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Correlation And Path Analyses of Yield and Its Component Traits in Pigeonpea [*Cajanus cajan* (L.) Millsp.]

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ABSTRACT

Keywords

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Twenty one genotypes of pigeonpea were used to investigate the nature and magnitude of association of seed yield with major agronomic characters viz., plant height (cm), days to 50 per cent flowering, days to maturity, number of branches, number of pods per plant and 100 seed weight (g). This research also focussed on finding the direct and indirect effect of the various yield contributing characters on seed yield by path coefficient analysis. Correlation studies, revealed the positive and significant relationship of number of pods per plant, days to 50 per cent flowering, number of branches per plant with seed yield. The path coefficient analysis indicated that characters viz., plant height, number of pods per plant, days to 50 per cent flowering, and days to maturity should be considered as selection indices in seed yield improvement programme as they recorded high direct effects on seed yield per plant.

Introduction

Pulses are the major source of proteins and are consumed worldwide to meet the protein requirement of the growing population. It is an important leguminous crop of tropics and sub-tropics occupying an important position in rainfed agriculture. Among the leguminous crops, pigeonpea [*Cajanus cajan* (L.) Millsp.] is a predominant crop grown and consumed in India. India is the largest producer and processor of pulses in the world (www.indiamicrofinance.com). Pigeonpea is the second most important pulse crop next to chickpea in India. Out of the total production of pulses (221 lakh tonnes), 19.14 per cent

share (42.3 lakh tonnes) is from pigeonpea (Directorate of Economics and Statistics, 2016-17 – Second advance estimate).

A complete understanding of the correlation between yield and yield components is a must for a plant breeder towards the improvement of any crop. Similarly path analysis determines the direct and indirect effects of these characters towards the yield. As emphasized by Pandey *et al.*, (2015) the optimum combination of yield contributing traits can be accumulated in a particular genotype only by understanding the inter relationships of various traits using correlation and path coefficients. Seed yield is a

dependant character and whenever plant breeder goes for selection for yield it always misleads because it depends on various characters and to some extent to the environmental conditions (Bal Chinmayee, 2016). An attempt has been made in this study to know the relationship between yield and different yield attributing characters and their direct and indirect effects on yield in pigeonpea.

Materials and Methods

A total of 21 pigeonpea cultures were utilised for the present study. The experiment was conducted in the farm of National Pulses Research Station, Vamban, Pudukkottai, Tamil Nadu during *kharif* 2016. The genotypes were raised in randomized block design with three replications. A spacing of 0.9 m between rows and 0.25 cm between plants were maintained in a plot of size 5m x 4m. All the recommended agronomic practices were strictly followed. Observations were recorded from five randomly selected plants in each replication for each genotype for characters *viz.*, plant height (cm), days to 50 per cent flowering, days to maturity, number of branches, number of pods per plant, 100 seed weight (g) and seed yield per plant. The data were subjected to statistical analysis *viz.*, correlation and path analysis as per the standard procedure. Data obtained were subjected to correlation and path coefficient analysis using statistical software TNAU STAT statistical package (Manivannan, 2014).

Results and Discussion

Results of correlation analysis were presented in Table 1. Genotypic correlation will provide the genotypic association between different yield attributing traits and helpful for the plant breeders to correctly identify the appropriate traits.

Seed yield was found to be significantly and positively correlated with number of branches, number of pods per plant and days to 50 per cent flowering.

Similar findings were reported by Mahendran (2011), Saroj *et al.*, (2013), Katiyar *et al.*, (2004) and Kesh Ram *et al.*, (2016). Positive and significant association of number of pods per plant with seed yield shows that it proves to be a vital character affecting final grain yield as corroborated by the report of Ganesamurthy and Dorairaj (1990).

Plant height had significant and positive association with days to 50 per cent flowering, days to maturity at genotypic level. It had a significant but negative association with 100 seed weight and number of branches per plant. Significant positive correlation was observed between pods per plant and days to 50 per cent flowering and days to maturity.

Days to 50 per cent flowering had significant and positive correlation with days to maturity. However 100 seed weight had significant and negative association with days to 50 per cent flowering and days to maturity. Hence it may be concluded that number of pods, number of branches, days to 50 per cent flowering and days to maturity are the important selection indices for seed yield based on correlation. Though 100 seed weight has no influence on seed yield, due to the negative association with days to 50 per cent flowering and days to maturity it should be given due importance during selection for high yield. Significant relationship between days to 50 per cent flowering and number of pods per plant, days to maturity, seed yield will help in improving the genotypes for selecting towards higher seed yield.

This study was in accordance with Sodavadiya *et al.*, (2009), Linge *et al.*, (2010), Prasad *et al.*, (2013), Kesh Ram *et al.*, (2016).

Table.1 Genotypic correlation coefficients of yield and yield contributing characters

Characters		Plant height (cm)	No. of branches	No. of pods/plant	Days to 50% flowering	Days to maturity	100 seed weight (g)	Seed yield per plant (g)
Plant height (cm)	G	1.0000	-0.5071*	0.3662	0.9031**	0.7775**	-0.5039*	0.2776
	P	1.0000	0.3449	0.6787**	0.6762**	0.5672**	-0.3849	0.5546**
No. of branches	G		1.0000	0.2457	0.1553	0.3768	0.0333	0.5403*
	P		1.0000	0.7305**	0.0861	0.1853	0.0060	0.7609**
No. of pods/plant	G			1.0000	0.6421**	0.6372**	-0.2907	0.9081**
	P			1.0000	0.4115	0.3924	-0.1951	0.8891**
Days to 50% flowering	G				1.0000	0.9201**	-0.4767*	0.6759**
	P				1.0000	0.9025**	-0.4687*	0.4178
Days to maturity	G					1.0000	-0.4872*	0.6594**
	P					1.0000	-0.4785*	0.3948
100 seed weight (g)	G						1.0000	-0.3459
	P						1.0000	-0.2352
Seed yield per plant (g)	G							1.0000
	P							1.0000

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

G and P -Genotypic and phenotypic correlation coefficients respectively

Table.2 Direct effect, indirect effect and genotypic correlation of yield-related traits with yield of *Cajanus cajan* (L.) Millsp

Traits	Plant height (cm)	No. of branches	No. of pods/plant	Days to 50% flowering	Days to maturity	100 seed weight (g)	Genotypic correlation with seed yield per plant
Plant height (cm)	-0.3465	-0.1298	0.2422	0.8376	-0.3986	0.0728	0.2776
No. of branches	0.1757	0.2560	0.1625	0.1440	-0.1932	-0.0048	0.5402*
No. of pods/plant	-0.1269	0.0629	0.6613	0.5955	-0.3267	0.0420	0.9081**
Days to 50% flowering	-0.3129	0.0397	0.4246	0.9274	-0.4717	0.0688	0.6759**
Days to maturity	-0.2694	0.0965	0.4214	0.8533	-0.5127	0.0704	0.6594**
100 seed weight (g)	0.1746	0.0085	-0.1923	-0.4421	0.2498	-0.1444	-0.3459

Residual effect: 0.1366; *, ** Significant at 5 and 1 % level respectively

Path coefficient analysis reveals the partitioning of correlation coefficients into direct and indirect effects and gives a more realistic relationship of the characters and helps in identifying the effective components. In the present investigation, path analysis was carried out using genotypic correlation of component traits on seed yield per plant. The characters viz., number of pods per plant and days to 50 per cent flowering showed high and positive direct effect on seed yield per plant and it was positive and moderate in case of number of branches. The direct effect of plant height and days to maturity seems to be high but in negative direction (Table 2). This clearly indicates that seed yield can be improved by resorting to selection for all these traits. The relationship of number of pods with yield was also studied by Francis (2003), Baskaran and Muthiah (2007), Thanki and Sawargaonkar, (2010), Mahendran (2011), Rao *et al.*, (2013), Kesha ram *et al.*, (2016) and they reported high positive direct effect of number pods per plant Among the traits, 100-seed weight alone had low and negative direct effect on seed yield per plant. It indicated that this trait is not an important trait for seed yield improvement programme. The traits number of pods per plant and days to flowering has moderate to high and positive indirect effects via other traits. The traits days to maturity has moderate to high and negative indirect effects via other traits on seed yield per plant. Hence based on path analysis, plant height, number of pods per plant, days to 50% flowering and days to maturity should be given importance in seed yield improvement programme.

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