

## Genetic variability, heritability and genetic advance for yield components in winged bean (*Psophocarpus tetragonalobus* L.)

RAJESHWAR NANDAN, R.S.VAISHNAV, K.SRIVASTAVA AND KAUSHLENDRA KUMAR ISSAR  
Department of Genetics and Plant Breeding, Institute of Agricultural Sciences, Banaras Hindu University, VARANASI (U.P.) INDIA

(Accepted : September, 2009)

Twenty one diverse winged bean genotypes were evaluated for phenotypic and genotypic variability, heritability and genetic advance in nine quantitative traits. Considerable amount of genetic variability was exhibited by days to 50% flowering, pod length, dry pod weight, 100 seed weight and grain yield per plant. Days to 50% flowering, days to maturity, number of pod per plant, 100 seed weight and grain yield per plant gave high heritability estimates with moderate genetic advance, which indicates additive gene effects to provide a rapid genetic improvement. The genetic advance and heritability estimates suggested that the characters e.g. days to 50% flowering, days to maturity, number of pod per plant, dry pod weight, 100 seed weight and grain yield per plant were under additive gene effects

Key words : Winged bean, GCV, PCV, Heritability, Genetic advance

### INTRODUCTION

Winged bean (*Psophocarpus tetragonalobus* L.) has assumed considerable importance as a protein rich multipurpose crop. The high protein content of the seeds, pods, leaves and roots can be utilized by man for himself as well as by his animals also. Yield is a complex character which is highly influenced by the environments. For 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 lines. Information on the nature and magnitude of variability present in the genetic material prior to start any selection programme are helpful in designing a successful breeding programme. Therefore, the present investigation was undertaken with the object to estimate genetic variability, heritability and genetic advance of various yield and yield contributing characters in winged bean.

### MATERIALS AND METHODS

Twenty one genotypes (IC-15018, IC-17005, IC-26949, IC-26949-1, IC-31981, IC-34865-1, IC-95222, IC-95224, IC-95225, IC-95227, IC-95228, IC-95229, IC-95231, IC-95233, IC-95237, IC-95240, IC-95241, TMV Local, EC-27886, EC-1426544 and EC-142662) of winged bean obtained from National Bureau of Plant Genetic Resources, Akola (Maharashtra) were maintained at Vegetable Research Farm., Institute of Agricultural Sciences, Banaras Hindu University, Varanasi during the

summer season 2006-07. The experiment was sown in a randomized block design with three replication. Each genotype was sown in one row plots. Each plot consisted of one row of 5 m length with row to row and plant to plant distance being 75 and 25 cm, respectively. Recommended agronomic practices were followed to raise the healthy crop. Observation on nine characters *i.e.* days to 50% flowering, days to maturity, pod length, pod width, number of grain per pod, number of dry pod per plant, dry pod yield per plant, 100 seed weight and seed yield per plant were taken on three competitive plant from each replication of genotype under study. Heritability was estimated by formula suggested by Kalton *et al.* (1952) and expected genetic advance was estimated according to the method given by Fobinson *et al.* (1949).

### RESULTS AND DISCUSSION

Mean sum of squares due to genotypes (Table1) were highly significant for all the characters suggesting presence of considerable genetic variation in respect of various characters. Estimates of mean, range, phenotypic and genotypic coefficient of variability, heritability and expected genetic advance for all the characters are presented in Table 1. Results exhibited that coefficients of phenotypic variability were always higher than their corresponding genotypic variability and their closer magnitudes for days to 50% flowering, pod length, dry pod weight, 100 seed weight and grain yield per plant suggested that greater role was played by genotype rather than environment. The high value of PCV suggested that,

**Table 1 : Estimation of range, mean, phenotypic (PCV), genotypic (GCV) coefficient of variation, heritability and genetic advance for different characters in winged bean (*Psophocarpus tetragonalobus*)**

Sr. No.	Characters	Range	Mean	PCV (%)	GCV (%)	Heritability	Genetic advance (as % of mean)
1.	Days to 50% flowering	80 – 97.67	86.90	6.18	6.06	96.0	17.66
2.	Days to maturity	142.66 – 162.67	152.67	.95	3.90	97.3	21.00
3.	Pod length	15.4 – 20.93	16.66	14.76	14.26	93.4	7.36
4.	Pod width	1.59 – 2.20	1.87	11.69	9.09	60.4	0.60
5.	Number of grain per pod	8.43 – 12.73	10.59	11.66	10.72	85.6	4.30
6.	Number of pod per plant	14 – 46.33	27.54	33.01	30.29	84.2	32.33
7.	Dry pod weight	23.50 – 39.73	29.59	15.10	14.92	97.6	16.23
8.	100 seed weight	29.33 – 43.76	37.65	13.59	13.33	78.6	38.82
9.	Grain yield per plant	143.33 – 259.20	225.68	14.24	14.23	89.2	68.60

for these characters considerable variation is available against the genotypes under study. The coefficient of variability (percentage) at both phenotypic and genotypic level were high for pod length, number of pod per plant, dry pod weight, 100 seed weight and grain yield per plant (Yassin, 1973).

The genotypic coefficient of variation together with heritability reflects the picture of genetic advance to be expected from selection (Dhillon *et al.*, 2005). All the characters under study exhibited high to moderate heritability were observed for all characters. This also indicated that these characters would respond more favorably to selection. In the present study days to 50% flowering, days to maturity, number of pod per plant, 100 seed weight and grain yield per plant gave high heritability estimates with moderate genetic advance in comparison to other characters, which indicates that additive gene effects may provide a rapid genetic improvement. On the other hand, pod length, pod width, number of grain per pod and dry pod weight showed high to moderate heritability with low genetic advance, indicating high environmental effects and selection may be ineffective for such traits.

High genetic advance was observed for almost all the characters under study. High heritability coupled with high genetic advance was recorded for days to 50% flowering, days to maturity, number of pod per plant, dry pod weight, 100 seed weight and grain yield per plant. It suggests for the preponderance of additive gene action which can be exploited by effective selection methods for the development of elite genotype of winged bean.

## REFERENCES

- Dillon, S.K., Singh, G. and Gill, B.S. (2005).** Genotypic and phenotypic variability and heritability of some yield and some quality characters in soybean (*Glycine max* L.). *Legume Res.*, **28**(4):276.
- Yassin, T.E. (1973).** Genotypic and phenotypic variances and correlations in field bean (*Vicia faba* L.). *J.Agric. Sci., Camb.*, **81**: 445-448.