Table 4. Score chart (based on gca effects of parents)

Parents	Plant height	Days to 50 % flowering	Primary branch number	Cluster number	Pod number	Pod length	seed number per pod	Hundred seed weight	Seed yield	Seed Protein	Total score
L1	-1	-1	+1	+1	-1	-1	-1	0	-1	+1	-3
L2	+1	+1	-1	+1	+1	+1	+1	+1	+1	+1	+8
L3	+1	+1	+1	+1	+1	+1	+1	0	+1	+1	+9
L4	-1	-1	-1	-1	-1	-1	0	+1	-1	-1	-7
L5	-1		-1	-1	-1	-1	-1	-1	-1	-1	-9
T1	+1	0	0	0	+1	0	-1	-1	+1	+1	+2
T2	-1	-1	+1	+1	0	-1	+1	+1	+1	0	+2
T3	-1	-1	-1	+1	+1	+1	+1	-1	0	+1	
T4	+1	+1	+-1	-1	-1	-1	+1	0	-1	0	-2
T5	-1	+1	0	-1	-1	+1	0	+1	-1	-1	-2

+1 = High status 0 = Moderate status -1 = Low status

References

Dasgupta, T. and Dass P.K. (1987). Inheritance of pod length and cluster number in blackgram. *Indian J. Agric. Sci.* **57** : 50-52.

Haque, M.F., Ganguli, D.K. and Mitra, A.K. (1988). Combining abilaity and heterosis in urd bean. *Indian J. Pulses Res.* **1** : 6-11.

Kempthrone, O. (1957). An introduction to genetic statistics. John Wiley and Sons Inc., New York. pp. 458-471.

Sagar, P. and Chandra, S.C. (1977). Heterosis and combining abilaity in urd bean. *Indian J. Genet.* **37** : 420-424.

Sarsan, S.M., Patil, R.A. and Bhatede, S.S. (1986). Heterosis and combining ability in upland cotton. *Indian J. Agric. Sci.* **73** : 567-573.

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Association analysis in black gram (*Vigna mungo* (L.) Hepper)

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Abstract : Correlation coefficient and path analysis studies conducted with ten parents and their twenty five hybrids revealed that primary branch number, cluster number, pod number, pod length and seed number per pod had strong positive association with yield. Besides, their inter correlations were positive and significant, indicating the possibility of improving these characters simultaneously. The path analysis indicated that the contribution of pod number followed by seed number per pod and primary branch number was much through direct effects and their indirect effects by way other traits were also much pronouncing. Seed protein had no association with any of the other characters and its direct effect on yield was also less. *(Key words : Correlation, Path analysis, Direct effects, Indirect effects)*

Yield is a complex Mentity and is associated with number of component characters which were themselves interrelated. Such inter dependence often affects their relationship with yield, thereby making correlation coefficient ineffective. So there is a need to partition the correlations into direct and indirect effects to get the information on actual contribution of each character to yield. Thus, correlation in conjunction with path analysis would give a better insight into cause and effect relationship between different pairs of characters.

Materials And Methods

Ten parents along with their twenty five hybrids were raised in a randomised block design, replicated thrice. Normal agronomic practices were followed throughout the crop period. Ten randomly selected plants were labelled for recording observations in each replication for the characters, plant height, days to 50 per cent flowering, primary branch number, cluster number, pod number, pod length, seed number per pod, hundred seed weight, seed yield and seed protein.

Correlation coefficient and path coefficient analysis was worked as suggested by Dewey and Lu (1959).

Results and Discussion

Correlation coefficient among yield and yield components (Table 1) revealed that seed yield had strong association with primary branch number, cluster number (Luthra and Singh, 1978; Sagar and Lal, 1979), pod number (Soundarapandian *et al.* 1976 and Patel and Shah, 1982), pod length (Usha Rani and Rao, 1981), seed number per pod (Sandhu *et al.* 1980) and hundred seed weight (Sarker *et al.* 1984) and their interrelationship was also positive and highly significant, indicating existence of linkage between the genes controlling these characters and the possibility of improving these characters simultaneously.

Plant height had significant positive association with yield and days to 50 per cent flowering revealed that increase in plant height extended the vegetative period thereby 50 per cent flowering commenced late. Seed protein had no association with any of the character under study showing the independent genetic control of seed protein with other characters.

The meagre residual effect in path coefficient analysis indicated the importance of all yield contributing characters in deciding the yield (Table 2). The direct effect of pod number was positive and high and its indirect effects through this was also positive (Patil and Narkhede, 1987 and kumar and Reddy, 1987). High direct effect by seed number per pod and primary branch number was also recorded (Rao *et al.* 1983) and the indirect effects by most of the other characters were also positive, indicating the importance of these characters for exercising selection. Even though, cluster had high positive correlation with yield, its direct effect and indirect effects via this character on yield were negative. So, selection based on correlation alone may mislead and make it unreliable for effective selection. Seed protein had less direct as well as indirect effects on yield restricting the possibility of further improvements of these characters, therefore it is suggested to have separate combination breeding programmes for the improvement of seed yield, seed protein and earliness. The aforesaid points therefore have clearly disclosed that, an ideal blackgram plant should bear many primary branches with more pods having increased number of seeds in each to boost the yield.

Table 1. Correlation co-efficient among yield and yield components (based on *per se* performance)

	Plant height	Days to 50% flowering	Primary branch number	Cluster number	Pod number	Pod length per pod	Seed number	Hundred seed weight	protein	yield
Plant height	1.0000	0.5409**	0.2171	0.2928	0.4524**	0.2415	0.1911	0.3226	0.3073	0.4727**
Days to 50% flowering		1.0000	-0.447	-0.0238	0.1119	-0.0109	0.0886	0.1151	-0.0246	-0.1093
Primary branch number			1.0000	0.9101**	0.7681**	0.6728**	0.7622**	0.3660*	0.1633	0.7668**
Cluster number				1.0000	0.8394**	0.7044**	0.8002**	0.3285	0.1181	0.8054**
Pod number					1.0000	0.5609**	0.6548**	0.3521*	0.1762	0.9480*
Pod length						1.0000	0.7049**	0.2599	0.2915	0.5529**
Seed number per pod							1.0000	0.4835**	0.0599	0.7091**
Hundred seed weight								1.0000	0.2231	0.3970*
Seed protein									1.0000	0.2535
Seed yield										1.0000

Significant of 5 per cent level ** Significant at 1 per cent level

Table 2. Path co-efficient analysis for seed yield (based on *per se* performance)

	Plant height wering	Days to 50% flo number	Primary branch per pod	Cluster number weight	Pod number	Pod length	Seed number	Hundred seed	Seed protein	Seed yield
Plant height	0.0670	0.0071	0.0310	-0.0640	0.3865	-0.0293	-0.0558	-0.0161	0.0348	0.4727
Days to 50% flowering	0.0363	0.0131	-0.0064	0.0052	0.0956	0.0013	-0.0273	-0.0057	-0.0028	0.1093
Primary branch number	0.0144	-0.0006	0.1426	-0.1991	0.6562	-0.0816	0.2347	-0.0183	0.0185	0.7668**
Cluster number	0.0196	-0.0003	0.1298	-2187	0.7171	-0.0854	0.2464	-0.0164	0.0134	0.8054**
Pod number	0.0303	0.0015	0.1095	-0.1836	0.8543	-0.0680	0.2016	-0.0176	0.0220	0.9480**
Pod length	0.0162	-0.0001	0.0959	-0.1541	0.4792	-0.1213	0.2170	-0.0130	0.0330	0.5529**
Seed number	0.0121	-0.0021	0.1087	0.1750	0.5594	-0.0855	0.3079	-0.0241	0.0068	0.7091**
per pod Hundred	0.0216	0.0015	0.522	-0.0718	0.3008	-0.315	0.1487	-0.0497	0.253	0.3970**
seed weight Seed protein	0.0206	-0.0003	0.0233	-0.0258	0.1505	-0.354	0.0184	-0.0111	0.1133	0.2535

Diagonal figure underlined indicate direct effects ** Significant at 1 per cent level Residual effect : 0.2523

References

Dewey, D.R. and Lu, K.H. (1959) A correlation and path coefficient analysis of components of crested wheat grass production. *Agron. J.*, 51 : 515-518.

Kumar, M.H. and Reddy, N.P. (1987) Influence of various characters on yield in blackgram I(Vigna mungo (L) Hepper). *Andra Agric. J.*, 34 : 285-289.

Luthra, J.B. and Singh, K.B. (1978) Path analysis of yield and its components in F2 and F3 populations of Urd bean. *SABRAO . J.*, 10 :36-39.

Patel, S.T. and Shah, R.M. (1982) Genetic parameters, association and path analysis in blackgram. *Madras Agric. J.*, 69 : 535-539.

Patil, H.S. and Narkhede. B.N. (1987) Variability, Association and path analysis in blackgram. *J. Maharastra Agric. Univ.*, 12 : 289-292.

Rao, M.S., Reddy, N.S.R, Subramanayam.D., Murthy. B.K. and Periniah, A. (1983) Correlation and path analysis in blackgram (*Vigna mungo* (L0. Hepper). *The Andra Agric J.*, 30 : 93-96.

Sagar, P. and Lal, S. (1979) Heterosis and characte association in blackgram. *Indian J. Agric. Sci.*, 49 : 769-775.

Sandhu, T.S., Bhullar, B.S. Cheema, H.S. and Brar, J.S. (1980) Character correlation and divergence in blackgram. *Indian J. Agri. Sci.*, 50 : 541-544.

Sarker, A., Wahhab, M.A., Sarker, D.M. and Bengum, K. (1984) Genetic variability and inter-relationship in blackgram. *Bangaladesh J. Agric. Res.*, 9 : 108-111.

Soundarapandian, G,, R. Nagarajan, K. Mahudeswaran and P.V. Marappan, (1976) Genotypic and Phenotypic correlation and path analysis in blackgram (*Vigna mungo* (L) Hepper). *Madras Agric. J.*, 63 : 141-147.

Usha Rani, Y. and S.J. Rao, (1981) Interrelationship between yield and yield components in blackgram. *Indian J. Agric. Sci.* 51 : 378-381.

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