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Studies On Genetic Variability In Pea (*Pisum sativum* L.)

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Abstract

Genetic variability was studied in 50 germplasms of pea (*Pisum sativum* L.). Wide range of phenotypic variability, genotypic coefficient of variation, heritability and genetic advance were observed in all the characters indicated large amount of variability among the genotypes for these traits. High heritability was accompanied by high genetic advance in plant height, seed yield per plant, number of pods per plant and days to maturity showing existence of additive gene action and selection may be effective. While, 100 seed weight, seeds per pod and days to flowering had high heritability with low genetic advance indicating, existence of non additive gene effect.

Introduction

The systematic breeding programme involves the steps like creating genetic variability, practicing selection and utilization of selected genotypes to evolve promising varieties. The large spectrum of genetic variability among combining genotypes offers a better scope for selection. Estimates of heritability and genetic advance will play an important role in exploiting future research projections of pea improvement. So breeder has to make constant search for few and diverse genetic stocks for stabilizing yield and quality of produce. In the present study the extent of variability available in all fifty germplasms of pea and the scope of selection through heritability and genetic advance were attempted.

Material And Methods

The experimental materials consisting of fifty germplams of pea obtained from NBPGR, New Delhi. The experiment was carried out during *rabi* 2005 in Randomized Block Design with three replications. Each genotype was represented by two rows of 4.5 m length spaced at 45 cm between rows and 15 cm between plants.

Five plants in each treatment were randomly selected for collecting data on days to flowering (No.), days to maturity (No.), plant height (cm), number of branches per plant, number of pods per plant, pod length (cm), number of seeds per pod, seed yield per plant (g) and weight of 100 seeds (g).The genetic coefficient of variation, heritability in broad sense and expected genetic advance were calculated according to formulae suggested

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by Burton and De Vane (1953), Hanson *et al.* (1956) and Johnson et al. (1955), respectively.

Results And Discussion

The analysis of variance for all characters showed significant differences indicating, presence of wide genetic variability among genotypes studied. The range, mean, coefficient of variation, heritability and genetic advance for all the characters are presented in Table 2.

A wide range of variation was observed in plant height at harvest, number of pods per plant, seed yield per plant and days to maturity. Other characters viz., days to flowering, 100-seed weight and number of branches per plant showed comparatively moderate range of variation. The magnitude of phenotypic and genotypic coefficient of variation ranged between 7.9637 to 30.8591 and 7.006 to 30.6794 for nine characters studied, respectively. The character 100 seed weight recorded highest PCV and GCV followed by seed yield per plant, pod length, number of branches per plant and plant height at harvest suggesting, presence of good amount of variability for these traits. Similar results were obtained by Gupta et al. (1983) and Ramesh et al. (2002).

The magnitude of PCV and GCV were low in days to maturity and days to flowering indicating narrow range of variation for these characters and provides very least scope for selection. In general the magnitudinal difference between PCV and GCV were minimum for all the characters studied indicating, less influence of environment on these characters expression.

All the characters except, pod length showed high heritability. The 100 seed weight (98.84) recorded highest heritability followed by plant height (93.57 cm), number of branches per plant (87.49), seed yield per pod (84.07) and number of pods per plant (83.53) indicating the role of additive gene effects and selection based on these characters would be more convenient. Selection based on heritability alone may mislead the selection process. Therefore genetic advance and heritability were taken into consideration during the selection programme (Johnson *et al*., 1955).

Plant height (42.87) had highest genetic advance followed by days to maturity (14.24), number of pods per plant (14.14) and seed yield per plant (11.86). In the present investigation, high heritability coupled with high genetic advance in plant height at harvest, seed yield per plant, number of pods per plant and days to maturity. These results coincide with those obtained by Singh *et al.* (1986), Dubey and Lal (1988), Beswana and Tewatia (1994) and Dixit (1998).

Table 1: Analysis of variance (MSS) for 9 characters in pea

Sr. No.	Characters	Mean sum of square		
		Replications (3)	Treatment (50)	Error (150)
1.	Days to flowering	23.6562	57.9018*	10.0682
2.	Days to maturity	24.6250	203.3214*	18.0281
3.	Plant height at harvest (cm)	169.6250*	1420.7550*	31.8176
4.	No. of branches per plant	0.51074	20.2284*	0.92014
5.	No. of pods per plant	137.6875*	180.5612*	11.1320
6.	Pod length (cm)	10.1208	17.3381*	10.8024
7.	No. of seeds per pod	0.0514	2.8216*	0.16765
8.	100-seed weight (g)	1.3750*	37.0732*	0.1446
9.	Seed yield per plant (g)	99.4922*	124.5169*	7.0341

*, ** Significant at 5 per cent and 1 per cent level

Table 2: Components of genetic variation in 50 germplasm lines of pea for various characters

Sr. No.	Characters	Range	General mean	PCV	GCV	Heritability h^2 (bs)	Genetic advance
1.	Days to flowering	45.37- 59.67	52.21	9.7681	7.6476	61.29	6.44
2.	Days to maturity	100.33-127.67	112.17	7.9637	7.006	77.41	14.2438
3.	Plant height at harvest (cm)	44.47-128.53	88.89	25.0237	24.2057	93.57	42.8761
4.	No. of branches per plant	6.47-14.53	10.39	26.0993	24.4125	87.49	4.8883
5.	No. of pods per plant	27.07-57.73	44.12	18.6377	17.0343	83.53	14.1493
6	Pod length (cm)	3.43-8.13	5.03	28.008	27.8578	16.78	1.2456
7.	No. of seeds per pod	3.20-6.47	4.65	22.0385	20.2067	84.07	1.7765
8.	100-seed weight (g)	6.0-19.53	11.44	30.8591	30.6794	98.84	7.1854
9.	Seed yield per plant (g)	10.85-41.01	22.39	30.3539	27.9476	84.77	11.8692

PCV = Phenotypic coefficient of variance, GCV = Genotypic coefficient of variance, h^2 (b.s) = Broad sense

Refrences

1. **Baswana, K.S. and A.S. Tewatia. 1994.** Genetic variability studies in pea under dry land condition. Haryana J. Agric. Sci. 23 (4) 317-321.
2. **Burton, G.W. and E.H. Devane. 1953.** Estimating heritability in tall fenscue (Festeca arundina ceae) from replicated clonal material. Agron. J. 45 : 478 – 481.
3. **Dixit, G.P. 1998.** Genetics of certain yield contributing traits in grass pea. (*Pisum sativum* L.) Indian J. Pulse Res. 11 (2) : 21 – 24.
4. **Dubey, R.S. and S. Lal. 1988.** Heritability and genetic advance in pea. Indian J. pulse Res. 1 (1) : 57 – 59.
5. **Gupta, K.R., K.P. Singh and V.P. Singh. 1983.** Inheritance of some 1 – 5. Quantitative traits in pea. (*Pisum sativum* L.) Crop improve. 10 (1).
6. **Hanson, C.H., H.F. Robinson, and R.E. Comstock. 1956**. Biometrical studies of yield in segregating population of Korean lespedeza. Agron. J. 48 : 268 – 271.
7. **Johnson, H.W., H.E. Robinson and R.E. Comstock. 1955.** Estimation of genetic and environmental variability in soybean. Agron. J., 47 (7) : 314 – 318.
8. **Ramesh, C., A.S. Tewatia and M.S. Dahiya. 2002**. Genetic variability and heritability in garden pea. Haryana J. Hort. Sci. 31 (3 – 4) : 250 – 252.
9. **Singh, K.N., V. Singh Santoshi and H.G. Singh. 1986.** Genetic analysis of yield components and protein content in pea. Indian J. Agril. Sci. 56 (11) : 757 – 764.