REFERENCES

BHATNAGAR, S.K. (1977). Combining ability and gene action studies in the inheritance of quantity and quality of oil in linseed (*Linum usitatissimum* L.) Ph.D. Thesis. University of Udaipur, Udaipur.

BHATNAGAR, S.K. AND MEHROTRA, H.N. (1980). Combining ability and gene action for oil content in linseed. **Indian J. Genet. 40 (1) : 99 - 101.**

DHAKAR, J.M. (1994). Studies on heterosis, combining ability and stability parameters in linseed. (*Linum usitatissimum* L.) Unpublished Ph.D. Thesis, R.C.A., R.A.U., Udaipur.

GRIFFING, B. (1956). Concept of general and specific combining ability in relation to diallel crossing system. **Aust. J. Bio. Sci. 9 : 463 - 493.**

HAYMAN, B.I. (1954). The theory and analysis of diallel crosses. **Genetics. 39 : 789 - 809.**

NIE, Z., GUO, B.C., CHEN, F.T and LIANG, A.O. (1991). Study on the combining ability of the principal agronomic characters in flax. **Ningria J. Agro. Forester Science and Technology 4 : 7 -11.**

SINGH, D. (1979). Diallel analysis for combining ability over environments. **Indian J. Genet. 39 : 383 - 386**

(Received : September 1998 Revised : September 1999)

Madras Agric. J., 86(4-6): 228 - 231 April - June 1999
https://doi.org/10.29321/MAJ.10.A00588

GENETIC VARIABILITY, CORRELATION AND PATH ANALYSIS IN BLACKGRAM

C. NATARAJAN and R. RATHINASAMY

Centre for Plant Breeding and Genetics, TNAU
Coimbatore - 3.

ABSTRACT

Fifteen parents and 50 hybrids were evaluated at two locations. Variability, correlation and path coefficients were worked out on seven characters. High PCV and GCV were observed for seed yield and plant height. High heritability coupled with high genetic advance was observed for plant height, clusters per plant, pods per plant and seed yield per plant. Branches per plant, clusters per plant and pods per plant showed significant positive correlation with seed yield. Protein content was negatively correlated with seed yields. Pods per plant exerted positive direct effect on yield.

KEY WORDS: Blackgram, Variability, Correlation, Path analysis

The improvement of crop yield largely depends upon the magnitude of genetic variability and the extent to which the determining characters are heritable from generation to generation. A measure of heritability alone does not give an idea about the expected genetic gain in the next generation but it has to be considered with genetic advance. Correlation and path analysis will establish the extent of association between yield and its components and bring out relative importance of their direct and indirect effects on yield for simultaneous improvement of characters. The present investigation in blackgram (*Vigna mungo* (L.) Hepper) is an attempt in this direction.

MATERIALS AND METHODS

The materials consisted of 15 parents and their resultant 50 cross combinations obtained through L X T mating design. They were evaluated in a randomized block design with three replications at two environments *viz.*, National Pulses Research Centre, Vamban and Coconut Research Station, Veppankulam during *Kharif* 1996. Observations were recorded on Plant height,number of branches per plant,number of clusters per plant, number of pods per plant, 100 seed weight,protein content and seed yield per plant on 10 randomly selected plants. Genotypic and phenotypic coefficient of variation (Burtan,1951), heritability (Lush,1940) Genetic advance (Burtan,1952), correction Co-efficients (Johnson *et al.*, 1955) and path analysis (Dewy and Lu,1959) were worked out.

RESULTS AND DISCUSSION

The analysis of variance revealed significant difference among the genotype for all the seven characters studied in two locations. The mean, PCV,GCV, heritability and genetic advance as per cent of mean are presented in Table 1. A notable mean difference were observed among the locations for plant height, clusters per plant, pods per plant and seed yield per plant. The relative

Table 1. Mean, range, PCV, GCV and genetic advance for seven characters of blackgram in two location (L1 & L2)

Characters		Mean	Range	PCV	GCV	Heritability	Genetic advance	Genetic advance as % of mean
Plant	L1	33.33	23.23 - 52.87	20.20	19.72	95.2	13.21	39.63
height	L2	41.08	28.13 - 60.37	22.87	22.52	96.9	18.76	45.67
Branches/	L1	3.61	2.47 - 4.17	12.25	10.78	77.5	0.71	19.67
plant	L2	3.27	1.60 - 4.70	22.34	20.60	85.0	1.28	39.14
Clusters/	L1	20.45	12.60 - 26.73	17.98	16.97	89.0	6.75	33.00
plant	L2	11.63	6.50 - 20.23	26.38	25.29	91.9	5.81	49.96
Pods/	L1	46.98	30.53 - 59.27	16.34	15.34	88.1	13.94	29.67
plant	L2	26.30	14.83 - 43.27	26.03	25.44	95.5	13.47	51.22
100 seed	L1	3.91	3.47 - 4.53	7.26	6.55	81.2	0.48	12.28
weight	L2	3.53	3.13 - 4.03	5.73	5.31	85.9	0.36	10.20
Protein	L1	19.53	16.57 - 23.10	9.60	9.27	93.3	3.60	18.43
content	L2	20.12	17.13 - 23.17	8.63	8.53	97.6	3.49	17.35
Seed	L1	9.49	4.63 - 15.87	29.01	27.63	90.7	5.14	54.16
yield/	L2	5.92	3.23 - 9.27	26.56	26.18	97.1	3.15	53.21
plant								

magnitude of PCV was greater than corresponding GCV for all the characters studied which indicated the effects of environmental factors (Ram and Singh,1993). Variation were observed among the locations in GCV for branches per plant, clusters per plant and pods per plant. The highest GCV was observed for seed yield per plant followed by plant height in both the locations. High GCV was observed for branches per plant, clusters per plant and pods per plant at Veppankulam. High GCV in the population could be exploited in the selection programme. Ram and Singh (1993) reported high GCV for pods per plant and seed yield. Sirohi *et al.*, (1994) reported high GCV were observed for 100 seed weight and protein content in both the locations.

Very high heritability was observed for plant height,protein content, seed yield per plant,clusters per plant and pods per plant in both the locations. The genetic advance as per cent of mean was highest for seed yield per plant followed by plant height,clusters per plant and pods per plant. The estimates of heritability and genetic advance should be considered together for reliable conclusion (Johnson *et al.* 1955). In the present study, high heritability coupled with high genetic advance was observed for plant height,clusters per plant,pods per plant and seed yield per plant indicating the importance of additive gene effects for these characters. This is in accordance with the findings reported by earlier workers, (Rao, 1992; and Ram and Singh, 1993).

The genotypic correlation co-efficients were generally higher than the phenotypic correlation co-efficients (Table 2) indicating the inherent association between various characters. Similar trend was reported by koteswara Rao (1990), Nainar Mohammed (1991), Shanmugasundaram and Sree Rangaswamy (1995) and Veerabadhiran (1995). Branches per plant, clusters per plant and pods per plant were exhibited positive and significant correlation with seed yield at both genotypic and phenotypic level in both the locations. Ramarathinam and Murugesan (1994). Sood and Gartan (1994) and Shanmugasundaram and Sree Rangaswamy (1995) reported significant positive association between seed yield and cluster number and pod number. Protein content was significantly and negatively correlated with seed yield. This is in accordance with findings reported by Sandu *et al.*, (1978).

Table 2. Phenotypic (P) and Genotypic (G) correlation coefficients for seven characters of blackgram in two location (L1 & L2)

Characters			Branches/ plant	Clusters/ plant	Pods/ plant	100 seed weight	Protein content	Seed yield/ plant
Plant	L1	P	0.061	-0.088	-0.010	0.234**	-0.188*	0.143
height		G	0.083	-0.108	-0.015	0.262**	-0.205*	0.162
	L2	P	0.290**	0.096	0.060	0.208*	-0.251**	0.041
		G	0.313**	0.105	0.064	0.234**	-0.258**	0.043
Branches/	L1	P		0.355*	0.186*	0.059	-0.241**	0.172*
plant		G		0.447**	0.249**	0.104	-0.284**	0.225**
	L2	P		0.393**	0.441**	0.073	-0.219*	0.329*
		G		0.465**	0.495**	0.059	-0.240**	0.369*
Clusters/	L1	P			0.753**	-0.111	-0.002	0.558**
plant		G			0.832**	-0.137	-0.022	0.612**
	L2	P			0.918**	0.131	-0.238**	0.760**
		G			0.939**	0.155	-0.249**	0.793**
Pods/	L1	P				-0.232**	-0.127	0.762**
plant		G				-0.280**	-0.130	0.807**
	L2	P				0.069	-0.246**	0.350**
		G				0.078	-0.251**	0.867**
100 seed	L1	P					0.007	-0.081
weight		G					0.034	-0.104
	L2	P					-0.231**	0.085
		G					-0.252**	0.089
Protein	L1	P						-0.178**
content		G						-0.180**
	L2	P						-0.230**
		G						-0.234**

The inter-association among yield components revealed that the branches per plant, clusters per plant and pods per plant were inter correlated with themselves at both genotypic and phenotypic level in both the locations. The positive association of these characters with seed yield and among themselves revealed that branches per plant, cluster per plant and pods per plant were the most important yield contributing characters in blackgram. Plant height and 100-seed weight was positively correlated with each other, while the plant weight and branches per plant significantly and negatively correlated with protein content. It is interesting to note that the trend of correlations between yield and yield components were similar in both the locations. The inter-association among yield components also showed similar trend in most of the cases.

Pods per plant showed highest positive direct effect on seed yield at both the locations (Table 3). Shanmugasundaram and Sree Rangaswamy (1995) and Veerabadhiran (1995) reported pod number to show maximum direct effect on yield. Clusters per plant followed by branches per plant showed negative direct effect on seed yield. Koteswara Rao (1990) and Shanmugasundaram and Sree Rangaswamy (1995) reported that branches per plant showed negative direct effect on yield. The clusters per plant and branches per plant exhibited positive indirect effect on seed yield through pods per plant.

Table 3. Path co-efficient analysis showing direct (diagnoal value) and indirect effects of characters on yield in two locations (L1 and L2)

Characters		Plant height	Branches/ plant	Clusters/ plant	Pods/ plant	100 seed weight	Protein content	Genetic correlation with seed yield
Plant height	L1	0.056	0.000	0.026	-0.015	0.015	0.008	0.162
	L2	0.014	-0.040	-0.024	0.073	-0.004	0.009	0.043
Branches/plant	L1	0.005	-0.003	-0.108	0.253	0.006	0.012	0.225
	L2	0.005	-0.127	-0.107	0.566	-0.001	0.008	0.369
Clusters/plant	L1	-0.006	-0.001	-0.241	0.845	-0.008	0.001	0.612
	L2	0.002	-0.059	-0.231	1.073	-0.003	0.008	0.793
Pods/plant	L1	-0.001	-0.001	-0.201	1.016	-0.017	0.005	0.807
	L2	0.001	-0.063	-0.217	1.142	-0.001	0.008	0.867
100 seed weight	L1	0.014	0.000	0.033	-0.285	0.061	-0.001	-0.104
	L2	0.003	-0.008	-0.036	0.090	-0.017	0.008	0.089
Protein content	L1	-0.011	0.001	0.005	-0.132	0.002	-0.041	-0.180
	L2	-0.004	0.030	0.057	-0.287	0.004	-0.033	-0.234

L1 - Residual effect : 0.282

L2 - Residual effect : 0.226

It is evident that branches per plant, clusters per plant and pods per plant are the most important characters to be considered for effective selection of superior types in blackgram.

REFERENCE

BURTON,G.W.(1952). Quantitative inheritance in grasses. Proc.6th Int. Grass Congr. 1 : 277 - 283.

DEWEY, D.R. and LU, K.H. (1959). A correlation and path co-efficient analysis of components of crested wheat grass seed production. Agron. J., 51 : 515 - 518.

JOHNSON, H.W., ROBINSON,H.F. and COMSTOCK, R.E. (1995). Genotypic and Phenotypic correlation on soybean and their implication in selection. Agron. J. 47 : 477 - 483.

KOTESWARA RAO, Y. (1990) . Genetic analysis in blackgram (*Vigna mungo* (L) Hepper) through line X tester and triple cross analysis. Ph. D. Thesis. TNAU. Coimbatore.

LUSH, J.L. (1940). Intra-sire correlation and regression of off spring on dams as a method of heritability of characters. Proc. Amer. Soc. Animal Production. 33 : 293 - 301.

NAINAR MOHAMED,R.(1991). Genetic analysis in blackgram (*Vigna mungo* (L.) Hepper) M.Sc. (Ag.). Thesis. TNAU. Coimbatore.

RAM, T. and SINGH, S.(1993). Genetic analysis of yield and its components in urd bean, **Indian J. Pulses Res.**, 6 : 194-196.

RAMARATHINAM, S. and MURUGESAN, N.V.(1994). Correlation and path co-efficient analysis of colchicine induced mutants in blackgram (*Vigna mungo* (L.) Hepper) **Madras Agri. J.**, 81: 409 - 411.

RAO, S.S. (1992). Estimation of heritability and genetic advance in blackgram (*vigna mungo* (L.) Hepper) **Indian J. Pulses Res.**, 5: 66 - 67.

SANDHU, T.S., BHULLAR, B.S., CHEEMA, H.S. and BRAR, J.S. (1978). Grain yield and its components in Urd bean. **Indian J. Genet.**, 38: 410 - 415.

SANMUGASUNDARAM, P.and SREE RANGASWAMY, S.R.(1995). Correlation and path coefficient analysis in F2 generation in blackgram. **Madras Agric. J.**, 82 : 125 - 129.

SIROHI, A., KALIA, V. VARMA, S.and RATHEE, V.K.(1994). Variability studies in blackgram. Crop Res., 7 : 494 - 497

SOOD, B.G. and GARTAN, S.L. (1994). Variability and character association in Urd bean. **Indian J. Pulses Res.**, 7 : 56 - 57.

VEERABADHRAN, P. 1995. Genetic analysis in blackgram (*Vigna mungo* (L.) Hepper) Ph.D. Thesis TNAU, coimbatore.

(Received : November 1997 Revised : February 1999)