RESEARCH ARTICLE

STUDY ON GENOTYPIC AND PHENOTYPIC COEFFICIENT OF VARIATION IN FIELD PEA (*PISUM SATIVUM* L.) PARENTS AND THEIR CROSSES

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Received-05.07.2022, Revised-14.07.2022, Accepted-25.07.2022

Abstract: The experiment study was conducted with 6 parent and their 15 F_1's (21 genotypes) obtained through half diallel cross. Simple measures of variability, such as phenotypic and genotypic coefficients of variation, these measures are commonly used for the evaluation of variability. The estimates of coefficient of variation provide an idea about the degree of variability present among the genotypes under study. Parents and crosses included in the current experiment showed significant genetic variation. Traits primary branches per plant, pod per plant and plant height recorded high genotypic coefficient of variation (GCV) with high phenotypic coefficient of variation (PCV).

Keywords: Genotypes, Phenotypic, Variation, Variability, Parent

INTRODUCTION

Field Pea is an important cool-season crop in India and throughout the world, it is an annual herbaceous vine that grows quickly and needs a trellis to support growth. Pea is a great source of protein (25%), amino acids, sugars (12%), carbohydrate, vitamins, calcium and phosphorus, besides having a minor amount of iron. Both whole and split ripe seeds are utilized in *dal* and put to use in various ways for human consumption. Besides vegetable purposes, it is also produced as a crop for cattle fodder and cover crop to prevent soil erosion but mostly for matured seed for human utilization. India is the second largest producer of pea after China in the world. It is also used as a vegetable in many other countries such as Canada, Russia, United States, France and Egypt (Food and Agriculture Organization 2012).

MATERIALS AND METHODS

The present experiment carries out Instructional cum Research Farm of S.G. CARS, Jagdalpur, during *rabi* 2019-20. The experiment was conducted in RBD (Randomize Block Design) of 21 genotypes with 3 replication for assessment of genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV). Randomly selected 5 competitive plants from each plot and replication were Observed and recorded.

Estimation of coefficients of variation:

The coefficient of variation for various traits was evaluated by equation as recommended by Burton and De Vane (1953).

$$\text{GCV}\ (\%) = \frac{\sigma_g^2}{\text{mean}}\ \text{X}\ 100$$

$$\text{PCV}\ (\%) = \frac{\sigma_p^2}{\text{mean}}\ \text{X}\ 100$$

where,

PCV = Phenotypic coefficient of variation

GCV = Genotypic coefficient of variation

$\sigma^2 g$ = Genotypic variance

$\sigma^2 p$ = Phenotypic variance

The magnitude of coefficient of variation was categorized as

Range	Category
> 20%	High
20% - 10%	Moderate
< 10%.	Low

RESULTS AND DISCUSSION

The analysis of variance observed that genotypes mean sum of squares were highly significant for all characters. Trait **Days to 50 % flowering showed** Low phenotypic and genotypic coefficient of variance (4.18 and 3.06) respectively, indicating lower variation showed insignificant environmental effect on this trait. Similar low GCV & PCV recorded by Pandey *et al*. (2015).

Plant height (cm) evaluated high GCV & PCV was 22.73 and 22.12 respectively, indicating high variation for the trait. Also Similar value recorded by Tiwari and Lavanya (2012). Traits **days to maturity** showed the low PCV was 2.58 and low GCV was founded to be 2.04. Lower values for coefficient of variation indicating lower variation for the character and showed insignificant environmental effect on this character. Similar low phenotypic and genotypic coefficient of variance recorded by Kour *et al.* (2018). **Primary branches per plant** high genotypic coefficient of variance were 37.44 and High phenotypic coefficient of variance trait was 38.61. Respectively, indicating very low variation for the trait and it is insignificant for breeding programme. Similar variance recorded by Pandey *et al.* (2014) and Saxsena *et al.* (2014). **Secondary branches per plant** PCV & GCV was 16.65 and 13.13, it's showed moderate variance. Trait **pod length (cm)** calculated moderate PCV 11.66 and GCV was 9.70

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respectively. Similar variation was observed by Singh *et al.* (2019) and Kumar *et al.* (2014). Observation for trait **number of pod per plant** was recorded high PCV (26.52) and high GCV (24.85), it's very important traits for increasing seed yield. Similar variance was recorded by Devi *et al*. (2017). The traits **number of seed per pod** moderate PCV and GCV was 12.08 and 10.72 respectively. Variation for number of seeds per pod directly influenced to seed yield per plant and moderate to high variation help to breeder in their research programmme. Similar result found by Yadav *et al.* (2019). The characters **harvest index** evaluated moderate PCV (11.96) and GCV (10.31). **Test weight (g)** noted that low PCV (5.38) and low GCV was (3.99). This trait directly associated with seed yield per plant similar result observed by Ali *et al.* (2018) and Bijalwan *et al.* (2018). Trait **seed yield per plant** (g) evaluated moderate PCV was 18.06 and GCV was 16.97, is it indicated. Similar result reported by Barcchiya *et al*. (2018).

SUMMARY AND CONCLUSION

Genetic variability evaluated under this study should fully be utilized to bring out genetic improvement in field pea. Considerable genetic variation exhibited by parents and crosses involved in present investigation. Number of primary branches and pod per plant recorded with highest genotypic coefficient of variation and similarly plant height pod per plant was observed for phenotypic coefficient of variation. If the PCV value is higher than the GCV, it is possible that environmental factors as well as genotype play a role in the apparent variation.

Table 1. Analysis of variance for yield and yield attributing traits in field pea

SV	DF	Day to 50 % Flowering	Plant Height (cm)	Day to Maturity	Primary Branches/Plant	Secondary Branches/Plant	Pod length	Pods per plant	Number of Seed/Plant	Harvest Index	Test Wieght	Seed Yield/Plant
Replication	2	0.90	36.10	0.78	0.09	0.02	0.14	0.15	0.16	5.83	0.84	0.26
genotypes	20	10.35**	980.75**	11.64**	1.85**	0.96**	1.15**	48.33**	1.05**	16.26**	2.56**	12.09**
Error	40	2.32	17.87	1.94	0.04	0.16	0.15	2.14	0.09	1.67	0.55	0.51
CD. at 5%		2.52	7.00	2.31	0.33	0.67	0.64	2.43	0.49	2.14	1.22	1.19
CV (%)		2.85	5.22	1.58	9.45	10.25	6.48	9.27	5.56	6.05	5.61	6.18

Table 2. Genetic parameters of variation for seed yield and its component traits in field pea

S.No.	Characters	Min	Max	Mean	GCV (%)	PCV (%)
1	**Day to 50 % Flowering**	49.67	56.33	53.48	3.06	4.18
2	**Plant Height (cm)**	49.67	101.99	80.98	22.12	22.73
3	**Day to Maturity**	85.33	92.00	88.11	2.04	2.58
4	**Primary Branches/plant**	1.20	4.10	2.08	37.44	38.61
5	**Secondary Branches/Plant**	3.47	6.13	3.92	13.13	16.65
6	**Pod length** (cm)	4.90	7.00	5.95	9.70	11.66
7	**Pods per plant**	11.97	26.71	15.79	24.85	26.52
8	**Number of Seed/Plant**	4.37	6.57	5.30	10.72	12.08
9	**Harvest Index** (%)	18.15	26.21	21.39	10.31	11.95
10	**Test Weight 100 seeds** (g)	19.08	22.73	20.51	3.99	5.38
11	**Seed Yield/Plant**	9.32	17.89	11.58	16.97	18.06

*Significant at 5%level of significance.

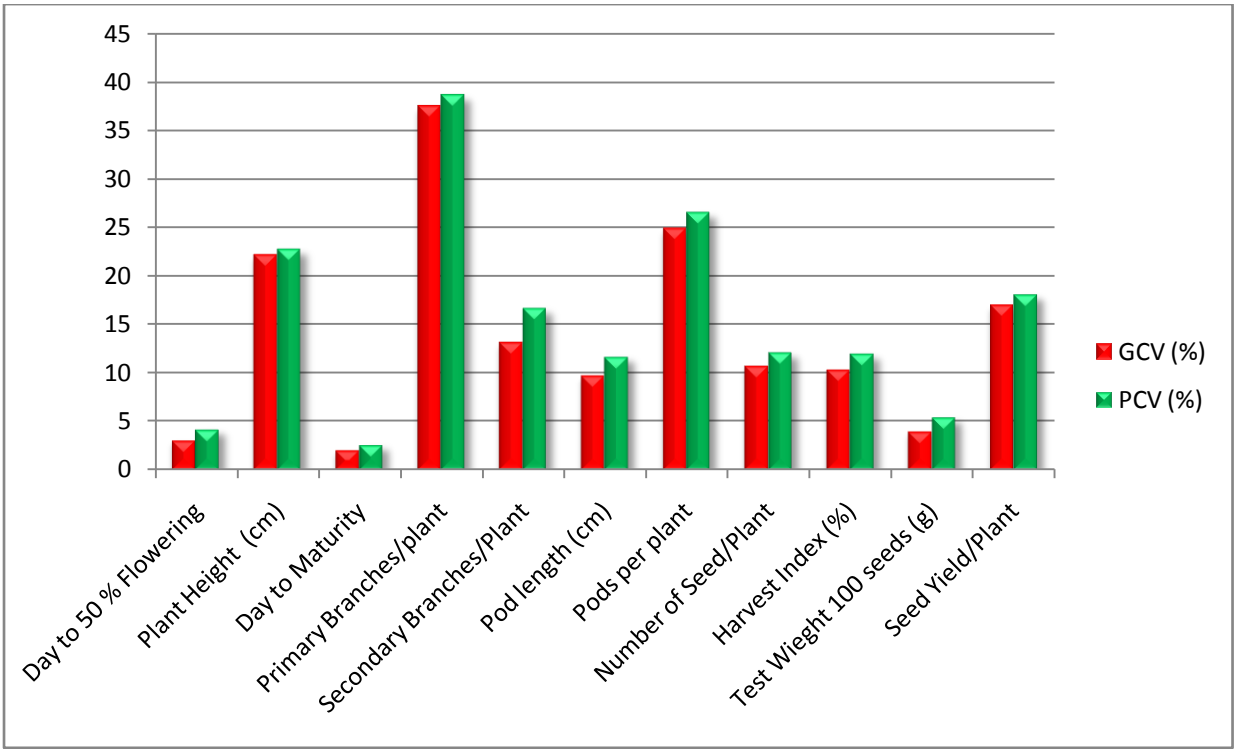

Fig. 1 Graphical representation of estimates of genotypic and phenotypic coefficient of variation under study.

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