

## Heritability and genetic advance in vegetable pea (*Pisum sativum* L.)

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### ABSTRACT

Ten pea genotypes crossed in a diallel mating design excluding reciprocals were evaluated with their 45 F<sub>1</sub>'s along with parents in a randomized block design in three replications at the Department of Vegetable Science, C.S. Azad University of Agriculture and Technology, Kalyanpur, Kanpur, during winter season 2007-08. The heritability and genetic advance were studied for all the traits under study. The estimates of heritability varied from 9.12 % (pod width) to 63.25% (number of first fruiting node). The heritability estimates were moderate for pod length and shelling percentage; low for pod width and ash content. For remaining characters, estimates of heritability were high. Genetic advance was highest for number of pods per plant while four characters viz. plant number of pods per plant, plant height, length to first fruiting node and days to flowering showed high genetic advance (more than 30%), while pod width showed lowest genetic advance. Other traits showed moderate genetic advance. The consequences of heritability coupled with genetic advance showed that four characters viz. number of pods per plant, plant height, length to first fruiting node and days to flowering had high heritability as well as high genetic gain, thus, these characters may be improved through selection method.

**Key words :** Heritability, genetic advance, vegetable pea.

Garden Pea (*Pisum sativum* L.) is a very common nutritious vegetable grown in cool season throughout the world. Peas are highly nutritious and contain high percentage of digestible protein (7.2%) alongwith carbohydrate, vitamins and mineral matters. It is commercially grown as winter crop in North India, widely consumed and most relished in various forms (Das *et al.*, 1992). Heritability indicates the proportion of phenotypic variance that is due to genotypes which is heritable. It serve as a useful guide to breeders as the selection for trait having high heritability will be effective and improvement will be brought through selection. The genetic advance is an improvement in the genetic value new population as compared to original one. It will be possible to decide various breeding programmes for improvement of different characters based on the study of heritability and genetic advance.

### MATERIALS AND METHODS

A set of ten genotypes of pea namely Azad

Pea-1, K.S.-150, K.S.-175, K.S.-156, P.M.R.-19, P.M.R.-20, Azad Pea-4, T.D.C.-1, Azad Pea-3 and E-6 were crossed in a diallel mating design excluding reciprocals. All the 45 F<sub>1</sub>'s along with parents were sown in a randomized block design with three replications at the Department of Vegetable Science, C.S. Azad University of Agriculture & Technology, Kalyanpur, Kanpur, during winter season 2007-08. Observations were recorded on ten randomly selected plants from each treatment for ten quantitative characters viz. days to flowering, days to maturity, plant height (cm), length of first fruiting node (cm), number of first fruiting node, pod length (cm), pod width (cm), number of seeds per pod, green pod yield per pod (g) and four qualitative traits viz. shelling percentage, total crude protein (%), dry matter content (%), ash content (%). Data were collected and subjected to statistical analysis. The estimates of heritability were calculated as per the method suggested by Crumpacker and Allard (1962) and the heritability and genetic advance were studied for all the traits under study.

**Table 1. Heritability, genetic advance & genetic advance in percent over mean for 14 characters in 10X10 diallel cross in vegetable pea**

S.No.	Characters	Population	Heritability mean	G.A.	G.A. in % over mean
1.	Days of flowering	42.14	62.16	12.66	30.04
2.	Days to maturity	65.87	50.28	16.77	25.46
3.	Plant Height (cm)	64.07	39.37	28.32	44.20
4.	Length of first fruiting node (cm)	30.75	52.39	12.40	40.33
5.	Number of first fruiting node	11.78	63.25	3.06	25.98
6.	Number of pods/plant	14.90	39.01	6.89	46.24
7.	Pod length (cm)	9.05	25.18	1.85	20.44
8.	Pod width (cm)	1.31	9.12	0.07	5.34
9.	Number of seeds/pod	8.29	37.91	1.84	22.20
10.	Shelling (%)	47.18	27.91	9.21	19.52
11.	Total crude protein content (%)	19.00	34.75	3.11	16.37
12.	Dry matter content (%)	26.93	49.05	3.35	13.55
13.	Ash content (%)	3.79	9.63	0.96	25.33
14.	Green Pod Yield (g)/plant	86.87	57.01	23.48	27.03

In order to facilitate the description of estimates of heritability, the reckoned values of estimates were classified into three categories by Robinson (1965). If the estimated value of heritability is below 10% it will be said to be having low heritability, while if heritability ranged between 10-30% then medium heritability but if it is greater than 30% it would be highly heritable.

#### RESULTS AND DISCUSSION

The estimates of heritability and genetic advances for 14 attributes are presented in Table 1. The estimates of heritability varied from 9.12 % (pod width) to 63.25% (number of first fruiting node). The heritability estimates revealed low for pod width and ash content; moderate for pod length and shelling percentage while high for remaining traits *viz.* days to flowering, days to maturity, plant height, length of first fruiting node, number of first fruiting node, number of seeds per pod, total crude protein, dry matter content and green pod yield per plant.

The number of pods per plant recorded highest value of genetic advance (46.24%) followed by plant height (44.20%), length of first fruiting node (40.33%), days to flowering (30.04%), green pod yield/plant (27.03%), number of first fruiting node (25.33%), number of seeds/pod (22.20), Pod length (20.44%), shelling % (19.52%), total crude protein content (16.37%), dry matter content (13.55%) and lowest for pod width (5.34%).

Four characters of plant *viz.* plant number of pods per plant, plant height, length to first fruiting node and days to flowering showed high genetic advance (more than 30%), while pod width showed lowest genetic advance. Other traits showed moderate genetic advance.

The other works also reported high to low heritability and genetic advance for different traits in vegetable pea (Rai *et al.* (2006), Mahamad *et al.* (2006), Gupta *et al.* (2006), Sharma *et al.* (2007) and Singh *et al.* (2007).

The consequences of heritability coupled with genetic advance showed that four characters viz. number of pod per plant, plant height, length to first fruiting node and days to flowering had high heritability as well as high genetic gain. Thus, these characters may be improved through selection method. The trait pod width showed low heritability coupled with low genetic advance and so selection would be ineffective for pod width. Pod length and shelling percentage showed moderate heritability coupled with moderate genetic advance. Traits days to maturity, number of first fruiting node, number

of seeds per pod, total crude protein (%), dry matter content (%) and green pod yield per plant showed high heritability coupled moderate genetic advance. Ash content showed low heritability coupled with moderate genetic advance. Thus selection may not be rewarding for pod length, shelling percentage, days to maturity, number of first fruiting node, number of seeds per pod, total crude protein (%), dry matter content (%) and green pod yield per plant therefore other breeding methods should be taken for improvement of these traits.

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