Plant Archives Vol. 14 No. 1, 2014 pp. 537-540 *ISSN 0972-5210*

CORRELATION AND PATH COEFFICIENT ANALYSIS IN DOLICHOS BEAN (*DOLICHOS LABLAB* L. *TYPICUS* PRAIN) GENOTYPES

V. Chaitanya*, R. V. S. K Reddy[1], S. R. Pandravada[2], M. Sujata[3] and P. Arun Kumar

College of Horticulture, Dr. Y. S. R. H. U, Rajendranagar, Hyderabad - 30 (A.P.), India.
[1]Vegetable Research Station, A. R. I., Rajendranagar, Hyderabad - 30 (A.P.), India.
[2]N.B.P.G.R. Regional Station, Hyderabad (A.P.), India.
[3]College of Agriculture, Acharya N.G. Ranga Agricultural University, Rajendranagar, Hyderabad-30 (A.P.), India.

Abstract

Forty eight genotypes of dolichos bean for thirteen yield and yield contributing characters, which are diverse in origin. In dolichos bean pod yield per plant showed positive and significant correlation with number of pods per plant, days to last pod harvest, number of inflorescences per plant, pod length, pod width, pod weight, number of seeds per pod, 100 seed weight and protein content and significant negative correlation with days to first flowering, days to 50% flowering and days to first pod harvest at both phenotypic and genotypic levels. Path analysis revealed that number of pods per plant exhibited high positive direct effect on pod yield per plant followed by pod weight at both levels of significance, days to 50% flowering showed moderate positive direct effect on pod yield per plant. The direct negative effects on pod yield were observed by number of inflorescences per plant, pod length, pod width and protein content.

Key words : Dolichos bean, correlation, path coefficient analysis.

Introduction

Dolichos bean (*Dolichos lablab* L. var. *typicus*) is an important vegetable crop of Indian origin (Deka and Sarkar, 1990). It occupies unique position for vegetable purpose among the legume vegetables (Biju *et al*., 2001). It is a good source of protein, minerals and vitamins (Basu *et al*., 2002). Yield depends on many components hence the information on the correlation between yield and its components is a prerequisite for crop improvement. The comparative magnitude of contribution made by various yield components is not obtained from correlation coefficient analysis. Path coefficient analysis is used for partitioning the direct and indirect effects to measure relative importance of all the characters. Keeping in view the above facts, the present investigation was undertaken to know the mean performance of the genotypes, correlation and path coefficient among yield and its contributing characters in 48 genotypes of dolichos bean collected from Andhra Pradesh.

Materials and Methods

The field experiment was comprised of 48 genotypes of dolichos bean growing during *rabi*, 2010-11 at N.B.P.G.R. Regional Station, Hyderabad (Andra Pradesh), India; in a randomized block design with three replications. All the recommended package of practices was followed to raise a good crop. For this study of correlation and path coefficient analysis, we used thirteen yield and yield contributing characters, *viz*., days to first flowering, days to 50% flowering, number of inflorescences per plant, days to first pod harvest, days to last pod harvest, pod length (cm), pod width (cm), pod weight (g), number of pods per plant, number of seeds per pod, 100 seed weight (g), protein content (%) and pod yield per plant (g) were recorded on randomly selected five plants in each replication. The correlation coefficient was worked out as per Al-Jibouri *et al*. (1958) and path coefficient of various characters was calculated by the formula by Dewey and Liu (1959).

***Author for correspondence :** E-mail: chaitanya.hortico@gmail.com

Results and Discussion

Correlation coefficient analysis

Genotypic correlation coefficients were observed to be higher than the corresponding phenotypic correlation coefficients for all the characters indicating the supervision of phenotypic expression under the influence of environmental factors (table 1). Pod yield per plant

Table 1 : Phenotypic (P) and genotypic (G) correlation coefficients among nineteen yield and yield attributes in forty eight genotypes of dolichos bean.

S. no.		Days to first flowering	Days to 50% flowering	No. of inflores-cences per plant	Days to first pod harvest	Days to last pod harvest	Pod length (cm)	Pod width (cm)	Pod weight (g)	No. of seeds/pod	No. of pods/ plant	100 seed weight (g)	Protein content (%)	Pod yield per plant (g)
DFF	**P**	**1.0000**	0.9940**	0.1014	0.9615**	-0.1360	-0.1178	-0.0980	0.0352	-0.1736*	-0.1814*	0.1450	0.1528	-0.1641*
	G	**1.0000**	1.0004	0.1405	0.9959**	-0.1695*	-0.1473	-0.1246	0.0348	-0.1842*	-0.2047*	0.1750*	0.1570	-0.1884*
D50% F	**P**	0.9941**	**1.0000**	0.1189	0.9558**	-0.1274	-0.1229	-0.1062	0.0218	-0.1714*	-0.1819*	0.1282	0.1607	-0.1662*
	G	1.0004	**1.0000**	0.1566	0.9960**	-0.1643*	-0.1557	-0.1246	0.0348	-0.1842*	-0.2049*	0.1618	0.1641*	-0.1924*
NI	**P**	0.1014	0.1189	**1.0000**	0.0842	0.4392**	0.0196	0.0204	-0.0506	-0.0629	0.2008*	0.0169	0.1779*	0.1226
	G	0.1405	0.1566	**1.0000**	0.1515	0.5783**	0.0449	0.0010	-0.1076	-0.1243	0.2587**	0.0512	0.2056*	0.1804*
DFPH	**P**	0.9615**	0.9585**	0.0842	**1.0000**	-0.1255	-0.1567	-0.0432	-0.0142	-0.1804*	-0.1004	0.1358	0.1454	-0.1183
	G	0.9959**	0.9965**	0.1515	**1.0000**	-0.1656*	-0.2129*	-0.0667	-0.0208	-0.221**	-0.1492	0.1607	0.1526	-0.1656*
DLPH	**P**	-0.1360	-0.1274	0.4390**	-0.1255	**1.0000**	0.2186**	0.0864	0.1253	0.1550	0.4729**	0.0364	0.1813*	0.5211**
	G	-0.1695*	-0.1643*	0.5780**	-0.1656*	**1.0000**	0.2119**	0.0834	0.1255	0.1628	0.5342**	0.0765	0.1950*	0.5761**
PL	**P**	-0.1178	-0.1229	0.0196	-0.1567	0.2186**	**1.0000**	-0.236**	0.6569**	0.4691**	0.0307	0.1415	0.1672*	0.2845**
	G	-0.1473	-0.1557	0.0449	-0.2129*	0.2119*	**1.0000**	-0.289**	0.7240**	0.5480**	0.0226	0.1499	0.1818*	0.2937**
PW	**P**	-0.0980	-0.1062	0.0204	-0.0432	0.0864	-0.236**	**1.0000**	-0.0928	-0.1361	0.2485**	0.0380	0.1206	0.1722*
	G	-0.1246	-0.1289	0.0010	-0.0667	0.0834	-2.883**	**1.0000**	-0.1222	-0.229**	0.2861**	0.0507	0.1319	0.1865*
PWT	**P**	0.0352	0.0218	-0.0506	-0.0142	0.1253	0.6568**	-0.0928	**1.0000**	0.2713**	-0.0665	0.2188**	0.1164	0.3237**
	G	0.0348	0.0213	-0.1076	-0.0208	0.1255	0.7243**	-0.1222	**1.0000**	0.3170**	-0.0726	0.2270**	0.1212	0.3167**
NSP	**P**	-0.1736*	-0.1714*	-0.0629	-0.1804*	0.1550	0.4698**	-0.1361	0.2713**	**1.0000**	0.1223	0.0739	0.1025	0.2537**
	G	-0.1842*	-0.1821*	-0.1243	-0.2210**	0.1628*	0.548***	-0.229**	0.3170**	**1.0000**	0.1327	0.1525	0.1192	0.2910**
NPP	**P**	-0.1814*	-0.1819*	0.2008*	-0.1004	0.4721**	-0.0370	0.2485**	-0.0665	0.1223	**1.0000**	-0.0369	0.2212**	0.8982**
	G	-0.2047*	-0.2049*	0.2587**	-0.1492	0.5341**	0.0226	0.2860**	-0.0726	0.1327	**1.0000**	-0.0430	0.2303**	0.9071**
100 SW	**P**	0.1450	0.1382	0.0169	0.1358	0.0364	0.1415	0.0380	0.2188**	0.0739	-0.0369	**1.0000**	0.2178**	0.0759
	G	0.1750*	0.1618	0.0512	0.1607	0.0765	0.1499	0.0507	0.2270**	0.1525	-0.0430	**1.0000**	0.2399**	0.0697
PC	**P**	0.1528	0.1607	0.1779*	0.1454	0.1813*	0.1672*	0.1206	0.1164	0.1025	0.2212**	0.2178**	**1.0000**	0.2257**
	G	0.1570	0.1641*	0.2056*	0.1526	0.1950*	0.1818*	0.1319	0.1212	0.1192	0.2303**	0.2399**	**1.0000**	0.2281**
PYP	**P**	-0.1641	-0.1662	0.1524	-0.1183	0.5210**	0.2845**	0.1722*	0.3232**	0.2537**	0.8980**	0.0759	0.2257**	**1.000**
	G	-0.1884*	-0.1924*	0.1804*	-0.1656*	0.5760**	0.2937**	0.1865*	0.3161**	0.2910**	0.9071**	0.0697	0.2281**	**1.000**

Table 2 : Direct and indirect effects of various yield and yield attributes on pod yield in forty eight genotypes of dolichos bean.

S. no.		Days to first flowering	Days to 50% flowering	No. of inflores-cences per plant	Days to first pod harvest	Days to last pod harvest	Pod length (cm)	Pod width (cm)	Pod weight (g)	No. of seeds/ pod	No. of pods per plant	100 seed weight (g)	Protein content (%)	Correlation coefficient
Days to first flowering	**P**	-0.0070	-0.0069	0.0008	-0.0059	-0.0002	-0.0031	0.0029	-0.0041	-0.0026	0.0033	-0.0032	-0.0004	-0.0474
	G	**-1.0965**	-1.0970	-0.1541	-1.0920	0.1858	0.1615	0.1366	-0.0381	0.2020	0.2245	-0.1919	-0.1721	-0.1884
Days to 50% flowering	**P**	0.2622	**0.2637**	0.0314	0.2520	0.0336	0.0324	0.0280	0.0057	0.0452	0.0480	0.0364	0.0424	-0.1662
	G	-0.2241	**-0.2240**	-0.0351	-0.2231	0.0368	0.0349	0.0289	-0.0048	0.0408	0.0459	-0.0362	-0.0368	-0.1924
No. of inflore-scences/plant	**P**	-0.0034	-0.0040	**-0.0339**	-0.0029	-0.0149	-0.0007	-0.0007	0.0017	0.0021	-0.0068	-0.0006	-0.0060	0.1524
	G	-0.0064	-0.0071	**-0.0456**	-0.0069	-0.0264	-0.0020	0.0000	0.0049	0.0057	-0.0118	-0.0023	-0.0094	0.1804
Days to first pod harvest	**P**	-0.1451	-0.1442	-0.0127	**-0.1509**	0.0189	0.0236	0.0065	0.0021	0.0272	0.0152	-0.0205	-0.0219	-0.1183
	G	1.2844	1.2845	0.1954	**1.2897**	-0.2136	-0.2746	-0.0860	-0.0268	-0.2850	-0.1924	0.2072	0.1968	-0.1656
Days to last pod harvest	**P**	-0.0102	-0.0096	0.0330	-0.0094	**0.0751**	0.0164	0.0065	0.0094	0.0116	0.0354	0.0027	0.0136	0.5211
	G	-0.0245	-0.0238	0.0836	-0.0240	**0.1446**	0.0307	0.0121	0.0181	0.0235	0.0773	0.0111	0.0282	0.5761
Pod length (cm)	**P**	0.0052	0.0054	-0.0009	0.0069	-0.0096	**-0.0439**	0.0104	-0.0289	-0.0206	0.0013	-0.0062	-0.0073	0.2845
	G	0.0192	0.0203	-0.0059	0.0278	-0.0277	**-0.1306**	0.0377	-0.0946	-0.0716	-0.0030	-0.0196	-0.0237	0.2937
Pod width (cm)	**P**	0.0013	0.0014	-0.0003	0.0006	-0.0011	0.0031	**-0.0132**	0.0012	0.0018	-0.0033	-0.0005	-0.0016	0.1722
	G	0.0072	0.0074	-0.0001	0.0039	-0.0048	0.0167	**-0.0578**	0.0071	0.0133	-0.0165	-0.0029	-0.0076	0.1865
Pod weight (g)	**P**	0.0130	0.0080	-0.0187	-0.0052	0.0462	0.2423	-0.0342	**0.3690**	0.1001	-0.0245	0.0807	0.0430	0.3237
	G	0.0150	0.0092	-0.0463	-0.0090	0.0540	0.3122	-0.0527	**0.4307**	0.1368	-0.0313	0.0978	0.0522	0.3167
No. of seeds/ pod	**P**	-0.0077	-0\.0076	-0.0028	-0.0080	0.0069	0.0208	-0.0060	0.0120	**0.0443**	0.0054	0.0033	0.0045	0.2537
	G	-0.0289	-0.0285	-0.0195	-0.0346	0.0255	0.0858	-0.0359	0.0498	**0.1566**	0.0208	0.0239	0.0187	0.2910
No. of pods/ plant	**P**	-0.1671	-0.1676	0.1851	-0.0926	0.4350	0.0283	0.2290	-0.0613	0.1127	**0.9216**	-0.0340	0.2039	0.8982
	G	-0.1640	-0.1642	0.2072	-0.1195	0.4280	0.0181	0.2295	-0.0581	0.1063	**0.8010**	-0.045	0.1845	0.9071
100 seed weight (g)	**P**	0.0062	0.0059	0.0007	0.0058	0.0016	0.0061	0.0016	0.0094	0.0032	-0.0016	**0.0429**	0.0094	0.0759
	G	0.0024	0.0022	0.0007	0.0022	0.0011	0.0021	0.0007	0.0031	0.0021	-0.0006	**0.0137**	0.0033	0.0697
Protein content (%)	**P**	-0.0031	-0.0033	-0.0037	-0.000	-0.0037	-0.0034	-0.0025	-0.0024	-0.0021	-0.0045	-0.0045	**-0.0205**	0.2257
	G	-0.0013	-0.0014	-0.0017	-0.0013	-0.0016	-0.0015	-0.0011	-0.0010	-0.0010	-0.0019	-0.0020	**-0.0084**	0.2281

exhibited highly significant positive association with number of inflorescences per plant, days to last pod harvest, pod length, pod width, pod weight, number of seeds per pod, number of pods per plant, 100 seed weight and protein content indicating the importance of these traits in selection for yield. Direct selection based on these traits would result in simultaneous improvement of aforesaid traits and yield in dolichos bean. This is in agreement with the results obtained by Rai *et al*. (2009), Chauhan *et al*. (2007) and Bangar *et al*. (2008) for number of pods per plant, pod weight, pod length, number of seeds per pod and Vasanthi and Das (1996) for protein content. Thus, the number of pods per plant seems to have predominated effect on pod yield per plant. Hence, there is ample scope in the improvement of yield by selecting a genotype having higher pod number and days to last pod harvest since, they are highly correlated. On contrary, pod yield per plant expressed significant negative correlation with days to first flowering, days to 50 percent flowering and days to first pod harvest.

Path coefficient analysis

Path coefficient analysis revealed that number of pods per plant exhibited high positive direct effect on pod yield per plant followed by pod weight at both levels of significance. Similar results were reported by Rai *et al*. (2009); Chattopadhyay and Dutta (2010).

Days to 50 percent flowering showed moderate positive direct effect on pod yield per plant, which is in agreement with Bangar *et al*. (2008) and Hingane and Navale (2008) and days to last pod harvest recorded low positive direct effect on pod yield per plant. This suggested that direct selection based on these traits will be rewarding for yield improvement in dolichos bean.

Days to first flowering showed very high negative direct effect on pod yield. Pod length exhibited low negative direct effect on pod yield per plant. For pod length similar results was reported by Rai *et al*. (2009). In this situation, the indirect causal factors are to be considered simultaneously for selection. The highest indirect effect on pod yield per plant was shown by number of pods per plant through days to last pod harvest and pod width. However, the highest indirect positive effect of pod weight on pod yield per plant was recorded through pod length and number of seeds per pod. Thus, the path coefficient analysis revealed the importance of characters such as number of pods per plant and pod weight in selection of superior genotypes for pod yield per plant.

References

Al-Jibouri, H. A., P. A. Miller and H. F. Robinson (1958). Genotypic and environmental variances and covariance in an upland cotton cross of interspecific origin. *Agronamy Journal*, **50** : 632-636.

Bangar, N. D., L. Amith and B. H. Chavan (2008). Correlation and path coefficient of analysis in Moth bean. *Journal of Maharashtra Agricultural Universities*, **33(2)** : 164-166.

Basu, A. K., S. K. Samantha and A. C. Sasmala (2002). Genetic analysis for some seed parameters in Lablab bean. *Veg. Sci*., **29(1)** : 163-164.

Biju, M. G., K. P. Prasanna and S. Rajan (2001). Genetic divergence in hyacinth bean. *Agron. Journal*, **45** : 578-81.

Chattopadyay, A. and S. Dutta (2010). Characterization and identification of selection indices of pole type dolichos bean. *Vegetable Crops Research Bulletin*, **73** : 33-45.

Chauhan, M. P., A. C. Mishra and A. K. Singh (2007). Correlation and path analysis in urd bean. *Legume Research*, **30(3)** : 205-208.

Deka, R. K. and C. R. Sarkar (1990). Nutrient composition and anti-nutritional factors of *Dolichos lablab* L. seeds. *Food Chemistry*, **38** : 239-246.

Dewey, D. R. and K. H. Lu (1959). A correlation with path coefficient analysis of components of creasted weed grass seed production. *Agronomy Journal*, **51** : 515-518.

Hingane, A. J. and P. A. Navale (2008). Path Analysis in Cluster bean (*Cymopsis tetragonoloba* (L.) Taub). *Journal of Maharashtra Agricultural Universities*, **33(3)** : 419-420.

Rai, N., B. S. Asati and A. K. Singh (2009). Genetic divergence, correlation and path analysis in Indian bean. *Legume Research*, **32(2)** : 166-172.

Vasanthi, S. and V. L. D. Das (1996). Correlation and path analysis in fodder lablab. *Madras Agricultural Journal*, **83(3)** : 147-149.