active leaf area in the case of SB 461 variety was less than half as compared to that of CSH 5. This superiority of CSH 5 with respect to LAI over CS 3541 and LAI and NAR over SB 461 was responsible for its higher dry matter accumulation at the reproductive phase in the ear and the higher yield.

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GENETIC VARIABILITY, CORRELATION AND PATH ANALYSIS IN PIGEONPEA

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ABSTRACT

Estimates of variability, heritability, genetic advance, correlation and path analysis were carried out in pigeonpea for seven characters. The highest genotypic coefficient of variation was observed for pod number followed by cluster number and seed yield while it was lowest for seeds per pod. High heritability and genetic advance were observed for pod number, cluster number and seed yield. Pod number, cluster number and plant height were positively and significantly correlated with seed yield. Cluster number showed high positive direct effect on seed yield. The studies suggested that selection for clusters per plant, pods per plant and plant height is important to evolve high yielding varieties of pigeonpea.

KEY WORDS : Pigeonpea, Variability, Character Association.

Pigeonpea (*Cajanus cajan*(L) Millsp) is one of the important legume crops grown in India. A thorough knowledge of existing genetic variation and extent of association between various yield contributing characters are essential for developing high yielding genotypes in pigeonpea. The observed variability is a combined measure of genetic and environmental causes. It is only the genetic variability that is heritable from generation to generation. However, a measure of heritability alone does not give an idea about the expected gain in the next generation but it has to be considered in conjunction with genetic advance. Correlation and path analysis will establish the extent of association between yield and yield components and bring out relative importance of their direct and indirect effects and thus give a clear understanding of their association with yield. The present investigation in pigeonpea is an attempt in this direction.

MATERIALS AND METHODS

The material consisting of 37 genotypes collected from ICRISAT, Hyderabad were raised at the National Pulses Research Centre, Vamban, Pudukkottai district, in a randomized block design with three replications during 1984 Kharif season adopting a spacing of 90 x 30 cm. Observations were recorded on five randomly selected plants from each plot on plant height, number of branches per plant, number of clusters per plant, number of

Table 1. Mean, range, PCV, GCV, heritability and genetic advance for seven characters in Pigeonpea.

Characters	Mean	Range	GCV	PCV	Heritability	Genetic advance	Genetic advance % of mean
Plant height	170.67	72.33 – 249.33	24.93	30.01	69.62	72.90	42.71
No. of branches/ plant	15.62	7.67 – 21.33	16.23	29.26	30.76	2.90	18.56
No. of cluster/ plant	93.33	13.33 – 247.67	68.82	76.69	80.53	118.86	127.35
No of pods/plant	160.67	31.00 – 594.33	76.95	82.99	85.96	236.35	147.11
No. of seeds/pod	3.77	3.00 – 5.33	7.60	16.29	21.76	0.27	7.31
100 seed weight	7.81	4.10 – 13.47	28.02	28.07	99.59	4.50	57.66
Yield	23.52	5.30 – 59.53	53.99	60.84	78.76	23.24	98.81

pods per plant, number of seeds per pod, 100 seed weight, and seed yield per plant. Coefficients of variations were worked out by adopting the method suggested by Burton (1952). Heritability in broad sense was worked out according to Lush (1940). Genetic advance and correlation coefficients (genotypic and phenotypic) were calculated according to Johnson *et al.* (1955). Path analysis was done as suggested by Dewy and Lu (1959).

RESULTS AND DISCUSSION

The analysis of variance showed highly significant differences among the genotypes for all the characters studied. Higher GCV was observed for pod number followed by cluster number and seed yield (Table 1). The high GCV could be exploited in selection programme. The findings by Prem Sagar and Jatarsa (1983) are in accordance with the present results. The GCV was very low for seed number. Jag Shoram (1983) reported high GCV for pod number and seed yield and low GCV for seed number. Bashiruddin and Sreeramulu (1981) reported high GCV for 100 seed weight, cluster number and pod number and low GCV for seed number. The PCV was invariably higher than their corresponding GCV. The difference between PCV and GCV was minimum for 100 seed weight, suggesting that this trait was least affected by the environment. This was also supported by very high value of heritability for this character. The branch number and seed number, on the other hand, exhibited wider gap between PCV and and GCV indicating higher environmental influence. It was confirmed by the lowest heritability values of the traits.

Very high heritability was observed for pod number, cluster number and seed yield. High heritability was also obtained for plant height. This is an accordance with earlier report of Prem Sagar and Jatarsa (1983). Sureshkumar and Reddy (1982) also reported high heritability for pod number and cluster number. Component breeding becomes more effective when selection is based on related characters with high heritability.

The genetic advance was highest for pod number followed by cluster number and seed yield. Similar finding was reported by Bashiruddin ad Sriramulu (1981) and Prem Sagar and Jatarsa (1983). It is interesting to see that the genetic advance (expressed as per cent of mean) was high

Table 2. Genotypic and phenotypic (figures in paranthesis) co-efficients of variation in pigeonpea

Characters	Plant height	No.of branches/ plant	No. of cluster/ plant	No. of pods/plant	No. of seeds/pod	100 seed weight	Yield
Plant height	1.000	0.632** (0.418)	0.523** (0.457)	0.318 (0.306)	0.431** (0.213)	0.335* (0.278)	0.468** (0.384)
No.of branches/ plant		1.000	0.298 (0.208)	0.152 (0.203)	0.406 (-0.032)	0.430** (0.231)	0.232 (0.206)
No. of clusters/ plant			1.000	0.836** (0.799)	0.157 (0.090)	-0.077 (-0.069)	0.902** (0.801)
No. of pods/plant				1.000	0.273 (0.118)	-0.048 (-0.428)	0.830** (0.757)
No. of seeds/plant					1.000	0.296 (0.148)	0.206 (0.127)
100 seed weight						1.000	-0.021 (-0.015)
Yield							1.000

not only for yield itself but also for pod number and cluster number which are the most important components of seed yield in pigeonpea. The association of high heritability with high genetic advance as observed in seed yield, pod number and cluster number was indicative of additive effects (Sureshkumar and Reddy, 1982) and consequently a high genetic gain from selection can be expected. (Prem Sagar and Jatarsa, 1983).

The genotypic correlations were generally higher than the phenotypic correlations, indicating the inherent associations between various traits (Table 2). The direction of genotypic and phenotypic correlations was same for all the characters. Seed yield was positively and significantly correlated with cluster number, pod number and plant height. This is in accordance with Malik *et al.* (1980). Eventhough the correlation between yield and seed size was negative, it was not significant. It contrast to this, Dunbre and Deshmukh (1985) reported significant positive correlation between these two characters. The inter correlations estimated for the yield components showed that plant height was significantly and positively correlated with branch number, cluster number, seed number and 100 seed weight. Branch number showed significant positive correlation with seed number and 100 seed weight. Cluster number showed positive correlation with pod number. These significant positive correlations among the characters like plant height, branch number, cluster number, pod number and seeds per pod indicate the simultaneous improvement of the characters by selection.

Cluster number recorded highest positive direct effect on seed yield followed by pod number (Table 3). Cluster number and pod number showed high magnitude of positive genotypic correlation with seed yield. Dumbre and Deshmukh (1985) reported that the pods per plant showed high positive direct effect on yield. The indirect effects of all the characters *via* cluster number and indirect effect of cluster number *via* branch number and pod number were much appreciable indicating the importance of these characters on seed yield. The importance of pod number was also reported by Sharma and Asawa (1977). Low magnitude of indirect negative effects were exhibited by all characters except cluster number *via* branch number.

Table 3: Path coefficient analysis showing direct (underlined figures) and indirect effects of six characters on grain yield in pigeonpea

Characters	Plant height	No.of branches/ plant	No. of cluster/ plant	No. of pods/plant	No. of seeds/ pod	100 seed weight	Genotypic correlation coefficient with yield
Plant height	0.038	-0.048	0.373	0.072	0.012	0.018	0.467
No.of branches/ plant	0.024	0.076	0.213	0.034	0.012	0.024	0.231
No. of clusters/ plant	0.020	0.227	0.714	0.190	0.005	-0.004	0.901
No. of pods/plant	0.012	-0.011	0.596	0.227	0.001	-0.001	0.830
No. of seeds/plant	0.016	-0.031	0.111	0.062	0.029	0.016	0.206
100 seed weight	0.013	-0.032	-0.055	0.011	0.001	0.0562	-0.021

Residual effect : 0.402

It is evident from the present study that cluster number per plant, pod number per plant and plant height are the most important characters to be considered for effective selection of superior type in pigeonpea.

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