https://doi.org/10.29321/MAJ.10.A03105

Madras agric. J. 65 (8) : 497—501, Aug., 1978.

Estimates of Genetic Parameters and Correlation Studies in Bunch Groundnut (*Arachis hypogaea* L.)

S.T. NATARAJAN[1], M.R. SATHIAMOORTHY[2], A.N. VENKATESWARAN[3] and T.K. RAMACHANDRAN[4]

Thirty bunch groundut varieties were evaluated for genetic parameters and degree of association between yield and its components. Number of pods per plant exhibited maximum genotypic and phenotypic co-efficient of variation. 100-pod weight had maximum heritability and genetic advance. Phenotypically, pod yield had positive correlation with 100-kernel weight and oil content. Number of pods per plant had negative association with 100-pod weight and 100-kernel weight while shelling out-turn showed a positive correlation with them.

A critical estimate of genetic variability is a pre-requisite for initiating appropriate breeding procedures in crop improvement programmes. The heritable variation is masked by non-heritable variation which creates difficulty in exercising selection. Hence it becomes necessary to split the overall variability into its heritable and non-heritable components with the help of certain genetic parameters, which may enable the breeders to plan out proper breeding programme. Besides, determination of the degree of association of plant characters usually forms the basis for selecting desirable parents which is estimated by means of correlation studies. The present study was undertaken to estimate the amount of genetic variability present among different bunch groundnut varities, the genetic co-efficient of variation, heritability and genetic advance in important components of yield as well their association with yield and their inter relationship with each other.

A field experiment was laid out with thirty bunch groundnut varieties in randomised block design replicated four times at Tindivanam, during *Kharif* 1976. A plot size of 4.2 x 1.0 m with a spacing of 20 x 15 cm was adopted. Observations on plant height, number of primary branches, number of nodes, internodal length, pod/peg ratio, number of pods per plant, 100 pod weight, 100 kernel weight, shelling percentage, oil content and plot yield, were recorded from five randomly selected plants.

Phenotypic co-efficient of variation (P.C.V), genotypic co-efficient of variation (G.C.V), heritability (H), expected genetic advance (G.A) and genetic advance expressed as percentage of mean were worked out as suggested by Burton and De Vane (1953), Hanson *et al.*

1 - 4 : All India Coordinated Research Project on oilseeds, Main centre for groundnut-Tindivanam.

TABLE I. Estimates of genetic parameters for ten characters

Character	Range	Mean	Variance		P.C.V.	G.C.V.	H. (%)	G.A.	G.A. as % of mean
			Phenotypic	Genotypic					
Plant height (cm)	26.1 — 53.5	38.21	8.25	4.04	7.51	5.26	48.93	2.89	7.57
Number of primery branches per plant	3.6 — 6.0	4.41	0.10	0.08	7.26	6.35	79.31	0.52	11.86
Number of nodes per plant	40.4 — 78.6	56.06	17.03	15.53	7.37	7.03	91.16	7.76	13.84
Internodal length (cm)	2.2 — 4.96	3.54	0.10	0.07	9.04	7.63	68.27	0.45	12.71
Pod/peg ratio	0.38 — 0.77	0.57	0.003	0.002	9.65	7.90	66.67	0.08	13.33
Number of pods per plant	4.8 — 17.0	9.75	2.58	2.36	16.41	15.69	91.21	3.01	30.82
100-pod weight(g)	61.0 — 125.0	75.91	137.68	134.56	15.45	15.28	97.73	23.61	31.10
100-kernel weight (g)	25.2 — 42.4	31.11	18.35	16.28	13.76	12.97	88.71	7.82	25.14
Shelling (%)	70.2 — 80.0	74.37	1.89	1.63	1.87	1.71	86.24	2.47	3.42
Yield per plot (g)	300 — 700	50.55	18.66	15.73	0.84	0.79	86.66	7.61	1.51

(1955) respectively. Simple correlation coefficients were also determined.

The estimates of genetic parameters are preesented for ten characters in Table I. Analysis of variance revealed that the differences among varieties were highly significant for all the plant characters studied.

Genotypic and phenotypic variances were higher for 100-pod weight, 100-kernel weight, yield and nodes per plant. Range also indicated that the variability was higher in these four traits. Pods per plant and 100-kernel weight exhibited higher phenotypic and genotypic co-efficient of variation. The results confirmed those reported by Sangha and Sandhu (1975). However, the present study revealed that 100-pod weight too exhibited equally higher phenotypic and genotypic co-efficient of variation to that of pods per plant and 100-kernel weight.

Pod/peg ratio, length of internodes, plant height, number of nodes and primary branches exhibited a very low variability. On the other hand, variability was the least in shelling and yield.

Highest heritability was observed in 100 pod weight (97.73 per cent) closely followed by pods per plant (91.21 per cent), nodes per plant (91.16 per cent) and 100-kernel weight (88.71 per cent) while lower value was noted for

TABLE II. Simple correlation co-efficients between eleven characters

Character	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}
X_1 Plant height (cm)	—	0.275	0.717**	0.816**	0.072	−0.215	−0.382*	0.116	0.238	−0.008	0.343
X_2 No. of primary branches per plant	—	—	0.435	0.284	0.056	−0.169	0.476	0.528	0.528	−0.811	0.103
X_3 No. of nodes per plant	—	—	—	−0.270	0.270	0.332	0.118	0.232	0.496	0.667	−0.068
X_4 Internodal length cm	—	—	—	—	0.190	−0.241	0.256	0.194	0.217	−0.031	0.188
X_5 Pod/Peg ratio	—	—	—	—	—	0.123	0.140	0.160	0.164	0.391**	0.177
X_6 No. of pods	—	—	—	—	—	—	−0.514**	−0.547**	0.132	0.431*	−0.097
X_7 100-pod weight (g)	—	—	—	—	—	—	—	0.891**	0.771**	0.088	−0.189
X_8 100-kernel weight	—	—	—	—	—	—	—	—	0.715**	0.164	0.731**
X_9 Shelling (%)	—	—	—	—	—	—	—	—	—	0.380*	0.133
X_{10} Oil content (%)	—	—	—	—	—	—	—	—	—	—	0.453*
X_{11} Yield per plot	—	—	—	—	—	—	—	—	—	—	—

*Significant (P=0.05) **Highly significant (P=0.01)

plant height (48.93 per cent). Heritability estimates were fairly higher for rest of the characters. This might be due to the fact that those characters were less influenced by environment and there would have been greater adjustment between phenotypic and breeding values. Johnson *et al*. (1955) have suggested that heritability along with genetic advance is more useful than heritability estimates alone in predicting the resultant effect for selecting the best individuals. High heritability with high genetic advance expressed as percentage of mean shows the most effective condition for selection and was observed for 100-pod weight, number of pods, and 100 kernel weight. This condition appears due to additive gene action. Yield and shelling percentage showed high heritability with low genetic advance. This condition arises due to the non-additive gene action (Liang and Walter, 1968). High heritability followed by high genetic advance has been reported by Sangha and Sandhu (1975) and Kangura and Sandhu (1972) for 100-kernel weight in groundnut.

Simple correlation coefficients between yield and other ten characters including oil content are presented in Table II. Association of 100-kernel weight and oil content with yield was positive and significant with showed that increase in yield was greatly dependent on those characters. The 100-kernel weight also had a significant positive association with number of primaries and 100-pod weight. On the contrary, its relationship was negative with pods per plant. The present results are in agreement with those of Sangha and Sandhu (1975). Oil content showed positively significant association with number of primaries nodes per plant, pod/peg ratio, number of pods and shelling revealing the importance of these characters on oil content.

Plant height was significantly associated with number of nodes and internodal length while it had a negative correlation with 100-pod weight Number of primaries per plant indicated significant correlation with number o nodes and 100-pod weight whereas number of pods per plant revealed a significant and negative association with 100-pod weight and 100-kernel weight. Shelling out-turn was significantly and positively correlated wit 100-pod and kernel weight, thereb confirming the findings of Ramanatha and Raman (1968). It also had a positive and significant association wit number of primaries and nodes pe plant.

The authors are sincerely thankfu to Indian Council of Agricultural Research and Tamil Nadu Agricultural University for the financial help rendered to the Project.

REFERENCES

BURTON, G. W. and E. H. DE VANE. 1953. Estimating heritability in tall Fescue (*Fescute arundinacea*) from replicated clonal material. *Agron. J.* 45 : 478-81.

HANSON, C. H., H. G. ROBINSON and R. F. COMSTOCK. 1955. Biometrical studies of yield in segregating populations of Korean Lespedeza. *Agron. J.* 48 : 268-72.

JOHNSON, H.W., H.F. ROBINSON and R.F. COMSTOCK. 1955. Estimation of genetic and environmental variability in Soy bean *Agron. J.* 47 : 314-18.

KHANGURA, B. S. and R. S. SANDHU. 1972. Path analysis in groundnut (*Arachis hypogaea* L). *Indian J. Agric. Sci.* 42 : 792-95.

LIANG, G.L.L. and T.L. WALTER. 1968. Heritability estimates and gene effects for agronomic tracts in grain sorghum (*Sorghum vulgare* L). *Crop Sci.* 8 : 77-80.

RAMANATHAN and V.S. RAMAN. 1968. Studies on the relation of groundnut (*Arachis hypogaea* L) *J. Indian Bot. Soc.* 47 : 113-16.

SANGHA' A.S. and R.S. SANDHU. 1975. Veriability and correlation studies in spreading groundnut. *Oilseeds J.* 5 : 5-8.