



# Estimation Of Genotypic And Phenotypic Coefficients Of Variation, Heritability And Genetic Advance Of Chick Pea (*Cicer Aritinum*)

Dr Balwant Singh

Associate professor, Department of GPB, BNPG College Rath, Hamirpur, UP.

## ABSTRACT:

Five varieties of chick pea or garm (*Cicer arietinum* L.) namely B. L. 9 (178), B. L. 8 (169), B. L. 13 (515), B. L. (174) and B. L. 8 (377) with six characters namely, days of flowering, height of plant, no. of pods per plant, 100 gram weight, Yield per plant and days to maturity were selected to estimate coefficient of variation, heritability and genetic advance. The highly significant values of analysis of variance for all the six characters showed sufficient amount of variability. Genotypic coefficient of variability was found lower than the respective phenotypic coefficient of variability for all six characters under studied. Maximum genotypic coefficient of variation was found for the characters 100 grain weight (23.644). Maximum phenotypic coefficient of variation was found for the characters 100 grain weight (25.261). It reveals that the maximum heritability was found in yield per plant (94.29%) followed by height of plant (93.39%). The maximum genetic advance was found in number of pods per plant (23.1504%) followed by 100 grain weight (8.1341%).

**KEYWORDS:** Coefficients of Variation, Heritability, Genetic Advance and Chick Pea (*Cicer Aritinum*)

## I. INTRODUCTION

Pulses being the members of leguminaceae family, have been occupying an important position over since man started domestication plants and have become a part of our cultural heritage.

Chick pea or gram (*Cicer Arietinum*) is one of the most important pulses grown in India ranking fourth among the grain crops in area and production. Gram is grown throughout the world and India accounts for 70% of the total produces.

Gram is used as pulses or “Split dol” and some other frame. Germinated seed are recommended to cure scurvy disease in children. The acids like malice and oxalic collected from surface on green leaves are generally prescribed for some intestinal disorders (Sigh, 1989).

Heritability has been used as an index of transmissibility of a character from the present to its off spring and thus it is a suitable aid to make improvements in a crop by selection for various characters.

Genetic advance also serves the same purpose. Therefore, for crop improvement by selection as a prelude, it is essential to study the extant of genetic variability and heritability along with genetic advance.

### Review of literature

A brief review of the literature on gram (*Cicer Arietinum*) has formed the basis of the “Estimation of genotypic and phenotypic coefficients of variation, heritability and genetic advance of chick pea (*Cicer Aritinum*) is given below:

Chardr (1968) studied the estimates of component of variance for ten characters in gram and reported wide variation in the material for all these characters, estimates of heritability in broad sense were generally high genetic gain accompanied by high heritability was observed in pod per plant, pod setting percentage, flowering duration and primary branches per plant.

Sandha and Chandra (1969) reported high heritability values for number of primary branches and number of secondary branches and seed setting percentage.

Moderately value for length of the longest branches and low for other character in gram. They also estimated genetic advance and found high estimates for branching. The expected genetic advance for yield observed to be 30%.

Bhardwaj and Singh (1972) found a wide range of phenotype variability to gram for height and number of branches per plant, number of secondary branches per pod, seed yield per plant, number of pods per plant, 100 seed weight and day



to 75% maturity. 1000 seed weight, number of seeds per pod and number of pods per plant were found to have comparatively high genetic coefficient of variation than other characters. Heritability estimate were high for all the characters, except the number of seeds per pod, where it was very low. It appeared that phenotypic selection for branches per plant, pod per plant, pod per plant, 100 seed weight and seed yield per plant was effective for all practical purpose.

Knosh-khul and Hiknejad (1972) observed heritability estimates in broad sense for plant height and spread of the plant in gram to be 16 to 20 per cent, respectively. The estimated minimum numbers of genes controlling plant height were significantly and positively correlated with 100 seed weight.

Rastogi and Sigh (1977) studied six yield components of gram and reported wide range in broad sense heritability for five out of six agronomic traits studied days to flower had a narrow sense heritability estimate of 60.01 per cent yield per plant was positively correlated with number of seeds per plant and ascorbic acid content genotypically as well as phenotypically. Protein and ascorbic acid content were strongly but negatively correlated to each other.

Ram *et al.* (1978) reported lack of any association between broad sense and narrow sense estimate heritability in the crossed material of gram seed. Number of per pod and 100 seed weight showed the highest narrow sense heritability and maximum genetic advance in all crosses.

## II. MATERIAL AND METHODS

The study was carried out at the research farm of Brahmanand Mahavidyalaya Rath, Hamirpur (UP) during *rabi* season. Five varieties of chick pea or garm (*Cicer arietinum* L.) namely B. L. 9 (178), B. L. 8 (169), B. L. 13 (515), B. L. (174) and B. L. 8 (377) were selected. The material was sown in RBD with three replications. Each treatment was sown in a plot of three rows, each 4 meters long with spaced 50 cm apart. Data on the following characters were recorded and analysed on 5 randomly plants. In all, 75 plants were selected randomly. The selected plants were tagged with proper information for nine identifications. Border rows were excluded from the experiment.

Coefficient of variations was calculated as:

$$A. \quad \text{Phenotypic coefficient of variation (P. C. V.)} = \frac{\sqrt{\sigma_p^2}}{\bar{x}} \times 100$$

$$B. \quad \text{Genotypic coefficient of variation (G. C. V.)} = \frac{\sqrt{\sigma_g^2}}{\bar{x}} \times 100$$

Heritability is calculated as:

$$\text{Heritability } (h^2) = \frac{\sigma_g^2}{\sigma_p^2}$$

Genetic advance is calculated as:

$$G.A. = \frac{\sigma_g^2 \times k}{\sqrt{\sigma_p^2}}$$

Where:

K is selection coefficient at 5% (2.05).

## III. RESULT AND DISCUSSION

Coefficient of variance is given in Table 1. Data revealed that the  $\sigma_g^2$  and  $\sigma_p^2$  were standing to sufficient range exist for different characters under study. Component of variability (Table 2) indicates the value of genotypic coefficient of variability which was lower than the respective phenotypic coefficient of variability for all six characters under studied. Maximum genotypic coefficient of variation was found for the characters 100 grain weight (23.644) followed by number of pods per plant (12.4521).



Table1. Calculation for Component of variance

S. N.	Character	$\sigma_g^2$	$\sigma_p^2$	$\sigma_e^2$
1	Days to flowering	1.7289	2.4792	0.7503
2	Height of plant	11.3879	12.1932	0.8052
3	No. of pods per plant	239.594	454.536	214.942
4	100 grain weight	17.5286	19.7066	2.178
5	Yield per plant	11.0939	11.7652	0.6713
6	Days to maturity	9.0993	12.0863	2.987

Maximum phenotypic coefficient of variation was found for the characters 100 grain weight (25.261) followed by number of pods per plant (17.1511). Heritability and genetic advance are given in Table 3. It reveals that the maximum heritability was found in yield per plant (94.29%) followed by height of plant (93.39%). The maximum genetic advance was found in number of pods per plant (23.1504%) followed by 100 grain weight (8.1341%).

Table2. Estimation of genotypic and phenotypic coefficient of variability

S. N.	Character	Genotypic coefficient of variability	Phenotypic coefficient of variability
1	Days to flowering	2.0092	2.406
2	Height of plant	5.5309	5.7231
3	No. of pods per plant	12.4521	17.1511
4	100 grain weight	23.644	25.261
5	Yield per plant	10.8141	11.1365
6	Days to maturity	2.3955	2.762

Table3. Estimation of heritability and genetic advance

S. N.	Character	Heritability Percentage	Genetic advance
1	Days to flowering	69.73	2.262
2	Height of plant	93.39	3.7183
3	No. of pods per plant	52.71	23.1504
4	100 grain weight	88.94	8.1341
5	Yield per plant	94.29	6.6628
6	Days to maturity	75.28	5.3917

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