GENETIC VARIATION ON COWPEA (VIGNA UNGUICULATA L. WALP) GENOTYPES

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Abstract: An experiment was conducted under NU:SASRD during Kharif of 2016 to estimate the genetic variability, heritability and genetic advance in ten genotypes of cowpea evaluated in a randomized block design with four replications. Observations were recorded for ten quantitative traits. Analysis of variance indicates the existence of significant variability in plant height, height to first pod, pod length, test weight and seed yield. High GCV and PCV were estimated for plant height, yield per plant, height to first pod, test weight and number of pods per plant. The present study revealed high heritability coupled with high estimates of genetic advance for plant height. Yield per plant, test weight and height to first pod also showed high heritability however the genetic advance estimates for these traits were found to be medium in magnitude.

Keywords : cowpea, heritability, variability

Introduction

Cowpea (*Vigna unguiculata* L. Walp) is a multi season, multipurpose, twining herbaceous legume grown throughout the tropics and sub-tropics of the world, primarily for seed but also as a vegetable belonging to the family Fabaceae it is also known as yard long bean, asparagus bean, snake bean or Chinese bean. It is a quick growing crop, which produces remarkable quantity of bulk in a short span of time and therefore is esteemed as a valuable catch crop as fodder, green manure, grains or vegetable crop (Thomas, 2003). Cowpea is grown on a wide range of soil types in the semi-arid to sub-humid lowland tropics. India grows nearly 25.23 million hectares of pulses with annual production of 17.38 million tonnes (Anonymous, 2014-15) and is widely adapted and grown in Uttar Pradesh, Punjab, Delhi and Haryana. In Nagaland, cowpea occupies an area of 480 hectares with a production of 700 metric tonnes (Anonymous, 2013-14) and cowpea being a quick growing legume crop having multipurpose value as food, fodder, green manure etc, is a potential crop in Nagaland. Presently it is mostly grown as a vegetable crop in the districts of Phek, Mon and Dimapur. It is also grown in other districts in mixed cropping systems. It is popular as a boiled vegetable and salad in Naga cuisine. Thorough evaluation, screening and understanding of the genetic architecture of the germplasm is essential prior to initiation of crop improvement program. Estimation of genetic variability parameters is the foremost step to be adopted in the source population, if the breeding program is aimed at improving economically important traits. The success of a crop improvement program depends on the ability of the breeder to define and assemble the required genetic variability and select for yield indirectly through yield associated and highly heritable characters after eliminating the environmental component of phenotypic variation (Mather and Jinks, 1983)

Materials and methods

The present investigation, Variability analysis of cowpea (*Vigna unguiculata* L. Walp) was carried out in the experimental farm of the Department of Genetics and Plant Breeding, School of Agricultural Sciences and Rural Development, Medziphema, Nagaland during kharif 2016. The present study comprised a set of seven cowpea genotypes were received from IIPR, Kanpur. The materils were sown in Randomized Block Design with four (4) replications with a row to row spacing of 40 cm and plant to plant spacing of 30 cm. The observations were recorded for ten characters viz., days to 50 % flowering, days to 50% podding, days to physiological maturity, plant height, height to first pod, number of pods per plant, pod length, number of seeds per pod, test weight and seed yield per plant. Genotypic coefficients of variance (GCV), phenotypic coefficients of variance (PCV), heritability (broad sense) and genetic advance was worked out as per (Johnson, *et al.,* 1955).

Results and discussion

Analysis of variance indicates the existence of significant variability in the characters *viz*., plant height, height to first pod, pod length, test weight and seed yield. These traits may be exploited for selection in yield improvement works. Other characters did not show significant variability (Table 1). These results collaborate with the findings of Khan *et al.* (2015) and Mishra (2013). Mean values for each genotype is presented in Table 2. The mean, range, phenotypic and genotypic coefficients, heritability and genetic advance as a percent of mean of the characters studied are presented in Table 3. Results indicated that the value of phenotypic coefficient of variations were higher in magnitude than that of genotypic coefficient of variation for all the characters showing that the environment had an important role in influencing the expression of the characters. High GCV and PCV were estimated for plant height, yield per plant, height to first pod, test weight and number of pods per plant. The results indicate the presence of substantial genetic variability for these traits and sufficient improvement could be achieved if selection is practiced based on these traits. Meena *et al*. (2015) reported similar results for plant height and test weight. Low estimates of GCV and PCV were observed in days to 50% flowering, days to 50% podding and days to maturity. Similar results were reported by Khan *et al*. (2015) and Rambabu (2014). The present study revealed high heritability coupled with high estimates of genetic advance for plant height. Yield per plant, test weight and height to first pod also showed high heritability however the genetic advance estimates for these traits were found to be medium

in magnitude. Thus, it could be inferred that simple selection based on phenotypic performance for these traits would be effective as these are apparently under the control of additive gene action. On the other hand, low estimates of heritability and genetic advance were observed for days to 50% flowering, days to maturity, days to 50% podding and number of pods per plant. These characters would be more sensitive to environmental changes. Similar results were recorded by Khan *et al*. (2015) for test weight, plant height, days to 50% flowering and days to maturity.

Table 1: Analysis of variance for ten characters of cowpea genotypes (MSS)

Source of variations	df	Mean squares									
		Days to 50% flowering	Days to 50% podding	Days to maturity	Plant height	Height to first pod	Pod length	Number of pods per plant	Number of seeds per pod	Test weight	Yield per plant
Replication	3	17.67	25.67	6.32	780.34	53.99	7.63	19.85	1.38	0.08	17.67
Genotypes	6	2.57	2.33	11.45	14023.80**	989.28**	22.16**	27.49	7.14	37.56**	346.11**
Error	18	8.22	12.56	24.40	521.69	61.02	4.37	10.38	2.83	0.26	32.73

**: significant at 1% level of significance.

Table 2: Mean values for ten characters in cowpea genotypes

Characters / Genotypes	Days to 50% flowering	Days to 50% podding	Days to maturity	Plant height (c)	Height to first pod (c)	Pod length (c)	Number of pods per plant	Number of seeds per pod	Test weight (g)	Seed yield per plant (g)
CP 1	34.50	41.00	74.75	168.90	72.90	14.39	18.75	9.25	8.48	14.15
CP 2	33.50	40.50	73.00	42.90	38.45	21.38	20.70	12.75	16.93	43.21
CP 3	33.00	39.00	73.75	131.40	49.60	14.87	19.90	12.00	9.85	24.04
CP 4	34.50	40.50	75.75	125.00	50.00	15.92	13.25	12.25	12.98	25.27
CP 5	35.00	41.50	77.50	37.15	28.95	18.13	17.00	12.50	12.25	20.88
CP 6	35.00	40.50	76.50	191.50	70.00	16.78	15.37	12.25	12.32	17.67
CP 7	35.00	40.50	77.50	143.85	52.00	17.39	16.50	13.50	11.30	25.67
S.E. (m)	1.43	1.77	2.47	11.42	3.91	1.04	1.61	0.84	0.25	2.86
C.D. (5%)	-	-	-	33.93	11.60	3.10	4.78	-	0.76	8.49

Table 3 : Analysis of Mean, Range, CV, Heritability and Genetic advance of ten characters in cowpea

Characters	Mean	Range	Genotypic coefficient of variation %	Phenotypic coefficient of variation %	Heritability %	Genetic advance as % of mean
Days to 50% flowering	34.36	33.00-35.00	3.46	7.59	20.7	32.46
Days to 50% podding	40.50	39.00-41.50	3.95	7.81	25.56	41.11
Days to maturity	75.46	73.00-77.50	2.38	6.09	15.30	19.21
Plant height	120.10	37.15-191.50	48.37	51.97	86.61	92.74
Height to first pod	51.70	28.95-72.90	29.46	33.11	79.18	54.01
Pod length	16.98	14.39-21.38	12.42	17.49	50.43	18.17
No. of pods per plant	17.35	13.25-20.70	11.92	22.06	29.19	13.27
No. of seeds per pod	12.07	9.25-13.50	8.60	16.37	27.64	93.21
Test weight	12.44	8.48-16.92	24.53	24.88	97.26	49.84
Yield per plant	24.41	14.15-43.21	36.25	43.16	70.54	62.72

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