

Original Research Article

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Correlation and Path Analysis Study in Dolichos Bean (*Lablab purpureus* L.)

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ABSTRACT

Present investigation was carried out at Department of Horticulture, Sam Hingginbottom Institute of Agriculture, Technology and Sciences, Allahabad, U.P. during 2015-2016. The experimental material comprised of thirty genotypes of dolichos bean and the experiment was laid out in Randomized Block Design with three replications. Green pod yield per plant was significantly positive correlated with 100 seed weight, pod length, pod width, number of pods per inflorescence, number of seeds per pod, pod weight, vine length, number of green pod pickings and days to last green pod harvest. 100 seed weight showed highest direct positive effect on green pod yield per plant followed by number of pods per inflorescence, days to last green pod harvest, pod length, days to first flowering, vine length, pod width and number of seeds per pod. While other traits like YBMV incidence %, pod weight, number of green pod picking, days to first pod harvest, number of flowers per inflorescence, inflorescence length showed direct negative effect on green pod yield per plant at genotypic as well as phenotypic level.

Keywords

Genotypes, Characters, Correlation and path analysis.

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Introduction

Dolichos bean (*Lablab purpureus* L.) is an important leguminous vegetable grown throughout the country and is mainly grown for its green pods, while the dry seeds also used in various vegetable preparations.

It is one of the major sources of protein in the preparations in India (Savitha *et al.*, 2012). It is a field crop mostly confined to a large extent in Andhra Pradesh, Tamil Nadu, Karnataka, Chhattisgarh and some parts of Bihar and Uttar Pradesh. Among the quantitative characters, yield is a complex character and is dependent on a number of

yield contributing characters. Therefore, the Knowledge of correlation between yield and its contributing characters are basic and for most endeavor to find out guide lines for plant selection. Partitioning of total correlation into direct and indirect effect by path coefficient analysis helps in making the selection more effective.

Keeping in view the above facts, the present investigation was undertaken to assess the genetic diversity of 30 dolichos bean genotypes collected from Chhattisgarh based on morphological variations.

Materials and Methods

The experiment was carried out at the Horticulture Research Farm, Department of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad U.P. The experiment was conducted in Randomized Block Design having thirty genotypes collected from different part of Chhattisgarh in three replications. The allocation of treatments of the individual plots using random number in each replications with spacing 1.5× 1 m row to row and plant to plant respectively. Five plants from each replication were taken for recording observation on 16 characters viz. days to first flowering, days to 50% flowering, inflorescence length, number of flowers per inflorescence, number of pods per inflorescence, days to first green pod harvest, days to last pod harvest, number of green pod pickings, vine length, pod length, pod width, pod weight, number of seeds per pod, 100 seed weight, green pod yield per plant, YBMV incidence %.

Results and Discussion

Correlation analysis

Correlation coefficient is a statistical measure which is used to find out the degree and direction of relationship between two or more variables. The necessity of coefficient of correlation to describe the degree of association between independent and dependent variables. Association analysis gives an idea about relationship among the various characters and determines the component characters, on which selection can be used for genetic improvement in the pod yield. The yield components may not always be independent in their nature but may be interlinked. Correlation analysis provided a measure of genetic association between the characters and normally used in selection

while, environmental as well as genetic architecture of a genotype plays a great role in achieving higher yield combined with better quality. In this experiment green pod yield per plant is highly significant and positively correlated with 100 seed weight (0.5730) followed by pod length (0.48), pod width (0.45), number of pods per inflorescence (0.37), while non-significant and positively correlated with number of seeds per pod (0.33), pod weight (0.32), vine length (0.24), number of green pod picking (0.22) and days to last green pod harvest (0.014), whereas highly significant and negatively correlated with YBMV incidence % (-0.6046) while non-significant and negative correlated with days to first green pod harvest (-0.20), days to first flowering (-0.1965), number of flowers per inflorescence (-0.1799) at genotypic level (Table 3). Similar result was observed by Patel *et al.*, (2014) for pod length, number of seeds per pod, 100 seed weight, and days to last green pod harvest. The experimental findings on correlated coefficient analysis are in general agreement with the result reported by Baswana *et al.*, (1980), Pandita *et al.*, (1980), Pandey *et al.*, (1980), Dahiya *et al.*, (1991), Upadhyay *et al.*, (2011) and Kiran *et al.*, (2014) (Tables 1 and 2).

Path analysis

Path coefficient analysis is an important tool for partitioning the correlated coefficients into the direct and indirect effects of independent variables on a dependent variable with the inclusion of more variables in correlated study. Their indirect association becomes more complex. Two characters may show correlated, just because they are correlated with a common third one. In such circumstances, path coefficient analysis provides an effective means of a critical examination of specific forces action to produce a given correlated and measure the relative importance of each factor.

Table.1 Genotypic correlations coefficient of yield and its attributing traits of dolichos bean

S. N.	Character	Days to first flowering	Days to 50% Flowering	Inflorescence Length	No. of flowers per Inflorescence	No. of pods Per Inflorescence	Days to First Green Pod harvest	Days to Last Green Pod harvest	No. of green Pod Picking	Vine Length	Pod Length	Pod Width	Pod Weight	No. of seeds Per Pod	100 seed weight	YBMV Incidence	Green Pod Yield per Plant
1	Days to first Flowering	1.000	0.995**	-0.028	0.317	0.108	0.991**	0.101	-0.084	0.126	-0.353	-0.013	-0.298	-0.264	-0.133	0.291	-0.196
2	Days to 50% Flowering		1.000	-0.013	0.306	0.118	0.996**	0.115	-0.069	0.143	-0.362*	-0.029	-0.319	-0.261	-0.143	0.295	-0.207
3	Inflorescence length			1.000	0.534**	0.158	-0.0009	0.223	0.158	0.268	-0.012	0.144	0.156	0.056	-0.065	0.322	-0.041
4	No. of flowers per inflorescence				1.000	0.337	0.302	0.183	0.166	0.139	-0.168	-0.115	-0.325	-0.187	-0.101	0.281	-0.179
5	No. of pods per inflorescence					1.000	0.144	0.072	0.463**	0.421*	0.313	-0.087	0.058	-0.041	0.490**	-0.430*	0.374*
6	Days to first green pod harvest						1.000	0.111	-0.060	0.154	-0.340	-0.032	-0.295	-0.261	-0.120	0.289	-0.202
7	Days to last green pod harvest							1.000	0.702**	0.339	-0.044	-0.260	-0.172	0.201	0.379*	0.241	0.014
8	No. of green pod picking								1.000	0.400*	0.391*	-0.140	0.214	0.292	0.666**	-0.111	0.228
9	Vine Length									1.000	0.234	-0.139	-0.020	0.066	0.224	-0.101	0.240
10	Pod Length										1.000	-0.025	0.283	0.371*	0.570**	-0.309	0.485**
11	Pod width											1.0000	0.633**	0.1745	-0.066	-0.168	0.459**
12	Pod Weight												1.000	0.247	0.242	-0.263	0.328
13	No. of seeds per pod													1.000	0.302	-0.062	0.337
14	100 seed Weight														1.000	-0.439*	0.573**
15	YBMV Incidence															1.000	-0.604**
16	Green pod yield per plant																1.000

* Significant at 5% level
 ** Significant at 1% level

Table.2 Phenotypic correlations coefficient of yield and its attributing traits of dolichos bean

S. N.	Character	Days to first flowering	Days to 50% Flowering	Inflorescence Length	No. of flowers per Inflorescence.	No. of pods Per Inflorescence	Days to First Green Pod harvest	Days to Last Green Pod harvest	No. of green Pod Picking	Vine Length	Pod Length	Pod Width	Pod Weight	No. of seeds Per Pod	100 seed weight	YBMV Incidence	Green Pod Yield per Plant
1	Days to first flowering	1.000	0.995**	-0.028	0.317	0.108	0.991**	0.101	-0.084	0.126	-0.353	-0.013	-0.298	-0.264	-0.133	0.291	-0.196
2	Days to 50% flowering		1.000	-0.013	0.306	0.118	0.996**	0.115	-0.069	0.143	-0.362*	-0.029	-0.319	-0.261	-0.143	0.295	-0.207
3	Inflorescence length			1.000	0.534**	0.158	-0.0009	0.223	0.158	0.268	-0.012	0.144	0.156	0.056	-0.065	0.322	-0.041
4	No. of flowers per inflorescence				1.000	0.337	0.302	0.183	0.166	0.139	-0.168	-0.115	-0.325	-0.187	-0.101	0.281	-0.179
5	No. of pods per inflorescence					1.000	0.144	0.072	0.463**	0.421*	0.313	-0.087	0.058	-0.041	0.490**	-0.430*	0.374*
6	Days to first green pod harvest						1.000	0.111	-0.060	0.154	-0.340	-0.032	-0.295	-0.261	-0.120	0.289	-0.202
7	Days to last green pod harvest							1.000	0.702**	0.339	-0.044	-0.260	-0.172	0.201	0.379*	0.241	0.014
8	No. of green pod picking								1.000	0.400*	0.391*	-0.140	0.214	0.292	0.666**	-0.111	0.228
9	Vine Length									1.000	0.234	-0.139	-0.020	0.066	0.224	-0.101	0.240
10	Pod Length										1.000	-0.025	0.283	0.371*	0.570**	-0.309	0.485**
11	Pod width											1.0000	0.633**	0.1745	-0.066	-0.168	0.459**
12	Pod Weight												1.000	0.247	0.242	-0.263	0.328
13	No. of seeds per pod													1.000	0.302	-0.062	0.337
14	100 seed Weight														1.000	-0.439*	0.573**
15	YBMV Incidence															1.000	-0.604**
16	Green pod yield per plant																1.000

Table.3 Genotypic path coefficient of green pod yield and its attributing traits in dolichos bean

S.N.	Character	Days to first flowering	Inflorescence length	No. of flowers per inflorescence	No. of pods Per inflorescence	Days to first green pod harvest	Days to last green pod harvest	No. of green pod picking	Vine length	Pod length	Pod Width	Pod weight	No. of seeds Per pod	100 seed weight	YBM V incidence
1	Days to first Flowering	0.4756	-0.0133	0.1511	0.0516	0.4716	0.0483	-0.0403	0.0603	-0.1681	-0.0066	-0.1422	-0.1256	0.0635	0.1385
2	Inflorescence length	0.0003	-0.0112	-0.0060	-0.0018	0.0000	-0.0025	-0.0018	-0.0030	0.0001	-0.0016	-0.0017	-0.0006	0.0007	0.0036
3	No. flowers per inflorescence	-0.0251	-0.0422	-0.0791	-0.0267	-0.0239	-0.0145	-0.0132	-0.0110	0.0133	0.0092	0.0257	0.0148	0.0080	0.0222
4	No. of pods per inflorescence	0.0234	0.0341	0.0726	0.2154	0.0312	0.0155	0.0999	0.0908	0.0675	-0.0188	0.0126	-0.0090	0.1056	0.0928
5	Days to first green pod harvest	-0.5886	0.0005	-0.1794	-0.0859	-0.5936	-0.0659	0.0360	-0.0918	0.2019	0.0192	0.1753	0.1551	0.0712	0.1721
6	Days to last green pod harvest	0.0266	0.0584	0.0481	0.0189	0.0291	0.2617	0.1838	0.0888	-0.0116	-0.0682	-0.0450	0.0527	0.0993	0.0631
7	No. of green pod Picking	0.0299	-0.0561	-0.0590	-0.1640	0.0215	-0.2482	-0.3535	-0.1415	-0.1383	0.0495	-0.0757	-0.1035	0.2354	0.0394
8	Vine length	0.0199	0.0421	0.0219	0.0662	0.0243	0.0533	0.0629	0.1571	0.0368	-0.0220	-0.0032	0.0105	0.0352	0.0159
9	Pod length	-0.0907	-0.0032	-0.0432	0.0804	-0.0873	-0.0114	0.1004	0.0601	0.2566	-0.0066	0.0727	0.0953	0.1463	0.0795
10	Pod width	-0.0091	0.0949	-0.0758	-0.0571	-0.0212	-0.1707	-0.0917	-0.0915	-0.0167	0.6548	0.4149	0.1143	0.0436	0.1104
11	Pod weight	0.0841	-0.0440	0.0915	-0.0164	0.0831	0.0484	-0.0602	0.0058	-0.0798	-0.1784	0.2815	-0.0697	0.0682	0.0742
12	No. of seeds per Pod	-0.0187	0.0040	-0.0133	-0.0030	-0.0186	0.0143	0.0208	0.0047	0.0264	0.0124	0.0176	0.0710	0.0214	0.0044
13	100 seed Weight	-0.0516	-0.0252	-0.0391	0.1895	-0.0464	0.1467	0.2575	0.0866	0.2204	-0.0258	0.0937	0.1168	0.3867	0.1697
14	YBMV incidence	-0.0726	-0.0804	-0.0701	0.1073	-0.0723	-0.0601	0.0278	0.0252	0.0772	0.0420	0.0657	0.0155	0.1094	0.2492
15	Green pod yield per plant	-0.1965	-0.0415	-0.1799	0.3746	-0.2024	0.0149	0.2284	0.2406	0.4859	0.4592	0.3289	0.3375	0.5730	0.6046

Table.4 Phenotypic path analysis of green pod yield and its attributing traits in dolichos bean

s.n.	Character	Days to 50% flowering	Inflorescence length (cm)	No. of flowers per inflorescence	No. of pods per inflorescence	Days to first green pod harvest	Days to last green pod harvest	No. green pod picking	Vine length	Pod length	Pod width	Pod weight	Seeds per pod	100 seed weight	YBMV incidence
1	Days to 50% flowering	0.409	-0.0055	0.1204	0.0452	0.4073	0.046	-0.0238	0.055	-0.147	-0.0121	-0.1286	-0.0882	-0.0582	0.1104
2	Inflorescence length	-0.001	0.0813	0.0407	0.0116	-0.0001	0.018	0.0116	0.019	-0.001	0.0117	0.0124	0.0037	-0.0053	0.0240
3	No. of Flowers per inflorescence	-0.038	-0.0652	-0.1303	-0.0395	-0.0379	-0.022	-0.0161	-0.015	0.020	0.0144	0.0395	0.0175	0.0128	-0.0329
4	No. of pods per inflorescence	0.008	0.0105	0.0223	0.0736	0.0099	0.005	0.0244	0.026	0.020	-0.0060	0.0038	0.0000	0.0332	-0.0288
5	Days to first green pod harvest	-0.484	0.0006	-0.1420	-0.0656	-0.4876	-0.053	0.0248	-0.069	0.165	0.0157	0.1424	0.1022	0.0582	-0.1287
6	Days to last green pod harvest	-0.0005	-0.0010	-0.0008	-0.0003	-0.0005	-0.004	-0.0026	-0.001	0.0002	0.0012	0.0008	-0.0007	-0.0017	-0.0010
7	No. of green pod picking	0.0032	-0.0078	-0.0068	-0.0182	0.0028	-0.032	-0.0551	-0.014	-0.018	0.0066	-0.0107	-0.0142	-0.0313	0.0061
8	Vine Length	0.0180	0.0318	0.0162	0.0469	0.0189	0.041	0.0360	0.132	0.028	-0.0173	-0.0032	0.0073	0.0282	-0.0134
9	Pod length	-0.0593	-0.0022	-0.0261	0.0467	-0.0557	-0.006	0.0551	0.035	0.164	-0.0042	0.0456	0.0502	0.0930	-0.0460
10	Pod width	-0.0188	0.0916	-0.0707	-0.0517	-0.0206	-0.165	-0.0760	-0.083	-0.016	0.6376	0.3996	0.0917	-0.0424	-0.0988
11	Pod weight	0.1224	-0.0595	0.1181	-0.0203	0.1138	0.066	-0.0754	0.009	-0.108	-0.2443	0.3898	-0.0843	-0.0935	0.0996
12	No. of seeds Per Pod	-0.0203	0.0043	-0.0127	0.0000	-0.0198	0.015	0.0244	0.005	0.028	0.0136	0.0204	0.0944	0.0227	-0.0061
13	100 seed weight	-0.0594	-0.0273	-0.0410	0.1884	-0.0498	0.156	0.2374	0.088	0.236	-0.0277	0.1002	0.1004	0.4175	-0.1691
14	YBMV incidence	-0.0712	-0.0780	-0.0668	0.1032	-0.0697	-0.057	0.0290	0.026	0.073	0.0409	0.0675	0.0169	0.1070	-0.2641
15	Green pod yield per Plant	-0.1925	-0.0265	-0.1793	0.3199	-0.1889	0.007	0.1938	0.213	0.447	0.4301	0.2999	0.2970	0.5402	-0.5487

Path coefficient analysis can explain the extent of relative contribution. In this analysis, fruit yield per plant was taken as dependent variable and the rest of the characters were considered as independent variables. The path coefficient analysis which splits total correlated coefficient of different characters into direct and indirect effects on fruit yield per plant in such a manner that the sum of direct and indirect effects is equal to total genotypic correlated. Data revealed that 100 seed weight (0.38) showed the highest direct positive effect on green pod yield per plant followed by number of pods per inflorescence (0.2154), days to last green pod harvest (0.2617), pod length (0.2566), days to first flowering (0.047), vine length (0.1571), pod width (0.065) and number of seeds per pod (0.071) while other traits like YBMV incidence % (-0.24), pod weight (-0.2815), number of green pod picking (-0.3535), days to first pod harvest (-0.59), number of flowers per inflorescence (0.0791), inflorescence length (-0.013) showed direct negative effect on green pod yield per plant at genotypic level (Table 3). Patel *et al.*, (2014) observed similar result that pod weight, number of seeds per pod, 100 seed weight, pod width expressed a higher positive direct effect on green pod yield per plant. Singh *et al.*, (2015) also observed that pod width expressed a higher positive direct effect on green pod yield per plant. Kiran *et al.*, (2014) also reported that pod weight showed a higher positive direct effect on green pod yield per plant (Table 4).

It is concluded that green pod yield per plant was significantly and positively correlated with 100 seed weight, pod length, pod width, number of pods per inflorescence, seeds per pod, pod weight, vine length, number of green pod picking and days to last green pod harvest. 100 seed weight showed high direct positive effect on green pod yield per plant followed by number of pods per

inflorescence, days to last green pod harvest, pod length, days to first flowering, vine length, pod width and number of seeds per pod. Therefore these characters should be considered in selection criteria for increasing green pod yield per plant.

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