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Association of characters and path coefficient analysis studies in rice bean [*Vigna umbellata* (Thumb) Ohwi and Ohashi]

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ABSTRACT

The correlation and path analysis were worked out for fifty genotypes of rice bean for 12 different characters. The correlation studies revealed that the seed yield per plant exhibited significantly positive correlation with number of pods per plant, number of seeds per pod, pod length, number of branches per plant and harvest index. Path coefficient revealed that number of pods per plant with the highest direct effect and contributed towards yield. Other traits, number of pods per plant, pod length, number of branches per plant, plant height at harvest, and days to 50% flowering were also found to be important yield indicators in rice bean.

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Key words : Phenotypic and genotypic correlation, Path analysis

INTRODUCTION

The information about interrelationship between the yield and yield components facilitates the choice of suitable breeding method to be applied and selecting the parents for improving the crop. The phenotypic and genotypic correlations have their own importance in breeding programme. The phenotypic correlation coefficient helps in determining selection index whereas genotypic correlation coefficient provides a close measure of association between characters and gives an indication of characters which may be useful for overall improvement of crop. They may also help to identify characters that have little or no importance in the selection programme. However they do not provide the exact picture of direct and indirect cause of such association which can be had through path analysis. Path analysis suggested by Dewey and Lu (1959) was used to estimate the direct and indirect contribution of different traits on yield.

MATERIALS AND METHODS

The present investigation was conducted at Botany farm, College of Agriculture, Pune-5. Fifty germplasm lines received from Officer

In-Charge, NBPGR, Regional Station, Umiam (Meghalaya) were evaluated in replicated trial during *Kharif* 2006. In a Randomized Block Design into three homogenous replications, fifty genotypes were randomly sown. Each entry was represented by the row of 4.5 m length spaced at 45 cm between the rows and 15 cm between the plants within the row. The basal dose of 25 kg N and 50 kg P_2O_5 per hectare was applied to whole experiment area. To understand the association among the characters, genotypic and phenotypic correlation coefficients were worked out by adopting method described by Singh and Chaudhari (1977). Path coefficient analysis was done according to the procedure suggested by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The number of pods per plant (0.9604), number of seeds per pod, pod length, harvest index, number of branches per plant and plant height at harvest showed highly significant positive association with seed yield per plant at genotypic level (Table 1). Days to 50% flowering showed significantly negative correlation with seed yield per plant (-0.2901). However, other three characters, 100 seed weight, number of root nodules per plant and shattering percentage exhibited non-significant positive correlation. Days to maturity showed non-significant negative correlation with seed yield per plant at genotypic level. The finding of the present study coincides with Sharma *et al.* (1991), Chaudhary *et al.* (2000), Sharma and Hore (1994) and Baisakh (1992).

Among the 12 characters studied, pod length recorded maximum direct effect (1.8114) on seed yield per plant (Table 2). This trait had significant and positive correlation with seed yield. Similarly positive direct effect were obtained for plant height at harvest, shattering percentage, days to maturity, number of branches per

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Table 1 : Correlation (above diagonal) and genotypic (below diagonal) coefficients of 12 characters in rice bean

Characters	Days to 50% flowering	Days to maturity	Panicle length at harvest (cm)	No. of branches per plant	No. of pods per plant	Pod length (cm)	No. of seeds per pod	100 seed weight (g)	No. of nodules per plant	Harvest index (%)	Shelling (%)	Seed yield per plant
Days to 50% flowering	1	0.9212**	0.2161	0.078	0.3793*	0.6016**	0.2805*	0.1980**	0.2660*	0.6858**	0.1733	0.2301*
Days to maturity	0.2105	1	0.0918	0.2959*	0.5873**	0.1710**	0.9585	0.1767**	0.0721	0.0712	0.2396	0.2109
Panicle length at harvest (cm)	0.0585	0.0956	1	0.3760**	0.3619**	0.1773	0.4953**	0.2722	0.2588	0.0828	0.1391	0.4597**
No. of branches per plant	0.0608	0.1281	0.2811*	1	0.5110**	0.1721**	0.2182	0.1721	0.0919	0.3332*	0.1511	0.5529**
No. of pods per plant	0.2617	0.0262	0.3085	0.4512**	1	0.3860**	0.3810**	0.1576	0.1396	0.6796**	0.0362	0.9607**
Pod length (cm)	0.1954	0.2815*	0.0170	0.0798	0.1658	1	0.9134**	0.3761*	0.1646	0.5775**	0.0843	0.5983**
No. of seeds per pod	0.0721	0.0058	0.2355	0.1995	0.3013*	0.1921	1	0.1711**	0.1228	0.2715	0.1921**	0.7503**
100 seed weight (g)	0.1151	0.2081	0.1531	0.0571	0.0582	0.1857	0.0755	1	0.0919	0.1781	0.0289	0.1189
No. of nodules per plant	0.0126	0.0351	0.1752	0.0092	0.1092	0.0813	0.0905	0.1191	1	0.1171	0.3959**	0.1855
Harvest index (%)	0.2613	0.3621	0.0511	0.2126	0.3163*	0.1601	0.0681	0.1391	0.1053	1	0.0111	0.5163**
Shelling (%)	0.1065	0.1685	0.0555	0.0218	0.0569	0.0711	0.022	0.0311	0.1629	0.0076	1	0.0575
Seed yield per plant	0.1121	0.1018	0.3581*	0.1012**	0.1812**	0.1218	0.3615**	0.1111	0.0351	0.0365	0.0102	1

* and ** indicate significance of values at 0.05 and 0.01, respectively.

Table 2 : Correlation (above diagonal) and phenotypic (below diagonal) coefficients of 12 characters in rice bean

Characters	Days to 50% flowering	Days to maturity	Panicle length at harvest (cm)	No. of branches per plant	No. of pods per plant	Pod length (cm)	No. of seeds per pod	100 seed weight (g)	No. of nodules per plant	Harvest index (%)	Shelling (%)	Seed yield per plant
Days to 50% flowering	1	0.9212**	0.2161	0.078	0.3793*	0.6016**	0.2805*	0.1980**	0.2660*	0.6858**	0.1733	0.2301*
Days to maturity	0.2105	1	0.0918	0.2959*	0.5873**	0.1710**	0.9585	0.1767**	0.0721	0.0712	0.2396	0.2109
Panicle length at harvest (cm)	0.0585	0.0956	1	0.3760**	0.3619**	0.1773	0.4953**	0.2722	0.2588	0.0828	0.1391	0.4597**
No. of branches per plant	0.0608	0.1281	0.2811*	1	0.5110**	0.1721**	0.2182	0.1721	0.0919	0.3332*	0.1511	0.5529**
No. of pods per plant	0.2617	0.0262	0.3085	0.4512**	1	0.3860**	0.3810**	0.1576	0.1396	0.6796**	0.0362	0.9607**
Pod length (cm)	0.1954	0.2815*	0.0170	0.0798	0.1658	1	0.9134**	0.3761*	0.1646	0.5775**	0.0843	0.5983**
No. of seeds per pod	0.0721	0.0058	0.2355	0.1995	0.3013*	0.1921	1	0.1711**	0.1228	0.2715	0.1921**	0.7503**
100 seed weight (g)	0.1151	0.2081	0.1531	0.0571	0.0582	0.1857	0.0755	1	0.0919	0.1781	0.0289	0.1189
No. of nodules per plant	0.0126	0.0351	0.1752	0.0092	0.1092	0.0813	0.0905	0.1191	1	0.1171	0.3959**	0.1855
Harvest index (%)	0.2613	0.3621	0.0511	0.2126	0.3163*	0.1601	0.0681	0.1391	0.1053	1	0.0111	0.5163**
Shelling (%)	0.1065	0.1685	0.0555	0.0218	0.0569	0.0711	0.022	0.0311	0.1629	0.0076	1	0.0575
Seed yield per plant	0.1121	0.1018	0.3581*	0.1012**	0.1812**	0.1218	0.3615**	0.1111	0.0351	0.0365	0.0102	1

* and ** indicate significance of values at 0.05 and 0.01, respectively.

plant, 100 seed weight and number of nodules per plant.

The high magnitudinal direct effect of pod length, number of branches per plant and plant height at harvest along with highly significant correlation in the desired direction towards seed yield, indicated the true and perfect relationship between them suggesting direct selection based on these characters would help in selecting the high yielding genotypes in rice bean. The results obtained are in aggrement with the results of Gadekar and Dhumale (1990), Jadhav (1996), Sharma and Hore (1994) and Chaudhari (1997) for plant height and number of branches per plant.

Conclusion:

The correlation studies revealed that the characters, no. of pods per plant, pod length, number of seeds per pod, harvest index and plant height at harvest have significant positive association with seed yield per plant. Days to 50% flowering had significant negative association with seed yield per plant. The characters days to 50% flowering and days to maturity had significantly negative association with most of the characters studied except 100 seed weight where it was significantly positive. The characters plant height at harvest, number of pods per plant, number of branches per plant, pod length and number of seeds per pod showed significantly positive association between each other. Harvest index was also significant positive associated with number of pods per plant, number of branches per plant and pod length.

The path analysis studies revealed that pod length, number of branches per plant, days to maturity, plant height at harvest and shattering percentage had maximum positive direct effect on yield while days to 50% flowering had maximum negative direct effect on yield. The characters pod length, plant height at harvest and number of branches per plant which exhibited positive direct effect also had significant positive association with seed yield per plant. The characters number of pods per plant, number of seeds per pod and harvest index showed significantly positive association with yield but its direct effect was negative

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