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Genetic variability and response to selection in chickpea (*Cicer arietinum* L.)

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SUMMARY

The genotypic and phenotypic variabilities for twelve quantitative characters ie. Days to 50 per-cent flowering, days to maturity, reproductive period, plant height, primary branches per plant, secondary branches per plant, pods per plant, seeds per pod, 100 seed-mass, biological yield, harvest index and seed yield per plant, in 45 genetically diverse chickpea genotypes were evaluated. The coefficients of phenotypic variability were always higher than the genotypic variability indicating the presence of environmental component. Considerable amount of exploitable genetic variability was observed in case of 100 seed–mass, seed yield per plant, biological yield and pods per plant. These characters had high predicted genetic advance with moderate to high heritability. Therefore, improvement in these traits would be more effective by selection in the present material.

Key words : Genotypic variability, Phenotypic variability, Heritability, Genetic advance and Chickpea.

Breeding strategy of any crop involves collection, evaluation and selection of superior genotypes. Chickpea provides a greater range of variation for its genetic improvement. Before aiming an improvement in yield, it is necessary to have the knowledge of genetic variability present in the population, heritability of various characters and probable genetic advance to be expected from selection of superior genotypes. Hence, the present investigation was conducted with 45 genotypes for estimating range of variation and genetic parameters of 12 characters in chickpea having differences in quantitative characters, morphological parameters and source of origin.

MATERIALS AND METHODS

Forty five diverse chickpea genotypes were raised in a randomized block design with three replications at Crop Research Center, G.B. Pant University of Agri & Technology, Pantnagar (UT), during Rabi Season under late sown (29th of November) condition. The experimental plot of each genotype constituted of four rows of four meters length. The spacing between rows were 30 cm. and between plants 10 cm. All recommended package of practices were followed for raising crop of chickpea. The observations were recorded on 12 characters namely days to 50 percent flowering, days to maturity, reproductive period, plant height, primary branches per plant, secondary branches per plant, pods per plant, seeds per pod, 100 seed- mass, biological yield, harvest index and seed yield per plant.

The coefficients of variation were estimated by using the method suggested by Burton and Davane (1953). Heritability in broad sense and GA under selection for these characters were estimated according to Lush (1949).

RESULTS AND DISCUSSIONS

The results revealed highly significant differences among the genotypes for different characters and exhibited quite wide range of variation. The estimates of mean, range, phenotypic and genotypic co-efficient of variability, heritability and expected genetic advance for all the characters are presented in Table-1.

The relative contribution of genotype and environment could be judged by computing phenotypic and genotypic coefficient of variation. The phenotypic and genotypic coefficient of variation expressed in terms of percent points were comparatively high for seed yield per plant (33.17, 21.67), 100 seed-mass (28.66, 26.32),pods per plant (28.44, 15.76) biological yield (18.22, 17.27), secondary branches per plant, (22.89, 10.37), primary branches per plant (15.12, 6.79) seeds per pod (14.69,8-91), harvest index (12.71, 6.59), plant height (11.70, 7.08) and low for reproductive period (2.87, 2.10), days to 50% flowering (1.54, 1.14) and days to maturity (0.85, 0.52). In all the traits, genotypic coefficient of variation was less than the phenotypic ones, indicating the role of environment, (heterogeneity in soil fertility status or other unpredictable factors) in the expression of the characters under observation but mostly their closer magnitude suggested that greater role was played by genotype rather than environment. The characters having high genotypic coefficient of variation (GCV) possessed better potential for improvement through selection. There is very little scope for improvement through selection in case of reproductive period, days to fifty percent flowering and days to maturity because these characters expressed very low variability. Same results were obtained by singh *et.al* (1990), Arora (1991).

The estimate of heritability acts as a predictive instrument in expressing the reliability of phenotypic value. It, therefore, helps the plant breeder to make selection for a particular character when heritability is high. The characters like 100 seed-mass, days to 50 per-cent flowering and reproductive period exhibited high estimates of heritability. This indicates that environment would play a little role while transmitting these characters to the progenies of selected lines. The characters seed yield per plant, biological yield, days to maturity, seeds per pod and plant