

STUDIES ON GENETIC VARIABILITY FOR SOME QUANTITATIVE CHARACTERS IN PIGEONPEA

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One hundred genotypes of pigeonpea (*Cajanus cajan* (L.) Millsp) were evaluated for 8 characters under five environments in two years. The magnitude of range for phenotypic variability was high for all the characters except seeds/pod. High estimates of genotypic coefficient of variation and heritability were observed to be accompanied by moderate to high genetic advance for pods/plant, days to maturity, plant height and days to flower across the varying environments. Therefore, it is suggested that there is ample scope for selection with respect to these characters in pigeonpea and mass selection could be quite effective.

The information on genetic parameters of variability for different characters of economic importance is pre requisite for a plant breeder to work with any crop plant species. The studies made by earlier workers on this aspect in pigeonpea are limited and that too are restricted to single set of environmental conditions. Therefore the present investigation was undertaken to assess the extent of genetic variability, heritability and genetic advance for some metric traits in pigeonpea across five environments.

MATERIAL AND METHODS

The experimental material comprised one hundred strains of pigeonpea selected from the germplasm maintained in the Department of Plant Breeding of this University. These were evaluated in randomised block design replicated three times at Pantnagar (*Kharif* 1973 and 1974), Bulandshahr (*Kharif* 1973 and 1974)

and Kanpur (*Kharif* 1973). Recommended agronomical practices were used for raising the crop at each location. Data on five competitive randomly selected plants in each strain were recorded for 8 characters, namely, days to flower, days to maturity, plant height (cm), primary branches/plant, pods/plant, seeds/pod, 100-seed weight (g) and seed yield/plant (g). Genotypic and phenotypic coefficients of variability, heritability in broad sense and expected genetic as grain percentage of mean were estimated following standard procedures.

RESULTS AND DISCUSSION

The analysis of variance revealed that the differences among genotypes for all the 8 characters studied in each of the five environments were significant at one percent level. This suggests that there was considerable amount of variability in the experimental

material with respect to different characters

The variability parameters such as range, phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability (h^2) and genetic advance (GA) estimated over five environments are presented in the table 1. The lower and upper values of range were observed almost consistent in case of days to flower, days to maturity, primary branches / plant, seeds/pod and 100-seed weight under varying environments while plant height, pods/plant and seed yield/plant exhibited a shift in the corresponding values of range under different environments. The magnitude of range for phenotypic variability was high for all the characters except seed/pod.

The corresponding estimates of PCV and GCV were very close to each other for all the characters in each environment except that of seeds/pod. The estimates of PCV were comparatively higher than GCV for seeds/pod. This indicates that with the exception of seed/pod, the expression of the remaining traits was little influenced by the environmental variation. The values of PCV as well as GCV were almost consistent across the environments for days to flower, days to maturity, seed/pod and 100-seed weight. However, these values did not exhibit consistency over the environments for the remaining characters. The estimates of GCV were observed to be high for pods/plant and seed yield/plant and low for

seeds/pod in all the environments. The remaining characters exhibited relatively medium and similar values for genotypic coefficient of variation. Joshi (1973), Kumar and Haque (1973) and Rathnaswamy *et al.* (1973) also reported high values for GCV with respect to pods/plant and seed yield/plant in pigeonpea. Hence, it can be inferred that there is greater diversity for pods/plant and seed yield/plant in pigeonpea and selection for better plant type based on these characters could be a suitable proposition for improving the productivity.

In the present study, the high estimates of h^2 were found to be accompanied by high genetic gain in case of pods / plant, days to maturity, plant height and days to flower indicating the usefulness of these traits. However, it was not true with 100-seed weight seed yield/plant and primary branches/plant which otherwise had high h^2 values. Seed/pod had lowest values for both heritability and genetic advance. It was also seen that the estimate of GA based on single environment may be deceptive. Particularly in case of seed yield/plant, the values of GA fluctuated considerably under different environments. Therefore, due emphasis for selection should be given for those characters in breeding programme which maintain consistently high estimates of various genetic parameters over a number of environments.

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TABLE 1. Range, coefficient of variability, heritability and genetic advance for 8 characters in pigeonpea under 5 environments.

Character	Parameter	Environment				
		Pantnagar		Bulandshahr		Kanpur
		1973-74	1974-75	1973-74	1974-75	1973-74
Days to flower	PCV	11.64	11.95	11.77	9.11	11.86
	GCV	11.36	11.74	11.54	8.88	11.51
	h^2	95.23	96.45	96.12	95.12	94.18
	GA	24.63	27.04	26.96	16.77	23.83
Days to maturity	PCV	11.45	11.33	10.40	12.65	12.06
	GCV	11.29	11.27	10.31	12.61	11.89
	h^2	97.22	98.94	98.28	99.38	97.29
	GA	48.36	47.92	44.25	47.62	49.04
Plant height	PCV	12.62	16.10	10.49	11.77	14.20
	GCV	12.07	15.51	9.87	11.25	13.28
	h^2	91.45	92.82	88.54	91.47	87.43
	GA	45.76	65.80	39.39	33.96	39.82
Primary branches plant	PCV	16.04	17.75	15.48	14.61	15.15
	GCV	13.83	16.00	12.97	12.26	10.46
	h^2	74.37	81.08	70.17	70.49	47.69
	GA	5.04	5.99	4.17	3.35	2.65
Pods plant	PCV	59.83	32.57	31.96	24.19	33.65
	GCV	59.52	32.09	30.29	23.38	32.24
	h^2	98.96	97.07	89.81	93.43	91.78
	GA	357.70	187.69	69.14	114.28	72.92
Seeds pod	PCV	8.46	6.86	9.02	7.90	9.21
	GCV	5.97	4.18	4.56	4.89	5.95
	h^2	49.77	37.14	25.64	38.38	41.80
	GA	0.22	0.21	0.18	0.24	0.30
100-seed weight	PCV	15.29	14.81	15.38	13.82	15.29
	GCV	14.77	14.49	14.52	13.09	14.75
	h^2	93.31	95.78	92.80	89.62	93.08
	GA	2.11	2.05	1.75	1.79	1.73
Seed yield plant	PCV	36.12	32.58	28.69	32.59	29.27
	GCV	55.75	31.34	25.56	30.39	26.52
	h^2	98.67	92.50	79.32	86.92	82.11
	GA	92.67	30.49	12.68	20.70	12.02