

CHARACTER ASSOCIATION IN GROUNDNUT (ARACHIS HYPOGAEA L.) HYBRIDS

V. MANOHARAN¹, P. VINDHIYA VARMAN² and R. SETHUPATHI RAMALINGAM³

Regional Research Station,
Vridhachalam - 606 001

ABSTRACT

The F₁ generation of 21 cross combinations of groundnut was studied. Pod number was positively associated with pod yield while plant height was negatively correlated with yield. Pod number and plant height were also negatively correlated. Pod number and 100 pod weight had higher positive direct effect on yield. Plant height had negative indirect influence through pod number. Therefore selection for pod number and weight will be helpful for yield improvement in groundnut.

KEY WORDS : Groundnut, Correlation, Path analysis

A knowledge on the inter-relationship between yield determining characters and their association for enhancement of yield is of paramount importance in crop important for enhancement of yield. The estimation of the direct and indirect effects of yield components on yield will help in the simultaneous improvement of many characters in directed crop evolution. Though a number of reported investigations are available on these aspects in the purelines (germplasm lines) of groundnut, such studies are limited in the F₁ hybrids. The present investigation was therefore undertaken to assess the genotypic, phenotypic and environmental correlations between yield and its components and also the components *inter se* in the F₁ generation of groundnut. The genotypic correlation coefficients were used to work out the direct and indirect influence of yield components on pod yield.

MATERIALS AND METHODS

The material for the study comprised of 21 F₁ hybrids obtained in a line x tester programme. The hybrids were obtained by crossing several ovule parents *viz.*, TMV 2, TMV 7, TMV 9, TMV 12, Co 1 and J 11 (Spanish bunch) and TMV 11 (Valencia) and three pollen parents *viz.*, Gangapuri, EC

21137-1 (Valencia) and Robut 33-1 (Virginia). The F₁ generation was raised in RBD replicated three times. A spacing of 30 x 15 cm was adopted. At maturity five hybrid plants were selected at random and observations were recorded on plant height, pod number, 100-pod weight, shelling percentage and pod yield per plant. The genotypic, phenotypic and error variances were used to calculate the genotypic, phenotypic and environmental correlation coefficients as suggested by Johnson *et al.* (1955a and b). The genotypic correlation coefficients were used to find out the direct and indirect effects of the component characters on pod yield, according to Dewey and Lu (1959).

RESULTS AND DISCUSSION

Significant differences were observed among the 21 hybrids for all the five characters studied (Table 1). In general, the genotypic correlation coefficients were greater than the respective phenotypic correlation coefficients (Table 2). This indicates that in spite of strong inherent association between various character pairs studied, the environment may modify the full expression of the genotypes (Nandpuri *et al.*, 1973). Pod yield was significantly and positively correlated with

¹ & ² Assistant Professors and ³ Professor, School of Genetics, Tamil Nadu Agricultural University, Coimbatore

Table 1. Analysis of variance for five characters

Source	Mean Squares				
	Plant height	Pod number	100 pod weight	Shelling %	Pod yield
Genotype	273.6153**	20.1634	162.7882*	80.6350**	17.8772*
Error	33.4811	8.6690	82.4097	29.1942	7.9026

*, ** Significant at 5 and 1 per cent levels respectively.

pod number. Though pod weight and shelling percentage also showed positive association with pod yield, they were not significant. Dholaria *et al.*, (1972) and Labana *et al.* (1980) also reported that pod

(1979). This may be due to the fact that the Virginia parent (Robut 33-1), though had a lesser plant height than the Valenica pollen parents, showed greater heterosis for pod yield than the latter in cross combinations

Table 2: Genotypic (r_g), Phenotypic (r_p) and Environmental (r_e) correlation coefficients among five characters

Character	Pod number	100 pod weight	Shelling %	Pod yield
Plant height	r_g -0.6694*	-0.4852	-0.1561	-0.7434**
	r_p -0.2911	-0.1779	-0.1407	-0.3293
	r_e 0.0444	0.0504	-0.1415	0.0226
Pod number	r_g	0.1314	0.4198	0.9369**
	r_p	0.2206	0.2692	0.9293**
	r_e	0.2552	0.1934	0.9262**
100 pod weight	r_g		-0.1419	0.4644
	r_p		0.0205	0.5421
	r_e		0.1005	0.5721
Shelling %	r_g			0.2854
	r_p			0.2464
	r_e			0.2282

*, ** Significant at 5 and 1 per cent levels respectively.

yield was positively correlated with pod number and pod weight. This indicates the possibility of simultaneous improvement of these traits by a single selection programme.

Plant height was negatively correlated with pod number and hence pod yield. This finding is at variance with that of Rao

with all the seven ovule parents. When two characters show negative correlation between themselves, it would be difficult to exercise simultaneous selection of these characters in developing a variety (Newell and Eberhart, 1961). Significant positive environmental correlation was observed between pod yield and pod number

Table 3. Path Coefficients-direct effects (underlined) and indirect effects

	plant height	Pod number	100-Pod weight	shelling %	Genotypic correlation with pod yield
Plant height	<u>0.0517</u>	-0.6382	-0.1754	0.0084	-0.7434**
Pod number	-0.0413	<u>0.9534</u>	0.0475	-0.0226	0.9369**
100-Pod weight	-0.0299	0.12153	<u>0.3614</u>	0.0076	0.4644
Shelling %	-0.0096	0.4002	-0.0513	<u>-0.0539</u>	0.2854

Residual effect = 0.0150

** Significant at 1 per cent level.

implying that the environment favourable for one character is also favourable for the other.

The direct and indirect effects of the four characters on pod yield are presented in Table 3. Pod number had the highest positive direct effect (0.9534) on pod yield followed by 100-pod weight (0.3614). This is in conformity with the findings of Sandhu and Khehra (1977) and Yadava *et al.* (1984). Shelling percentage exhibited a higher positive indirect effect on pod yield *via* pod number. Plant height exhibited the least positive direct effect on pod yield though it had negative indirect effect through pod number and pod weight. The low residual effect indicates that most of the important yield components had been included in the present study.

The present investigation showed that pod yield and positively correlated with pod number but negatively with plant height. Pod number and pod weight had higher positive direct effect on yield and these two characters may be considered for yield improvement in groundnut.

REFERENCES

DEWEY, J.R. and LU, K.H. 1959. Correlation and path coefficient analysis of components of created wheat grass seed production. *Agron. J.*, 51: 515-518.

Madras Agric. J. 77, (9-12): 514-516 (1990)

DHOLARIA, S.J., JOSHI, S.W. and LABANA, M.M. 1972. Correlations of yield and yield contributing characters in groundnut grown under high and low fertility levels. *Indian J. agric. Sci.*, 42: 1084-1086

JOHNSON, H.W., ROBINSON, H.F. and COMSTOCK, R.E. 1955 a. Estimation of genetic and environmental variability in soybean. *Agron. J.*, 47: 477-483.

JOHNSON, H.W., ROBINSON, H.F. and COMSTOCK, R.E. 1955b. Genotypic and phenotypic correlation in soybeans and their implications in selection. *Agron. J.* 47: 477-483.

LABANA, K.S., MOHINDER SINGH, SANGHA, A.S. and JASWAL, S.V. 1980. Variability and inter-correlations among characters in the F₂ progeny of groundnut J. Res., Punjab Agric. Univ., 17: 107-114

NANDPURI, K.S., SINGH, S., and LAL, T. 1973. Studies on the genetic variability and correlation of economic characters in tomato. *J. Res., Punjab. Agric. Univ.*, 10: 316-321.

NEWELL, L.C. and EBERHART, S.A. 1961. Clone and progeny evaluation in the improvement of switch grass *Panicum virgatum* L. *Crop Sci.* 1: 117-121.

RAO, T.S., 1979. Assessment of genetic variation in bunch groundnut. *Crop Improv.*, 6: 172-174.

SANDHU, B.S. and KHEHRA, A.S. 1977. Inter relationships in semi-spreading cross of groundnut. *Indian J. Genet.*, 37: 22-26.

YADAVA, T.P., KUMAR, P. and THUKRAL, S.K. 1984. Association of pod yield with some quantitative traits in bunch group of groundnut (*Arachis hypogaea* L.) *J. Res. Punjab Agri. Univ.*, 15: 85-88.

CHARACTER ASSOCIATION OF GRAIN YIELD WITH SOME YIELD COMPONENTS IN MAIZE (*ZEA MAYS* L.)

E. SATYANARAYANA, R. SAIKUMAR, and G. KOTESWARA RAO

Agri. Research Station, Amberpet, Hyderabad - 13

ABSTRACT

Correlation coefficients and path analysis were computed for grain yield with some of the yield components namely ear length, ear girth, grain number per ear and 1000 kernel weight in 10 parents and their all possible 45 direct crosses. The correlation coefficient values were highly significant for the yield attributes studied on yield and they have indicated their strong correlation with yield and their inherent capacity to influence it. The path analysis revealed that, 1000 kernel weight had the maximum direct effect on yield, where as ear length and ear girth exhibited indirect effect *via* 1000 kernel weight on yield. Further, grain number per ear had influenced the grain yield mainly through ear length. Among the yield attributes studied, 1000 kernel weight seems to be the most important trait influencing the yield directly as well as indirectly.

KEY WORDS : Maize, Correlation, Path analysis