

GENETIC VARIABILITY IN COWPEA (*Vigna unguiculata* (L.) Walp.)*

V. DHARMALINGAM¹ and M. KADAMBAVANASUNDARAM²

Variability studies undertaken on forty genotypes of cowpea had shown that there existed greater variability for the traits harvest index, number of pods and seed yield. The least contribution to genetic variability was by number of seeds per pod. Pod length, 100 seed weight and harvest index recorded higher heritability estimates.

INTRODUCTION

Pulses constitute the only concentrated source of dietary protein (Jain, 1975). Hence any amount of improvement of these crops will be a boon to the largest mass struggling with malnutrition and starvation. Among pulses, cowpea is the most cosmopolitan being grown in many regions of India as a pulse and a vegetable crop. Yield improvement of any crop would be achieved by developing new superior varieties which is feasible by altering the genetic make up of the existing varieties. Such a work would be facilitated, only when genetic variability exists in the material chosen for improvement (Murty and Pavate, 1962). Grain yield is a complex character and its expression depends upon the influence of yield component characters. So, proper evaluation of the extent of genetic variation available for the yield attributes, and their

heritability values will be of immense help to breeders. With that objective, an assessment of variability through different parameters has been made in the present study.

MATERIAL AND METHODS

Forty genotypes of cowpea of diverse geographical origin obtained from National Pulses Research Centre, Vamban, Pudukottai District, were studied in a randomized block design replicated thrice during 1983 summer in the Oilseeds Experiment Station, Tindivanam, South Arcot District. Eight characters were taken into consideration. Mean of five randomly chosen plants from each replication for each variety was used for statistical scrutiny. The genotypic and phenotypic coefficients of variation were estimated by the methods outlined by Burton (1952) and heritability estimates (broad sense) were obtained as per the method described by Lush (1940).

* Part of M.Sc. (Ag.) Thesis of the first author, submitted to the Tamil Nadu Agricultural University, Coimbatore.

1. Assistant Crop Specialist (Pulses), Oilseeds Experiment Station, Tindivanam.
2. Professor, School of Genetics, TNAU, Coimbatore-3.

Table : Range, Mean, Coefficient of variation and Heritability for eight characters in cowpea

S. No.	Characters	Range		Mean	Coefficient of variation (%)			Heritability (broad sense) (%) (h ²)
		From	To		Genotypic (G.C.V.)	Phenotypic (P.C.V.)	P. C. V.- G. C. V.	
1.	Number of pods per plant	11.9	46.7	24.4	29.92	41.09	11.17	53.01
2.	Pod length	8.9	14.7	11.7	14.04	15.02	0.98	87.37
3.	Number of seeds per pod	6.2	12.9	10.3	12.88	16.09	3.21	64.00
4.	100 seed weight	7.5	14.2	10.5	16.01	17.33	1.32	85.38
5.	Final plant height	15.5	33.3	25.6	13.19	17.98	4.79	53.80
6.	Number of clusters per plant	6.4	19.9	12.3	19.16	32.21	13.05	35.37
7.	Harvest index	14.4	61.1	28.2	35.99	43.14	7.15	69.58
8.	Seed yield	8.2	31.9	17.4	24.16	40.53	16.37	35.52

RESULTS AND DISCUSSION

The range, mean, phenotypic and genotypic coefficients of variation, the difference between the two coefficients and heritability estimates are presented in the table.

Wide variations both phenotypic and genotypic were recorded by the traits, harvest index, number of pods per plant and seed yield. High estimate of phenotypic variability alone will not be enough to throw light on the true nature of variability. Genotypic coefficient of variation would be more useful for assessing the variability since it depends upon the heritable portion of variability (Allard, 1970). Hence these three traits are potentially variable. Several of the early workers in cowpea are in support of this view. Bapna and Joshi (1973), Lakshmi and Goud (1977) and Balakrishnan (1978) reported the pod number as the maximum contributing character to the genetic variability. Similarly Lakshmi and Goud (1977), Hanchinal (1977), Balakrishnan (1978) and Pandita *et al.* (1982) opined that the seed yield had recorded a high genetic variability. In green gram also, Veeraswamy *et al.* (1973 b) and Paramasivan and Rajasekaran (1980) made parallel reports.

In the present study the least estimate of G. C. V. was recorded by the number of seeds per pod which is in accordance with the findings by Bapna and Joshi (1973), Gopal Singh *et al.* (1977), Lakshmi and Goud

(1977) and Balakrishnan (1978). In green gram also, similar findings were reported by Veeraswamy *et al.* (1973b) and Paramasivan and Rajasekaran (1980).

A comparison of the differences between P. C. V. and G. C. V. estimates for the eight characters indicated that seed yield exhibited the maximum difference revealing thereby predominant environmental influence effecting seed yield. Similar observation has been reported by Veeraswamy *et al.* (1973 a) and Balakrishnan (1978) in cowpea. The minimum difference was recorded by pod length showing the stability of this trait.

Burton (1952) has suggested that genotypic coefficient of variation together with heritability estimate would give the best picture of the extent of advance to be expected of a selection. Heritability in the broad sense estimated in this material varies much from 35.37 to 87.37 per cent. The stability of the trait *viz.* pod length shown by the least difference between P. C. V. and G. C. V. was ascertained by the highest heritability estimate (87.37%) recorded for this character. Similar observation was made by Veeraswamy *et al.* (1973 a), Angadi (1976), Hanchinal (1977) and Balakrishnan (1978) in cowpea. Harvest index has also recorded a higher heritability estimate coupled with the highest G. C. V. indicating the predominance of additive gene effects in controlling

these two traits. Hundred seed weight has also recorded higher heritability estimate.

Based on the higher mean values recorded for the pod length, hundred

seed weight and harvest index the varieties Co.2, K.C.195 and K. M. I. can well be chosen for further improvement by hybridization followed by mass selection.

REFERENCES

- ALLARD, R. W. 1970. Principles of plant breeding. John Wiley and Sons. Inc., New York. pp. 485.
- ANGADI, S. P. 1976. Correlation studies and D² analysis in cowpea (*Vigna sinensis* (L.) SAVI.). M.Sc. (Ag.) Thesis. TNAU., Coimbatore, Unpublished.
- BALAKRISHNAN, G. 1978. Studies on pattern of variability and genetic diversity in cowpea (*Vigna sinensis* (L.) SAVI.). M.Sc. (Ag.) Thesis. TNAU., Coimbatore, Unpublished.
- BAPNA, C. S. and S. N. JOSHI. 1973. A study on variability following hybridisation in *Vigna sinensis* (L.) SAVI. *Madras Agric. J.* 60 (9-12): 1369-1372.
- BURTON, G. W. 1952. Quantitative inheritance in grasses. *Proc. 6th Intern. Grassland Congr.*, 1: 277-283.
- GOPAL SINGH, B., C. RAJA REDDY and V. V. KRISHNAIAH. 1977. Studies on heritability, genetic advance and character association in cowpea (*Vigna unguiculata* (L.) Walp.). *Andhra Agric. J.*, 24 (5-6): 209-212.
- HANCHINAL, R. R. 1977. Variability studies in cowpea (*Vigna unguiculata* (L.) Walp.). *Thesis Abstracts*. HAU (Hissar). pp. 265.
- JAIN, H. K. 1975. Breeding for yield and other attributes in grain legumes. *Indian J. Genet.*, 35 (2): 169-187.
- JOSHI, S. N. 1973. Variability and correlation studies in pigeon pea (*Cajanus Cajan* L.). *Madras Agric. J.*, 60(6): 412-414.
- LAKSHMI, P. V. and J. V. Goud. 1977. Variability in cowpea (*Vigna sinensis* (L.) SAVI.) *Mysore J. Agric. Sci.*, 11: 144-147.
- LUSH, J. L. 1940. Intra-sire correlation and regression of offspring on dams as a method of estimating heritability of characters. *Proc. Amer. Soc. Animal Production*, 33: 293-301.
- MURTY, G. S. and M. V. PAVATE. 1962. Studies on quantitative inheritance in *Nicotiana tabacum*. Varietal classification and selection by multivariate analysis. *Indian J. Genet.*, 22: 68-80.
- PANDITA, M. L., R. N. VASHISTHA, R. D. BHUTANI and B. R. BATRA. 1982. Genetic variability studies in cowpea (*Vigna sinensis* (L.) SAVI) under dry farming conditions. *Haryana Agric. Univ. J. Res.*, 12(2): 241-245.
- PARAMASIVAN, J. and S. RAJASEKARAN. 1980. Genetic variability in green gram (*Vigna radiata* (L.) Wilczek). *Madras Agric. J.*, 67 (7): 421-424.
- VEERASWAMY, R., G. A. PALANISWAMY, A. REGUPATHY and R. RATHINASWAMY. 1973 a. Genetic variability in some quantitative characters of *Vigna sinensis* (L.) SAVI. *Madras Agric. J.*, 60 [9-12]: 1359-1360.
- VEERASWAMY, R., R. RATHINASWAMY and G. A. PALANISWAMY. 1973 b. Genetic variability in some quantitative characters of *Phaseolus aureus* Roxb. *Madras Agric. J.*, 60 [9-12]: 1320-1322.