

Correlation and path coefficient analysis in indian bean (*Dolichos lablab* L.)

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ABSTRACT

Fifty diverse genotypes of Indian bean (*Dolichos lablab* L.) were evaluated for correlation and path coefficient for twelve characters. Seed yield per plant was found to be highly significant and positively correlated with days to 50 per cent flowering, number of clusters per plant, number of pods per plant and days to maturity at phenotypic level while pod length and plant height had significant and positive correlation with seed yield per plant at phenotypic level. The number of clusters per plant, number of pods per cluster, 100-seed weight, number of branches per plant and pod length exhibited high and positive direct effects on seed yield per plant. The path analysis showed that maximum direct effects as well as appreciable indirect influences were exerted by number of clusters per plant, number of pods per cluster, 100-seed weight and number of branches per plant and pod length. Selection of these traits may be effective for the improvement of Indian bean.

Key Words: Indian bean, correlation, path coefficient analysis

Indian bean (*Dolichos lablab* L.), commonly known as hyacinth bean, Dolichos bean or Sem, is an important vegetable crop of Indian origin. Seed yield depends on many component traits hence the information in the correlation between seed 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 coefficients; path analysis is used for partitioning direct and indirect effects to measure relative importance of the causal factors.

MATERIALS AND METHODS

The field experiment was comprised of 50 promising germplasm of Indian bean grown during Rabi 2009-10 at the Instructional Farm, College of Agriculture, Junagadh Agricultural University, Junagadh (Gujarat) in randomized block design with three replications. Each entry was accommodated in a single row of 7.0 m length with a spacing of 1.5 m between two rows and 1.0 m between two plants within the row. The experiment was surrounded by two guard rows to avoid

border effects. All the recommended package of practices and plant protection measures were followed timely to raise a good crop. Five plants were randomly taken from each plot to record observations for days to 50 per cent flowering, number of branches per plant, number of clusters per plant, number of pods per cluster, number of pods per plant, pod length (cm), pod width (cm), number of seeds per pod, 100-seed weight (g), plant height (cm), days to maturity and seed yield per plant (g). The statistical analysis was done according to the methods of Panse and Sukhatme (1985) for analysis of variance, Al-Jibouri *et al.*, (1958) for phenotypic and genotypic correlation coefficients for all the pair wise character, Dewey and Lu (1959) for path coefficient analysis.

RESULTS AND DISCUSSION

The analysis of variance revealed significant mean squares differences among the genotypes for all the traits studied. The values of genotypic correlation in general were higher than their phenotypic correlation in the present investigation (Table 1). Seed yield per plant was found to be highly significant and positively correlated with days to 50 per cent flowering, number of clusters per plant, number of pods per plant and days to maturity at phenotypic level. Similar results

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Table 1. Genotypic (r_g) and phenotypic (r_p) correlation coefficients among 12 characters in Indian bean

Characters		Days to 50 per cent flowering	Number of branches per plant	Number of clusters per plant	Number of pods per cluster	Number of pods per plant	Pod length (cm)	Pod width (cm)	Number of seeds per pod	100-seed weight (cm)	Plant height (cm)	Days to maturity
Seeds yield per plant (g)	rg	0.4150	0.1689	0.5295	0.1443	0.5654	0.2071	-0.1923	0.0628	0.1667	0.1743	0.3977
Days to 50 per cent flowering	rp	0.3668**	0.1494	0.5019**	0.1277	0.5539**	0.2082*	-0.1788*	0.0634	0.1516	0.1649*	0.3577**
Number of branches per plant	rg		0.0066	0.5383	-0.1202	0.4984	0.2159	0.0170	0.4359	-0.0717	0.4254	0.8300
Number of clusters per plant	rp		-0.0053	0.4798**	-0.1240	0.4393**	0.1997*	0.0048	0.3946**	-0.0514	0.3539**	0.7178**
Number of pods per cluster	rg			0.0937	-0.0038	0.1344	-0.1998	0.0952	-0.2181	-0.1881	-0.1208	0.0005
Number of pods per plant	rp			0.0485	0.0724	0.1169	-0.1450	0.0605	-0.1710*	-0.1563	-0.0437	-0.0181
Number of pods per cluster	rg				-0.3933	0.8371	0.1604	-0.0945	0.0940	-0.0802	0.1575	0.4652
Number of pods per plant	rp				0.4333**	0.8068**	0.1343	-0.1060	0.0724	-0.0704	0.1411	0.4289**
Number of pods per cluster	rg					0.1219	-0.3328	-0.3191	-0.2353	-0.3337	0.0587	-0.2057
Number of pods per plant	rp					0.1142	-0.2638**	-0.2451**	-0.1797*	-0.2788**	0.0569	-0.1864*
Pod length (cm)	rg					-0.0634	-0.2573	-0.1057	-0.3645	0.1856	0.3296	
Pod width (cm)	rp							0.1354	0.4351**	0.4232**	0.2369**	0.3300**
Pod width (cm)	rg								0.2084	0.3949	-0.1946	0.3517
Number of seeds per pod	rp								0.1888*	0.3619**	-0.1724*	0.3069**
100-seed weight (g)	rg									0.3111	0.3926	0.6147
Plant height (cm)	rp									0.2752**	0.3614**	0.5279**
	rg										0.0811	0.2458
	rp										0.0680	0.1986*
	rg											0.3605
	rp											0.2969**

* , ** Significant at 5 % and 1% levels, respectively.

Table 2. Genotypic (rg) and phenotypic (rp) path coefficient analysis showing direct and indirect effect of different characters in Indian bean

Characters	Days to 50 per cent flowering	Number of branches per plant	Number of clusters per plant	Number of pods per cluster	Number of pods per plant	Pod length (cm)	Pod width (cm)	Number of seeds per pod	100-seed weight (cm)	Plant height (cm)	Days to maturity	rg and rp yield per plant
Days to 50 per cent flowering	rg 0.2308	0.0015	0.1242	-0.0277	0.1150	0.0498	0.0039	0.1006	-0.0166	0.0982	0.1915	0.4150
	rp 0.0990	-0.0005	0.0475	-0.0123	0.0435	0.0198	0.0005	0.0391	-0.0051	0.0350	0.0711	0.3668**
Number of branches per plant	rg 0.0015	0.2287	0.0214	-0.0009	0.0307	-0.0457	0.0218	-0.0499	-0.0430	-0.0276	0.0001	0.1689
	rp -0.0008	0.1614	0.0078	0.0117	0.0189	-0.0234	0.0098	-0.0276	-0.0252	-0.0071	-0.0029	0.1494
Number of clusters per plant	rg 0.5821	0.1013	1.0814	-0.4254	0.9052	0.1735	-0.1022	0.1016	-0.0867	0.1704	0.5031	0.5295
	rp 0.3482	0.0352	0.7258	-0.3145	0.5856	0.0975	-0.0770	0.0525	-0.0511	0.1024	0.3113	0.5019**
Number of pods per cluster	rg -0.0935	-0.0029	-0.3059	0.7776	0.0948	-0.2588	-0.2481	-0.1830	-0.2595	0.0456	-0.1600	0.1443
	rp -0.0695	0.0406	-0.2428	0.5604	0.0640	-0.1478	-0.1374	-0.1007	-0.1563	0.0319	-0.1044	0.1277
Number of pods per plant	rg -0.2208	-0.0595	-0.3708	-0.0540	-0.4429	0.0281	0.1140	0.0468	0.1614	-0.0822	-0.1460	0.5654
	rp -0.0438	-0.0117	-0.0805	-0.0114	-0.0998	0.0059	0.0239	0.0101	0.0334	-0.0176	-0.0317	0.5539**
Pod length (cm)	rg 0.0294	-0.0272	0.0218	-0.0452	-0.0086	0.1360	0.0204	0.0629	0.0650	0.0360	0.0486	0.2071
	rp 0.0273	-0.0199	0.0184	-0.0361	-0.0080	0.1369	0.0185	0.0595	0.0579	0.0324	0.0452	0.2082*
Pod width (cm)	rg -0.0032	-0.0177	0.0176	0.0595	0.0479	-0.0280	-0.1863	-0.0388	-0.0736	0.0363	-0.0655	-0.1923
	rp -0.0009	-0.0112	0.0196	0.0453	0.0442	-0.0250	-0.1848	-0.0349	-0.0669	0.0319	-0.0567	-0.1788*
Number of seeds per pod	rg -0.0329	0.0165	-0.0071	0.0178	0.0080	-0.0349	-0.0157	-0.0755	-0.0235	-0.0296	-0.0464	0.0628
	rp -0.0260	0.0113	-0.0048	0.0118	0.0066	-0.0287	-0.0124	-0.0659	-0.0181	-0.0238	-0.0348	0.0634
100-seed weight (g)	rg -0.0324	-0.0850	-0.0362	-0.1508	-0.1647	0.2159	0.1784	0.1406	0.4518	0.0366	0.1110	0.1667
	rp -0.0188	-0.0573	-0.0258	-0.1021	-0.1226	0.1550	0.1325	0.1008	0.3662	0.0249	0.0727	0.1516
Plant height (cm)	rg -0.0466	0.0132	-0.0173	-0.0064	-0.0203	-0.0290	0.0213	-0.0430	-0.0089	-0.1096	-0.0395	0.1743
	rp -0.0277	0.0034	-0.0110	-0.0045	-0.0138	-0.0185	0.0135	-0.0283	-0.0053	-0.0782	-0.0232	0.1649*
Days to maturity	rg 0.0006	0.0000	0.0003	-0.0001	0.0002	0.0002	0.0002	0.0004	0.0002	0.0003	0.0007	0.3977
	rp 0.0798	-0.0020	0.0477	-0.0207	0.0353	0.0367	0.0341	0.0587	0.0221	0.0330	0.1112	0.3577**

*, ** = Significant at 5% and 1% levels, respectively Residual Effect: R=0.3616 (Genotypic path-rg), R=0.3475 (Phenotypic path-rp)

were also reported by Rai *et al.*, (2009) for seed yield per plant and number of pods per plant and Bendale *et al.*, (2008) for seed yield per plant and number of branches per plant. The seed yield per plant was positively correlated at both phenotypic and genotypic levels with number of branches per plant, number of pods per cluster, pod length, number of seeds per pod, 100-seed weight and plant height, indicating that these attributes were influencing the seed yield in Indian bean and they can serve as marker indicator characters for improvement in seed yield.

The days to 50 per cent flowering had significant and positive correlation with number of clusters per plant, number of pods per plant, pod length, number of seeds per pod, plant height and days to maturity; number of clusters per plant had significant and positive association with number of pods per cluster, number of pods per plant and days to maturity; pod length had had significant and positive association with number of seeds per pod, 100-seed weight, plant height and days to maturity; pod width had significant and positive correlation with number of seeds per pod, 100-seed weight and days to maturity; number of seeds per pod had significant and positive association with 100-seed weight, plant height and days to maturity. Similarly, 100-seed weight and plant height had significant and positive correlation with days to maturity.

The path coefficient analysis (Table 2) revealed the number of clusters per plant, number of pods per cluster, 100-seed weight, number of branches per plant and pod length exhibited high and positive direct effects on seed yield per plant. Similar results were also reported by Rai *et al.*, (2009) and Bendale *et al.*, (2008). Days to 50 per cent flowering and days to maturity exhibited moderate and positive direct effects towards seed yield. The path analysis showed that maximum direct effects as well as appreciable indirect influences were exerted by number of clusters per plant, number of pods per cluster, 100-seed weight, number of branches per plant and pod length and due weightage should be given to these traits while improving seed yield per plant in Indian bean.

The pod width had high negative direct effect on seed yield at phenotypic level but contributed indirectly by exerting positive effects via number of pods per cluster, number of pods per plant, plant height and number of clusters per plant and resulted positive association with seed yield. Similarly, number of pods per plant also showed negative low direct effect on seed yield at both level but its positive correlation with seed yield was primarily formed through its indirect contribution through 100-seed weight, pod width and number of seeds per pod. Plant height had negative and low direct effect on yield but contributed indirectly by exerting positive indirect effects via pod width. Number of pods per plant had negative direct effect on seed yield but it contributed indirectly through their positive indirect effects via number of pods per cluster, number of branches per plant and number of pods per plant thereby giving their significant and positive associations with seed yield.

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