

GENETIC VARIABILITY IN COWPEA

Cowpea (*Vigna unguiculata* L. Walp) is a popular pulse crop and is widely adapted to varying soil and climatic conditions. Thus its cultivation has been popular in most of the tropical and subtropical countries of the world. Crop improvement largely depends on the magnitude of the genetic variability and the extent to which the desirable characters are heritable. Therefore, the present investigation on ten cowpea cultivars and its 45 crosses (10 x 10 diallel) was undertaken to explore the genetic variability for different quantitative characters. Ten lines of cowpea of diverse origin were chosen from the germplasm of the pulse scheme, Gandhi Krishi Vignana Kendra, Bangalore and were crossed in all possible combinations without reciprocals. These crossed seeds together with parents (55) were grown in a randomized block design in three replications. Each treatment was raised in a single row plot of 5 m length spaced at 45 cm apart and plants were placed 30 cm apart in each row. Five plants were selected at random in each treatment and observations were recorded on seven quantitative characters (Table 1). Various genetical parameters were computed following the method of Burton and Devane (1953) and Johnson *et al.* (1955). Range, mean and mean sum of squares are presented in Table 1 and estimates of various genetic parameters are presented in Table 2.

Plant height ranged from 19.23 cm (RC-2 x TVX-944-02E) to 82.6 cm (Co-VU-2 x TVX-1936-90E). In number of pods per plant mean values ranged from 8.2 (RC-2) to 23.73 (RC-2 x V-37). The lowest pod length of 9.5 cm was found

in RC-2 x TVX-944-02E and the highest of 15.32 cm in APC-68 x TVX-1836-90E. Seeds per pod were the lowest in RC-2 parent of 7.62 and the highest in APC-68 x Co-VU-2 (13.15). Petiole length was the lowest in RC-2 x TVX-944-02E (11.47 cm) and the highest in KBC-1 x V-16 (24.17 cm). For seed weight per plant the lowest seed weight of 11.65 g per plant in RC-2 x TVX-944-02E and the highest in S-488 x APC-68 (67.76 g). The lowest hundred seed weight of 7.35 g was in RC-2 x TVX-1836-90E and the highest of 17.42 g in TVX-1836-90E.

RC-2 had low number of pods per plant and seeds per pod while the cross RC-2 x TVX-944-02E has given lower values for plant height, pod length, petiole length and seed weight per plant.

Highly significant mean sum of squares due to treatments were observed for the traits with wide range of variation, indicating the scope for selection of desirable types. High genotypic variances were recorded for all the characters except seeds per pod and was further confirmed by high genotypic coefficient of variation ranging from 7.939 (seeds per pod) to 31.859 (plant height). Seed weight per plant, hundred seed weight and petiole length showed high genotypic coefficient of variation. This is in conformity with Angadi *et al.* (1978).

In the present study, heritability values ranged from 15.23 per cent for number of pods per plant to 71.41 per cent for hundred seed weight. High heritability values have been observed for three traits, viz., plant height, pod length and hundred seed weight.

Table 1. Mean, range and sum of squares for seven characters in a 10 x 10 diallel set in cowpea

Characters	Mean \pm SE	Range	MSS (df 54)	Error (df 108)
Plant height (cm)	41.95 \pm 11.657	19.23 to 82.60	739.73"	203.85
Number of pods per plant	17.91 \pm 4.215	8.20 to 23.73	41.025"	26.65
Pod length (cm)	12.83 \pm 1.021	9.50 to 15.32	6.795"	1.56
Seeds per pod	10.56 \pm 1.114	7.62 to 13.15	3.97"	1.86
Petiole length (cm)	18.22 \pm 2.765	11.47 to 24.17	24.80"	11.47
Seed weight per plant (g)	31.78 \pm 12.34	11.65 to 67.76	382.62"	228.58
Hundred seed weight (g)	11.84 \pm 0.895	7.35 to 17.42	10.22"	1.203

** Significant at 1% level

Table 2. Variance, heritability and genetic advance for seven quantitative traits in 10 x 10 diallel crosses of cowpea

	Plant height (cm)	Number of pods /plant	Pod length (cm)	Seeds per pod	Petiole length (cm)	Seed weight/ plant (g)	Hundred seed weight (g)
Genotypic variance (g)	178.626	4.791	1.745	0.703	4.443	51.346	3.005
Phenotypic variance (ph)	382.476	31.444	3.305	2.563	15.913	279.926	4.208
Genotypic coefficient of variation	31.859	12.220	10.296	7.939	11.568	22.540	14.640
Phenotypic coefficient of variation	46.619	31.307	14.169	15.160	21.890	52.646	17.325
Heritability (h^2)	46.702	15.230	52.798	27.428	27.920	18.340	71.410
Genetic advance	18.815	1.789	1.977	0.904	2.294	6.323	3.017
Genetic advance as percentage of mean	44.85	9.820	15.83	8.560	12.590	19.880	25.480

High genetic advance was recorded in respect of plant height, seed weight per plant and hundred seed weight. Number of pods per plant, pod length, seeds per pod and petiole length have exhibited heritability and low genetic advance. Johnson *et al.* (1955) in their studies with soybean reported that heritability estimates along with high generic advances are more useful than the heritability value, in predicting the improvement through selection. In the present study, plant height, pod length and hundred seed weight had high heritability coupled with high

genetic advance, which indicates that high heritability obtained by these characters is probably due to additive gene effects while number of pods per plant, seeds per pod and petiole length had high heritability due to non-additive gene effects (Panse, 1957).

From this study of various genetic parameters, it may be concluded that individual plant selections for plant height, pod length and hundred seed weight would be satisfactorily effective in selection programme.

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