



Character Association and Path Coefficient Analyses for Yield and Component Traits in Pigeonpea [*Cajanus cajan* (L.) Millspaugh]

Key words : Character association, Pigeonpea and Path analysis

Eighty three pigeonpea [*Cajanus cajan* (L.) Millsp.] genotypes obtained from different research centers across the country were sown in randomized block design with three replications at Regional Agricultural Research Station, Lam, Guntur during *khari* 2008. Each plot consisted of six rows of 4m length/genotype/replication with inter- and intra-row spacing of 0.90 and 0.20m, respectively. The observations were recorded on five equally competitive plants, randomly selected from each genotype per replication for eleven characters, viz., plant height (cm), number of branches plant⁻¹, number of pods plant⁻¹, pod length (cm), number of seeds pod⁻¹, seed yield plant⁻¹ (g) and harvest index. Days to 50% flowering, days to maturity, 100 seed weight (g) and protein content (%) were recorded on plot basis. The character protein content was estimated using the procedure described by Williams Horowitz (A.O.A.C, 1980). The data were statistically analyzed to estimate genotypic and phenotypic correlation coefficients as per Falconer (1964) and for direct and indirect effects through path coefficient analysis following the procedure of Dewey and Lu (1959).

Genotypic correlation coefficients in general were higher than phenotypic correlation coefficients (Table 1). The characters viz., days to 50% flowering, days to maturity, plant height, number of branches plant⁻¹, number of pods plant⁻¹, pod length, number of seeds pod⁻¹, harvest index and protein content showed significant positive correlation with seed yield. These results are in broad agreement with Aher *et al.*, (1998), Baskaran and Muthaiah (2007), Mausumi Das *et al.*, (2007) and Kalaimagal *et al.*, (2008). Days to 50% flowering showed significant positive association with days to maturity, plant height, number of branches plant⁻¹, pods plant⁻¹, seeds pod⁻¹ and protein content both at phenotypic and genotypic levels (Aher *et al.*, 1998). Days to maturity exhibited significant positive association with plant height, number of branches plant⁻¹, pods plant⁻¹ and seeds pod⁻¹ (Baskaran and Muthaiah, 2007), while this trait showed significant negative association with 100 seed weight (Jagadish Singh, 1999) and harvest index (Pandey and Singh, 2001).

Plant height had significant positive association with number of branches plant⁻¹, pods plant⁻¹ and seeds pod⁻¹ (Baskaran and Muthaiah, 2007; Mausumi Das *et al.*, 2007; Singh *et al.*, 2008 and Kalaimagal *et al.*, 2008). This trait showed significant negative association with protein content. Number of branches plant⁻¹ showed significant positive association with pod length, pods plant⁻¹, seeds pod⁻¹ and 100 seed weight (Basavarajaiah *et al.*, 1999 and Mausumi Das *et al.*, 2007).

The number of pods plant⁻¹ exhibited significant positive association with pod length, seeds pod⁻¹, harvest index (Francis Kwame Padi, 2003). It recorded negative association with 100 seed weight (Basavarajaiah *et al.*, 1999). Pod length had significant positive association with seeds pod⁻¹, 100 seed weight, harvest index and protein content (Baskaran and Muthaiah 2007 and Mausumi Das *et al.*, 2007). Number of seeds pod⁻¹ showed significant positive association with protein content (Aher *et al.*, 1998). At genotypic level, this trait exhibited significant negative correlation with 100 seed weight (Pandey and Singh, 2001) and significant positive correlation with harvest index (Basavarajaiah *et al.*, 1999). 100 seed weight had significant positive association with protein content. Harvest index showed positive significant association with seed yield plant⁻¹ (Basavarajaiah *et al.*, 1999) and protein content.

Path coefficient analysis revealed that pods plant⁻¹ exerted highest direct effect on seed yield plant⁻¹ (Baskaran and Muthaiah 2007) followed by days to maturity and harvest index (Francis Kwame Padi, 2003) (Table 2). At genotypic level, days to 50% flowering exerted negative direct effect on seed yield plant⁻¹, while pod length exerted at phenotypic level (Vanniarajan *et al.*, 1997). Most of the characters exhibited their indirect effect through days to 50% flowering, days to maturity, plant height, branches plant⁻¹, pods plant⁻¹, 100 seed weight, harvest index and protein content.

The character association and path coefficient analyses revealed that major emphasis should be given on selection process for plant types with more number of pods and late maturing genotypes for realizing higher seed yield in pigeonpea.

Table 1. Phenotypic (above diagonal) and genotypic (below diagonal) correlations for 11 characters in 83 pigeonpea [*Cajanus cajan* (L.) Millsp] genotypes

Character	Days to 50% flowering	Days to Maturity	Plant height	Branches plant ⁻¹	Pods plant ⁻¹ length	Seeds pod ⁻¹ weight	100 seed weight	Harvest index	Protein content	Seed yield plant ⁻¹
Days to 50% flowering	—	0.82**	0.47**	0.40**	0.57**	0.09	0.19**	0.07	-0.15*	0.12*
Days to Maturity	0.87**	—	0.35**	0.31**	0.49**	0.10	0.18**	-0.02	-0.22**	0.08
Plant height	0.55**	0.42**	—	0.54**	0.61**	0.10	0.18**	0.10	0.08	-0.06
Branches plant ⁻¹	0.46**	0.34**	0.63**	—	0.53**	0.13*	0.17**	0.13*	0.10	0.04
Pods plant ⁻¹	0.60**	0.53**	0.71**	0.62**	—	0.12*	0.28**	-0.04	0.21**	0.00
Pod length	0.13*	0.16*	0.13*	0.22**	0.20**	—	0.20**	0.15*	0.24**	0.17**
Seeds pod ⁻¹	0.47**	0.59**	0.54**	0.37**	0.75**	0.64**	—	-0.06	0.09	0.13*
100 seed weight	0.09	-0.03	0.12*	0.19**	-0.05	0.21**	-0.26**	—	-0.02	0.14*
Harvest index	-0.17**	-0.25**	0.09	0.09	0.26**	0.39**	0.24**	-0.00	—	0.17**
Protein content	0.12*	0.09	-0.07	0.04	0.01	0.23**	0.32**	0.18**	0.18**	—
Seed yield plant ⁻¹	0.60**	0.56**	0.68**	0.64**	0.90**	0.23**	0.77**	0.00	0.40**	0.14*

*, ** = Significant at 5% level and at 1% level, respectively.

Table 2. Estimates of direct and indirect effects (genotypic) between yield and components in pigeonpea [*Cajanus cajan* (L.) Millsp]

Character	Days to 50% flowering	Days to Maturity	Plant height	Branches plant ⁻¹	Pods plant ⁻¹	Pod length	Harvest index	Protein content
Days to 50% flowering	-0.3430	-0.2992	-0.1894	-0.1584	-0.2065	-0.0446	0.0603	-0.0444
Days to maturity	0.5137	0.5889	0.2518	0.2026	0.3164	0.0954	-0.1492	0.0579
Plant height	0.1394	0.1079	0.2524	0.1608	0.1806	0.0339	0.0246	-0.0194
Branches plant ⁻¹	0.0247	0.0184	0.0341	0.0535	0.0333	0.0123	0.0050	0.0023
Pods plant ⁻¹	0.5400	0.4819	0.6418	0.5573	0.8970	0.1865	0.2399	0.0111
Pod length	0.0279	0.0347	0.0288	0.0492	0.0446	0.2145	0.0841	0.0500
Seeds pod ⁻¹	-0.2722	-0.3405	-0.3158	-0.2176	-0.433	-0.3730	-0.1388	-0.1871
100 seed weight	-0.0182	0.0065	-0.0229	-0.0369	0.0093	-0.0409	0.0013	-0.0351
Harvest index	-0.0394	-0.0568	0.0219	0.0209	0.0599	0.0878	0.2241	0.0423
Protein content	0.0349	0.0265	-0.0208	0.0118	0.0034	0.0629	0.0509	0.2700
Genotypic correlation with seed yield	0.6078**	0.5685**	0.6819**	0.6432**	0.9046**	0.2348**	0.7715**	0.4023**

Residual effect: 0.3488 Bold and diagonal values are direct effects

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