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Genetics of Pod Yield and its Components in Cowpea [*Vigna unguiculata* (L.) Walp.]

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Information on the nature and magnitude of genetic component and its appropriate exploitation is important to direct the breeding research in any crop. This information, however, is scanty in vegetable cowpea. Hence the present study was undertaken to determine the genetics of eight important characters in vegetable cowpea.

Seven diverse parents, namely, Line Selection-102, Punjab-263, Pusa Barsati, Gujarat-1, GC-82-7, Arka Garima, In-103 and their 21 F_1s were evaluated in a randomized block design with three replications at Vegetable Research Station, GAU, Junagadh during *kharif*, 1996. Each entry was planted in a single row of ten plants spaced at 60 x 30 cm. Data were recorded on five randomly selected plants from each entry of parents and F_1s for the all characters except days to 50% flowering and days to first picking. These were recorded over 8 plants excluding border plants. The analysis for the estimation of genetics components was carried out by employing diallel analysis method of Hayman (1954 a).

The estimates of D, H_1, H_2, h^2 and F for all the quantiatative traits are present in Table 1. D which measures the variance due to additive genetic effects was significant for all the characters studied except days to 50% flowering, days to first picking and number of seeds/pod, H_1 which measures the variance due to non-dditive effects, was also significant for all the characters. Of these two components, magnitude of H_1 was relatively higher for all the traits suggesting predominance of non-additive gene action. Savithramma and Nagaraja (1995) observed similar findings. In general, H_1 was greater in magnitude than H_2 advocating that genes with positive and negative effects were not in equal proportions in the parents. The non-significant value of F for all the characters indicated an equal distribution of dominant and recessive genes in the parents.

The average degree of dominance $(H_1/D)^{1/2}$ was greater than unity for all the traits indicating overdominance. Over-dominance was earlier reported by Zavery *et al.* (1980) for days to flowering and Singh and Dabas (1992) for pods per plant. The proportion of positive and negative effects in the parents is given by the ratio, which theoretically should be equivalent to

TABLE 1

Estimates of components of variance.

Genetic component	*Days to 50 % flowering*	*Days to first picking*	*Number of seeds/pod*	*Leaf area*	*Number of branches/ plant*	*Plant height*	*Number of pod/plant*	*Pod yield/ plant*
D	59.68 ± 28.93	39.12 ± 24.33	1.17 ± 1.11	1859.66* ± 695.06	3.29* ± 0.94	2886.42** ± 559.85	121.15* ± 42.41	1366.63* ± 514.14
H_1	186.98* ± 69.64	156.59* ± 58.58	7.34* ± 2.67	6398.09* ± 1673.34	9.04* ± 2.27	5833.90** ± 1347.83	522.36** ± 102.11	6252.16** ± 1237.77
H_2	159.13* ± 61.36	128.34 ± 51.61	5.90 ± 2.35	5710.35* ± 1474.45	5.18* ± 2.00	4495.14* ± 1187.63	413.39** ± 89.97	4720.57** ± 1090.65
h^2	3.02 ± 41.21	13.36 ± 34.67	–0.10 ± 1.58	622.74 ± 990.31	1.61 ± 1.34	273.65 ± 797.66	10.06 ± 60.43	1218.29 ± 732.53
F	23.20 ± 69.39	15.73 ± 58.27	0.43 ± 2.66	773.24 ± 1667.44	4.89 ± 2.26	2627.57 ± 1343.07	69.58 ± 101.75	1551.19 ± 1233.40
E	2.57 ± 10.23	3.21 ± 8.60	0.23 ± 0.39	37.04 ± 245.74	0.16 ± 0.33	62.44 ± 197.94	4.81 ± 15.00	71.39 ± 181.77
$(H_1/D)^{1/2}$	1.77	2.00	2.50	1.85	1.66	1.42	2.14	2.14
$H_2/4H_1$	0.21	0.20	0.20	0.22	0.14	0.19	0.19	0.19
KD/KR	1.25	1.22	1.16	1.25	2.63	1.94	1.31	1.72
h^2/H_2	0.02	0.10	–0.02	0.11	0.31	0.06	0.02	0.26
Heritability (ns) %	25.53	20.29	12.99	24.34	40.68	45.51	19.43	21.51
t^2	0.2216	0.1743	4.3014	0.0109	1.2697	0.5933	0.1011	0.1024

*, ** = Significant at 5% and 1% levels, respectively.

0.25. In the present study, asymmetry of loci was indicated for all the traits. The ratio of h^2/H_2 is an estimate of number of gene groups contributing the character. The value of h^2/H_2 was lower than unity in most of the cases indicating that the inheritance of a particular characters was generally controlled by a few genes or gene gropus. These findings are closely in agreement with Singh and Dabas (1992). The KD/KR value higher than unity for the traits revealed the unequal frequency of dominant to recessive genes with more number of dominant genes. It was also supported by positive F value.

Estimated narrow sense heritability ranged between 12.99% (number of seeds per pod) to 45.51% (plant height). It was low for days to 50% flowering, days to first picking, number of seeds per pod, leaf area, number of pods per plant and pod yield per plant; whereas moderate for rest of the traits. These results indicated the major role of non-additive gene action in the inheritance of these characters and limited scope of their improvement through straight selection.

Thus, in the present investigation both the additive and non-additive components were observed in the inheritance of pod yield and its major component characters, however, non-additive gene action was preponderant. It is, therefore, suggested that reciprocal recurrent selection should be followed which meets the requirement of utilizing both the gene actions.

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