RESEARCH PAPER International Journal of Agricultural Sciences, Vol. 5 Issue 1, January to May, 2009 : 205-206

Role of genetic variability in chickpea (*Cicer arietinum* L.)

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ABSTRACT

Twenty seven genetically diverse genotypes of chickpea were studied for genotypic and phenotypic variability, heritability and genetic advance in 12 quantitative traits *viz*., days to flowering initiation, days to 50% flowering, days to maturity, number of primary branches per plant, plant height, number of primary branches per plant, number of secondary branches per plant, 100 seed weight, number of pod per plant, number of seed per pod, seed yield per plant, harvest index and protein content. Higher estimates of genotypic co-efficient of variation(GCV) and phenotypic co-efficient of variation(PCV) was observed for seed yield per plant, number of primary branches per plant, number of seeds per pod, number of pods per plant, 100-seed weight and harvest index. Almost equal magnitude of GCV and PCV for all the characters indicated that genetic factors were predominant in the expression of these traits.

Key words : Genotypic co-efficient of variation, Phenotypic co-efficient of variation, Heritability, Genetic advance

INTRODUCTION

Chickpea is one of the most important grain legumes of India, grown over 7 million hectares during 2005-2006 with an overall production of 5.6 million tones and productivity around 808kg/hectare. However yield enhancement in this crop is far from satisfactory due to inadequate information on genetic variability existing in the indigenous material. The present investigation was therefore conducted to estimate genetic variability present in twenty seven diverse genotypes of chickpea and to compute the heritability and genetic advance for various quantitative and qualitative characters.

MATERIALS AND METHODS

Twenty seven genotypes of chickpea were evaluated in Randomized Block Design with two replications at Agronomy farm, B.A. College of Agriculture, Anand Agriculture. University, Anand during 2006-2007 *rabi* season. The inter and intra row spacing were 45 and 10 cms respectively. Data were recorded on random sample of five plants from each plot for days to flowering initiation, days to 50% flowering, days to maturity, number of primary branches per plant, plant height, number of primary branches per plant, number of secondary branches per plant, 100 seed weight, number of pod per plant, number of seed per pod, seed yield per plant, harvest index and protein content. The coefficient of variability was calculated following the method of Burton (1952). Heritability (broad sense) and genetic advance under selection for different characters was calculated according to Allard (1960).

RESULTS AND DISCUSSION

The estimates of mean, range and genotypic and phenotypic coefficient of variability and expected genetic advance for all the characters are presented in Table 1. The results revealed highly significant differences among 27 genotypes and wide range of variation for all the characters under study. The coefficient of phenotypic variability for various characters was always higher than their corresponding genetic variability indicating the presence of environmental component. However, the magnitude of genotypic and phenotypic co-efficient of variation were almost equal for most of the characters, indicating the predominance of genetic components in the expression of the characters under study. 100 seed weight exhibited highest amount of genetic variability followed by harvest index, number of seeds per pod, number of pods per plant, number of primary branches per plant and seed yield per plant.

The character, number of pods per plant expressed higher genetic advance followed by harvest index and 100 seeds weight. High value of heritability coupled with high expected genetic advance was observed for 100 seed weight, which indicated high additive gene effect. High heritability with moderate or low genetic advance for number of seeds per pod, days to flower initiation, days to 50% flowering, seed yield per plant and number of primary branches per plant revealed the role of non additive gene action in the character expression. Number of secondary branches per plant, protein content, days to maturity and plant height showed low heritability with low expected genetic advance indicating that most of the variation for these characters was environmental. Similar results were observed by Samal and Jagdev (1989), Arora

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Table 1 : Mean, Range, Phenotypic (PCV) and Genotypic (GCV) coefficients of variation, Heritability (h^2) and Genetic advance (GA) for different characters in chickpea

Sr. No.	Characters	Mean	Range	GCV (%)	PCV (%)	H^2 (%)	GA (k= 2.06)
1.	Seed yield per plant	22.74	10.20 - 40.03	21.56	23.96	81.00	9.09
2.	Days to flowering initiation	46.96	38.00 – 59.00	12.36	12.74	94.20	11.61
3.	Days to 50 per cent flowering	57.68	51.50- 66.00	7.57	8.06	88.22	8.44
4.	Days to maturity	106.44	98.50- 112.50	2.93	3.31	78.25	5.68
5.	Plant height	52.7	35.39-66.50	12.34	15.03	67.41	10.99
6.	Number of primary branches per plant	4.09	2.47-8.75	28.77	29.81	93.26	2.34
7.	Number of secondary branches per plant	11.52	8.49- 21.80	19.97	23.12	74.64	4.09
8.	Number of pods per plant	63.75	35.00- 93.80	25.49	29.32	75.60	29.11
9.	Number of seeds per pod	1.77	1.07- 2.76	26.93	28.57	88.90	0.93
10.	100-seed weight	21.13	12.73- 37.33	34.52	34.59	99.64	15.00
11.	Protein content	12.19	17.55- 22.27	5.94	6.65	79.82	2.09
12.	Harvest Index	42.6	28.45- 86.32	31.53	32.40	94.71	26.92

(1991) and Arora and Jeena (2001) for different traits in chickpea.

Therefore, the present study reiterated and corroborated the findings of earlier workers that characters such as harvest index, days to flowering initiation, number of pods per plant and 100-seed weight exhibiting high heritability coupled with high genetic advance, could be profitably used to improve the yield of chickpea through an effective selection programme.

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Received : September, 2008; Accepted : November, 2008