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VARIABILITY IN COWPEA (*Vigna unguiculata* L. Walp.) UNDER DIFFERENT ENVIRONMENTAL CONDITIONS

S. KANDASAMY, M. KADAMBAVANASUNDARAM and S. RAJASEKARAN
School of Genetics, Tamil Nadu Agricultural University, Coimbatore-3.

ABSTRACT

The variability study for yield and other traits in cowpea in two seasons and three environments indicated that Kharif season (June sowing) is more advantageous for expression of a wider spectrum of variability. Selection for pods per plant, seeds per pod and 100 seed weight resulted in increased yield.

Key words : Cowpea, Genetic variability, Environment, Yield.

The prerequisite for any improvement is the information on genetic parameters of variability for different characters of economic importance. Only limited studies have been made in this aspect in cowpea and mostly restricted to single set of environmental conditions. Sohoo *et al.* (1971) and Hanchinal *et al.* (1981) reported variability in cowpea under different seasons. The aim of present investigation is to assess the extent of genetic variability, heritability and genetic advance for yield and other traits in cowpea in two different seasons and in each season in three environments artificially created. This is mainly to know inter and intra seasonal variation for different characters.

MATERIALS AND METHODS

A total of ten genotypes comprising seven promising cultures and three released cultivars in cowpea with different geographic origin was studied in six different environments. The environments were created by sowing during February 1983 (summer) and June 1983 (*Kharif*), using three levels of nitrogen in each location *viz* nitrogen at 0, 25, 50 kg/ha. All plots received P_2O_5 at 50 kg/ha uniformly and both nitrogen and P_2O_5 were applied basally in the form of urea and super phosphate. These genotyes were grown in a randomised complete block design with there replications in each enviro ment. The experimental plot consisted of six rows of five metre each in each replication. The other cultural practices and plant protection measures were followed as per the recommended practices. Observations were recorded on five random plants in each of the ten genotypes in each replication for eight traits. The genetic coefficient of variation, heritability and expected genetic advance as per cent of mean were estimated following standard procedures.

RESULTS AND DISCUSSION

The analysis of variance revealed that the differences among genotypes for all the eight characters studied in each of the six environments were significant This suggests that there was considerable amount of variability in the experimental material with respect to different characters.

A wide genetic variability was observed under two distinguishable

Table 1: Range, mean, coefficient of variability, heritability (%) and genetic advance in percentage of mean

Characters	Parameters	Summer 1983			Kharif 1983		
		E. 1	E. 2	E. 3	E. 4	E. 5	E. 6
Days to 50 percent flowering	Range	36.0-43.0	36.0-43.0	35.0-44.0	35.0-48.0	35.0-45.0	34.0-44.0
	Mean	39.6	39.5	39.2	42.2	39.9	39.5
	PCV	7.10	6.94	8.63	10.73	9.26	9.28
	GCV	6.97	6.85	8.55	10.51	9.04	9.02
	h^2	96.30	97.39	98.19	96.05	95.36	94.41
	GA	14.08	13.93	17.46	21.23	18.19	18.05
Days to maturity	Range	57-65	57-65	57-65	55-69	55-65	55-65
	Mean	61.8	61.7	59.9	62.7	60.8	60.1
	PCV	4.80	4.79	5.80	7.28	5.98	5.93
	GCV	4.48	4.56	5.70	7.15	5.92	5.89
	h^2	87.36	90.60	96.65	96.46	98.12	98.58
	GA	8.64	8.93	11.54	14.46	12.08	12.05
Pods per plant	Range	4.7-8.6	4.1-8.3	3.9-9.1	1.1-14.6	1.1-17.1	1.2-18.1
	Mean	6.9	6.1	6.4	5.8	6.3	7.3
	PCV	21.52	23.78	30.85	65.39	75.91	68.29
	GCV	15.22	18.66	29.39	65.14	75.76	68.16
	h^2	49.98	61.60	90.77	99.24	99.61	99.64
	GA	22.16	30.17	57.68	133.67	155.76	140.16
Clusters per plant	Range	3.3-6.6	3.4-6.6	3.1-6.9	0.9-10.6	1.1-12.3	1.1-11.5
	Mean	5.2	4.6	5.5	4.5	4.6	5.3
	PCV	25.01	26.60	28.57	61.51	73.10	60.13
	GCV	19.4	19.16	27.09	61.25	72.95	59.96
	h^2	60.20	51.87	89.95	99.17	99.61	99.43
	GA	31.01	28.42	52.93	125.66	149.99	123.16
Pod length	Range	13.4-17.0	12.9-16.6	13.0-17.0	13.8-17.4	14.0-16.9	13.4-17.2
	Mean	14.7	14.5	14.6	15.5	15.2	15.3
	PCV	9.50	10.11	9.45	10.08	8.12	8.32
	GCV	8.72	9.72	7.55	9.06	7.87	8.12
	h^2	84.30	58.26	63.95	95.81	94.07	95.19
	GA	16.5	12.14	12.44	19.89	15.73	16.31
Seeds per pod	Range	9.9-14.0	8.8-13.9	8.9-13.6	11.2-15.6	10.4-15.5	9.5-15.6
	Mean	11.92	11.04	11.21	13.29	12.75	12.77
	PCV	11.63	16.48	14.97	10 51	12.84	14.13
	GCV	10.23	11.98	13.08	10.23	12.68	14.07
	h^2	10.24	52.87	76.60	94.73	97.59	99.12
	GA	18.74	17.95	23.56	20.51	25.81	28.51
100 grain weight	Range	9.7-13.8	9.9-15.8	9.7-15.6	9.5-12.6	9.0-12.2	9.0-12.2
	Mean	11.3	11.8	11.6	10.9	10.5	10.8
	PCV	14.15	16.11	16.12	9.66	10.17	10.13
	GCV	14.10	16.09	16.11	9.66	10.16	10.12
	h^2	99.37	100.00	99.88	99.83	99.90	99.04
	GA	28.96	33.1	33.17	19.87	20.93	20.84
Seed yield per plant	Range	5.7-10.3	5.5-10.0	3.9-7.9	1.6-14.3	1.1-16.4	2.3-18.0
	Mean	8.37	7.08	6.36	6.69	6.90	8.06
	PCV	19.91	26.99	24.49	61.31	71.37	61.19
	GCV	16.21	25.51	23.30	61.05	71.24	63.56
	h^2	66.29	89.29	90.55	99.13	99.64	92.22
	GA	27.18	49.95	45.68	125.2	146.49	125.75

seasons for pods per plant, clusters per plant, pod length, seeds per pod and yield per plant (Table 1). The maximum range of variation was observed for number of pods per plant, clusters per plant and seed yield per plant. This was also reported by Hanchinal *et al.* (1981).

Genotypic coefficient of variation formed large component of phenotypic variation in all environments for all traits. In view of higher estimates of gcv and pcv for the characters such as pods per plant, clusters per plant and seed yield per plant in June sowing as compared to February sowing, more variability in respect of these characters can be obtained in *kharif* season facilitating a critical selection.

Hanchinal *et al.* (1981) reported higher estimates of genotypic and phenotypic variation for days to flowering, pod length, seeds per pod and pod yield in summer as compared to winter. Sohoo *et al.* (1971) reported that genotypic variation formed large component of phenotypic variation for days to maturity, pods per plant, 100 seed weight under different environment. According to Athwal and Singh(1966), the season and soil factors are important in the study of quantitative variation and have the potential to influence the expression of variability.

The heritability values in respect of pods per plant, clusters per plant, pod length, seeds per pod and seed yield per plant were observed to be more variable with the change in season and was much less in different environments within *kharif* season. This indicates that soil factors like nutrient play a role in expression of these characters in summer season.

In this study, high h^2 value of pods per plant, clusters per plant, 100 seed weight and seed yield per plant was accomponied with relatively high estimate of genetic advance, which will be more useful in predicting the resultant effects of selecting the best individuals. Sohoo *et al.* (1971) and Hanchinal *et al.* (1981) reported high h^2 accompanied with relatively high genetic advance for pods per plant, pod length, seeds per pod, 100 seed weight and seed yield per plant.

The correlation and path coefficient studies in cowpea by different workers also revealed that pods per plant, seeds per pod and 100 seed weight were important yield components in cowpea (Singh and Mehndiretta, 1970, and Dumbre *et al.*, 1982).

It seems possible, therefore that selection for these traits would be very useful. The study of environmental effects indicated that the *kharif* season is more advantageous for selecting with wider spectrum of variability.

REFERENCES

Athwal, D. S. and Singh, G. 1966. Variability in kangani I. adaptation and genotypic and phenotypic variability in four environments. *Indian J. Genet 26 :* 142-152

Dumbre, A. D., Deshmukh R. B. and Pudhye, A.P. 1982 Association of grain yield with other economic charecters in cowpea. *J. Maharashtra Agri. Univ. 7* (2) : 154

Hanchinal, R. R., Habib, A. F. and Goud, J. V. 1981: Variability in Cowpea *Vigna unguiculata* (L.) Walp. *Mysore. J. Agri. Sci. 15* : 371-375

Singh, K. B. and Mehndiratta, P. D. 1970. Path analysis and selection indices for cowpea. *Indian. J. Genet 30* : 471-475

Sohoo M. S., Arora, N. D. Lodhi, G. P. and Chandra, S. 1971. Genotypic and phenotypic variability in cowpeas (*Vigna sinensis*) under different environmental conditions. *J. Res. 8* (2) : 159 164.