	0.0826
	G		0.2906**	0.1232	0.9121**	0.6437**	0.0403	0.0562	0.0913
	E		-0.1132	-0.0832	-0.0864	0.1236	-0.0869	-0.1532	-0.0915
Number of	P			0.0643	0.7132**	0.6219**	0.0624	0.0232	0.0562
Primary	G			0.0821	0.8326**	0.7132**	0.0812	0.0361	0.0713
branches per plant	E			-0.0569	-0.0923	-0.0426	-0.0921	-0.0132	-0.0621
Number of	P				0.0962	0.0291	0.0567	0.0164	0.0189
secondary	G				0.1236	0.0346	0.0723	0.0312	0.0264
branches per plant	E				-0.1232	-0.0620	0.0628	-0.0601	-0.0912
Number of	P					0.3216**	0.0627	0.0124	0.0308
clusters	G					0.3463**	0.0832	0.0321	0.0461
per plant	E					-0.1731	-0.1012	-0.0967	-0.1624
Number of	P						0.0124	0.0626	0.0629
pods per	G						0.0329	0.0913	0.0834
plant	E						0.1239	-0.0321	-0.1529
Pod length	P							0.4932**	0.0525
	G							0.6319**	0.0639
Number of	P								0.0629
seeds per	G								0.0829
pod	E								-0.1234

** Significant at 0.01 probability level

due to non-additive gene action (Panse, 1957). Some modified selection methods such as progeny testing method could be applied to improve these characters. In this study, seed yield per plant exhibited highly significant positive correlation with all the characters both at genotypic as well as phenotypic levels, except for pod length (Table 3). Selection for these character besides seed yield per plant could result in further yield improvement, as all the characters exhibited high genotypic variance and heritability. The positive association of different yield attributing characters with seed yield per plant in green gram were also reported by Borthakur and Hazarika (1977), Giriraj and Vijaykumar (1974) and Kumari and George (1985).

Among the other characters, plant height exhibited positive correlation with number of primary branches per plant, number of clusters per plant and number of pods per plant. Number of primary branches showed positive correlation with number of clusters per plant and number of pods per plant; number of clusters per plant with number of pods per plant and pod length with number of seeds per pod, suggesting that selection for these characters would ultimately help in identifying varieties with high yield potential.

REFERENCES

BHARGAVA, P.D., JOHRI, J.N. SHARMA, S.K. and BHATTA, B.N. (1966). Morphological and genetic variability in green gram. **Indian J. Genet., 26**: 370-373

BORTHAKUR, A.K. and HAZARIKA, M.H. (1977). Interrelationship between yield and yield components in green gram. **J. Assam Sci. Soc.,20**: 77-85

BURTON, G.W. (1952). Quantitative inheritance in grasses. **Proceedings of the 6th Grassland Congress 1**: 277-285

CHAUDHURY, R.K., SINGH, R.K. and KAKAR, S.N. (1982). Correlation coefficients and selection indices in mungbean *(Vigna radiata*(L.) Wilckzek). **Pulse Crops Newsl., 2**: 22-24

GIRIRAJ, K. (1973). Natural variability in green gram *(Phas eolus aureus* roxb.). **Mysore J. Agric Sci.,7**: 184-187.

GIRIRAJ,K and VIJAYKUMAR, S. (1974). Path coefficient analysis of yield attributes in mungbean. **Indian J. Genet., 34**: 27-30

JOHNSON, H.W., ROBINSON, H.F. and COMSTOCK, R.E. (1955). Estimate of genetic and environmental variability in soybean. **Agron. J., 47**: 314-318

JOSHI, S.N. and KATARIA, M.M. (1973). Interrelationship between yield and yield components in *Phaseolus aureus* Roxb. **Madras Agric J., 60**: 1331-1334

KUMARI, K.T.P and GEORGE, M.K. (1985). Correlation and path analysis in green gram. **Agric. Res. J. Kerala 20**: 82-85

MILLER, P.A., AL-JIBOURI, N.A. and ROBINSON, H.F. (1958). Genotypic and environmental variances, covariances in an upland cotton cross of interspecific origin. **Agron J., 50**: 633-637

PANSE, V.G. (1957). Genetics of quantitative characters in relation to plant breeding. **Indian J. Genet., 28**: 225-229

Madras Agric. J., 82(4): 271-273 April, 1995

EFFECTS OF IRRIGATION LEVELS AND IRRIGATION LAYOUTS ON THE YIELD ATTRIBUTES AND GRAIN YIELD OF GREEN GRAM

R.VIJAYALAKSHMI and A.RAJAGOPAL

Water Technology Centre, Tamil Nadu Agricultural University, Coimbatore 641 003.

ABSTRACT

The influence of irrigation levels and irrigation layouts on the yield attributes and grain yield of green gram in summer season revealed that irrigation at 0.60 IW/CPE ratio with 4 cm under flat ridges significantly increased the pods per plant, seeds per pod and hundred grain weight. The highest greengram grain yield was obtained under the irrigation level of 0.60 IW/CPE ratio with flat ridges.

KEY WORDS : Green gram, Irrigation Levels, Irrigation Layouts

Water influences crop growth directly through all physiological processes in plant taking place in an aqueous media. It also influences crop performance indirectly through its effect on the soil nutrients and soil microbes. Soil and crop management practices are also decided by the water availability and irrigation practices. Crops need water in optimum quantities and at specific intervals. Improper scheduling, over irrigation, lack of proper drainage etc. often lead to reduction in crop yields due to water logging and salt imbalance in soils. Pulses are grown during *kharif* season (first monsoon) under rainfed conditions as mixed crops with cereals and millets. There is need to grow these crops under irrigation in the present context of increased need and high price for these crops.

MATERIALS AND METHODS

A study was carried out with Co5 green gram during summer 1990 at the Central farm, Agricultural College and Research Institute, Coimbatore to investigate the effect of various irrigation levels as well as irrigation layouts on the yield attributes and grain yield. The experiment was laid out in randomised block design replicated three times. The treatments comprised (i) irrigation at 0.6 IW/CPE ration (I_1) (ii) irrigation at 0.75 IW/CPE ratio (I_2) (iii) irrigation at 0.90 IW/CPE ratio (I_3) (iv) basin (M_1) (v) ridges and furrows (M_2) (vi) flat ridges (M_3). Nine treatment combinations (3 irrigation levels and 3 irrigation layouts) were tested. The depth of irrigation was fixed as 4 cm. The gross and net plot sizes were 5.5 m x 3.5 and 5 m x 3m, respectively. Three to four seeds after treating with carbendazim were dibbled per hole in a spacing of 30 x 10 cm. One sowing and another life irrigation were given as common to all reatments to a depth of 4 cm. The plots were irrigated as per the schedule with measured quantity of water through a parshall flume.

RESULTS AND DISCUSSION

The results of the experiment revealed that irrigation levels and irrigation layouts significantly influenced the yield attributes (Table 1).