https://doi.org/10.29321/MAJ.10.A03212

Madras agric. J. 64 (7) : 447—450, July, 1977

Genetic Variability in Certain Metric Traits of *Arachis hypogaea* L.

P. SIVASUBRAMANIAN[1], T. RAMANATHAN[2], R. MAHALINGAM[3], K. N. SATHYAPRASAD[4], and D. ADHIVARAHAN[5]

The magnitude of heritable variability in some of the metric traits in bunch groundnut was assessed. High values recorded for G. C. V., heritability and genetic advance as percentage of mean in the height of main stem and number of pods per plant indicate that certain amount of reliance can be placed on these characters for selection and recombination.

The extent of genetic variability is more important than the total variation since greater the genetic diversity wider the scope for selection. Studies on these genetic parameters on groundnut are limited. Investigations on the genotypic and phenotypic variability were undertaken in bunch groundnut varieties under irrigated conditions to estimate the heritable variability and the possible genetic advance that can be expected in some of the metric traits.

MATERIALS AND METHODS

Twenty five bunch groundnut varieties were sown in a simple randomised block design with four replications under irrigated condition at Aliyarnagar. The plot size was 3.3 x 0.6 m and the spacing adopted was 30 x 15 cm. At maturity, data on height of main stem, number of nodes on the main stem, number of primary branches, number of nodes on the primaries, length of primaries, number of flowers produced, number of mature pods and pod yield per plant were collected. Eight plants were selected at random in each replication for each variety and the mean values were arrived at for all the eight characters. The data were statistically analysed to estimate various genetic parameters like phenotypic variance, genotypic variance, phenotypic co-efficient of variation, heritability and genetic advance. Heritability and genetic advance as percentage of mean were worked out using the following formula :

Phenotypic variance : $\sigma^2 ph : \sigma^2 g + \sigma^2 e$

Genotypic variance : $\sigma^2 g$: Treatment mean square - error mean square

Where $(\sigma^2 e + r \sigma^2 g)$ = treatment mean square

$\sigma^2 e$ = error mean square

Heritability (in broad sense) (h^2) = $\frac{\sigma^2 g}{\sigma^2 ph}$

where $\sigma^2 g$: genotypic variance

$\sigma^2 ph$: Phenotypic variance

1 - 5: Groundnut Research Station, Pollachi.

Genotypic coefficient = $\frac{\sigma^2 g}{\bar{x}} \times 100$

Phenotypic coefficient of variation (GCV) = $\frac{\sigma ph}{\bar{x}} \times 100$

where σg = genotypic standard deviation

σph = phenotypic standard deviation

Genetic advance = $(h^2) \times k \times \sigma ph$

Genetic advance as % of mean = $\frac{(h^2) \times k \times \sigma ph)}{\bar{x}} \times 100$

where h^2 = Heritability in broad sense

k = Constant factor (2.06 at 5% selection differential)

$\bar{x}$ = Mean

RESULTS AND DISCUSSION

The analysis of variance indicated significant varietal differences for all the characters except for number of node and yield. Among the eight characters studied, the variability is high in the number of flowers produced and low but significant in the number of primaries.

The estimated data of genetic parameters for different attributes are presented in Table. The highest and the lowest values for phenotypic and genotypic variance were recorded in the number of flowers produced and number of primaries respectively. But for the number of flowers per plant and height of main stem all the characters recorded low genotypic variance and most of them were in agreement with the findings of Dixit *et al.* (1971). High genetic coefficient of variation was observed in height of main stem, number of pods and number of flowers per plant. Burton (1952) also suggested that genetic coefficient of variation together with heritability estimates would give the best picture of the amount of advance to be expected from selection. Though a very high value for genotypic variance was recorded in number of flowers per plant, the heritability value was comparatively low indicating the influence of environment on this character. The genotypic co-efficient of variation was high in height of main stem and number of pods along with high heritability estimates indicating their selection potential. The traits namely number of nodes on main stem, number of mature pods, height of main stem, length of primaries and number of primaries recorded high heritability values. The highest heritability value was also met with in number of nodes on the main stem. The low heritability recorded for plant yield was in agreement with the finding of Mahapatra (1966), Kulkarni and Albuquerqne (1967), Majumdar *et al.* (1969) and Dixit *et al.* (1970, 1971) in groundnut.

The genetic advance as percentage of mean was high for the height of main stem followed by the number of mature pods. Number of nodes on primary branches possessed the minimum value for the genetic advance as percentage of mean.

Height of main stem showed fairly high heritability estimate and genetic advance followed by the number of

TABLE. Estimates of variance, co-efficient of variance, heritability, genetic advance and genetic advance as percentage of mean of 25 varieties of bunch groundnut

Character	Phenotypic variance	Genotypic variance	Error variance	Heritability (Broad sense)	P.C.V.	G.C.V.	G. A.	G.A. as percentage of mean	Mean
Height of main stem (cm)	47.33	22.92	24.41	0.48	22.49	15.64	6.86	22.42	30.6
Nodes on main stem	1.09	0.67	0.42	0.62	8.63	5.54	1.35	10.99	12.1
No. of primaries	0.30	0.05	0.25	0.41	13.36	5.48	0.28	6.83	4.1
Length of primaries (cm)	0.56	0.25	0.31	0.45	2.24	1.49	0.69	2.07	33.5
No. of nodes on primaries	2.15	0.14	2.01	0.07	13.83	3.53	0.02	0.21	10.6
No. of flowers produced	219.04	43.51	175.53	0.20	25.17	11 21	6.14	10.40	58.8
No. of mature pods	2.34	1.29	1.05	0.55	18.18	14.03	1.74	20.50	8.1
Plant yield (g)	1.66	0.22	1.54	0.07	2.05	0.21	0.35	6.22	5.6

PCV : Phenotypic coefficient of variability
GCV : Genotypic coefficient of variability
GA : Genetic advance

nodes on it indicating that these characters could be relied upon for exercising selection. Dixit *et al.* (1971) in groundnut had reported high values for heritability and genetic advance for these characters. Moderate heritability and genetic advance are noticed for the number of flowers produced. Number of primaries, number of nodes on the primaries and length of primaries show uniformly lower genetic advance as percentages of mean. According to Panse (1957) if the heritability is mainly owing to non-additive gene effect, the expected genetic advance would be low and if there is additive gene effect a high genetic advance may be expected. The low genetic advance recorded for length of primary branches indicates that the character is conditioned by non-additive genes.

Number of mature pods, the height of main stem, and number of nodes could be improved for single plant selection, as heritability and genetic advance as percentage of mean for these characters are high.

REFERENCES

BURTON, G.W. 1952. Quantitative inheritance in grasses. *Proc. 6th int. Grassld. Congr.* 1 : 277-83.

DIXIT, P.K., P.D. BHARGAVA, D.K. SAXENA and L.K. BHATIA. 1970. Estimates of genotypic variability in some quantitative

characters in groundnut. *Indian J. agric. Sci.* 40 : 197-202.

DIXIT, P.K., P.D. BHARGAVA, D.K. SAXENA, L.K. BHATIA and K.N. SHARMA. 1971. Variability in groundnut *(Arachis hypogaea L.). Indian J. agric. Sci.* 41 : 685-91.

KULKARNI, G.N. and S.D.S. ALBUQUERQUE. 1967. Studies on variation in some quantitative characters of nine strains of groundnut evolved in Raichur. *Mysore J. agric. Sci.* 1 : 53-59.

MAHAPATRA, L.N. 1966. Preliminary studies on correlations of yield with other characters of groundnut. *Indian Agric. Sci.* 10 : 97-106.

MAJUMDAR, P.K., RAM PRAKASH and Md.F. HAQUE. 1969. Genotypic and phenotypic variability in quantitative characters in groundnut. *Indian J. Genet.* 29 : 291-96.

PANSE, V.G. 1957. Genetics of quantitative characters in relation to plant breeding. *Indian J. Genet.* 17 : 318-28.