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VARIABILITY AND CORRELATION STUDIES OF KERNEL WEIGHT AND RELATED ATTRIBUTES IN GROUNDNUT (ARACHIS HYPOGAEA L.)

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ABSTRACT

Twenty three groundnut genotypes were evaluated for genetic parameters. High heritability estimates combined with genetic advance were observed for pod and kernel weights indicating that these characters are governed by additive genes. The genetic advance for pod width, L/W ratio, shelling and SMK percentages was low. Seed weight was positively correlated with pod length, breadth, L/W ratio and weight.

KEY WORDS : Groundnut, Variability, Correlation.

Kernel weight is an important yield attribute of groundnut (*Arachis hypogaea* L.) besides kernel number. The improvement of kernel weight largely depends on the magnitude of genetic variability and the extent to which the weight determining characters are heritable. An understanding of the characters associated with kernel weight is desirable in effecting selection in the segregating populations. An attempt is made in the present investigation to explore the genotypic variability, heritability and the expected genetic advance in a group of groundnut genotypes. The genotypic and phenotypic correlation coefficients were also estimated to assess the degree of association of the weight determining characters with kernel weight.

MATERIALS AND METHODS

The experiment was conducted at the Regional Research Station, Vriddhachalam during kharif 1985. Twenty three genotypes (consisting of 19 Virginia and four bunch types) of groundnut were raised in RBD with three replications. Each genotype was represented by a single row of 5.1 m length. A spacing of 30 x 15 cm was adopted. After harvest and drying of the produce, observations were recorded on 20 pods for mean pod length (L), width (W) and L/W ratio. Besides these, 100, pod and kernel weights, shelling and sound mature kernel (SMK) percentages were also recorded.

The genotypic and phenotypic variances were calculated by utilising the respective mean square values from the variance table (Johnson *et al.*, 1955a). The genotypic and phenotypic coefficients of variation were calculated following the method suggested by Burton (1952). Heritability were calculated according to Burton and Devane (1953) and Johnson *et al.* (1955b) respectively.

RESULTS AND DISCUSSION

Significant differences were observed among the 23 genotypes for all the seven attributes (Table 1).

Table 1. Analysis of variance for seven seed weight contributing characters in groundnut

Source	df	Mean squares						
		Pod length	Pod width	L/W ratio	100 pod weight	Shelling %	SMK %	100 Kernel weight
Genotypes	22	0.2149**	0.0268**	0.0675**	1133.2182**	192.7826**	25.5644**	35.6639**
Error	44	0.0305	0.0065	0.0209	38.4660	17.3459	3.3459	5.3108

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Table 2. Heritability and genetic advance for seven characters

Character	Genotypic variance	Phenotypic variance	GCV	PCV	Heritability	Genetic advance	Genetic advance as percentage of mean
Pod length	0.0615	0.0920	7.9743	9.7532	0.6685	0.4177	13.4313
Pod width	0.0068	0.0133	5.6937	7.9628	0.5103	0.1212	8.8684
L/W ratio	0.0155	0.0365	5.7845	8.8765	0.4261	0.1676	7.7870
100 pod weight	351.5841	430.8501	14.6207	16.1702	0.8175	34.9232	27.2313
Shelling %	10.1177	15.4285	4.6282	5.7152	0.6558	5.3064	7.7209
SMK %	7.2717	4.0210	2.8368	3.4924	0.6598	4.5122	4.7458
100 kernel weight	58.4789	75.8248	14.4519	17.0256	0.7712	13.8337	27.0481

In general, the genotypic and phenotypic coefficients of variation for all the characters were very low except for pod and kernel weights (Table 2). The SMK percentage recorded the lowest genotypic coefficient of variation. Heritability in the broad sense was the highest for pod weight followed by kernel weight. The L/W ratio recorded the lowest heritability. Godoy (1982) also obtained high heritability values for pod and seed size. However, the results are not in agreement with those of Coffelt and Hammons (1974) who obtained high heritability estimates for pod width and L/W ratio. Since the heritability of pod and kernel weights are high, it is evident that they are less influenced by the environment. The low heritability estimate of L/W ratio indicates that it is more influenced by he environment.

Johnson *et al.* (1955a) and Lerner (1958) were of the view that heritability estimates when used in connection with genetic advance would provide better information than the heritability estimate alone in predicting the resultant best individuals. The genetic advance as percentage of mean was high for pod and seed weights followed by pod length. Natarajan *et al.* (1978) also obtained higher genetic advance for pod and seed weights and low genetic advance for shelling percentage which is in conformity with the present findings. Sangha and Sandhu (1978) also recorded higher genetic

Table 3. Genotypic (r_g) and Phenotypic (r_g) correlation coefficients

		100 pod weight	Shelling %	Pod length	Pod width	L/W ratio	SMK %
100 Kernel weight	r_g	1.0219**	0.2290	0.8807**	0.6397**	0.5731**	-0.0416
	r_p	0.8140**	0.1960	0.5768**	0.3357	0.3312	-0.0060
100 pod weight	r_g		0.0758	0.8592**	0.6001**	0.5728**	-0.1108
	r_p		0.1711	0.6913**	0.4572*	0.3382	-0.0334
Shelling %	r_g			-0.0295	-0.2134	0.2679	0.8287**
	r_p			-0.1308	-0.1964	0.0467	0.4720*
Pod length	r_g				0.7542**	0.6309**	-0.4538*
	r_p				0.5606*	0.5888**	-0.3030
Pod width	r_g					-0.0390	0.1518
	r_p					-0.3362	0.1372
L/W ratio	r_g						-0.4228*
	r_p						-0.2748

*, ** = Sigfificant at 5 and 1 per cent levels respectivelv

advance for seed weight. High heritability with high genetic advance for pod and seed weight indicates that the characters are controlled by additive gene action and phenotypic selection for the improvement of these characters will be effective. High heritability and low genetic advance were observed for SMK percentage. This condition arises due to non additive gene action (Liang and Walter, 1968).

The genotypic correlation coefficients were, in general slightly higher than the phenotypic correlation coefficients (Table 3). Kernel weight exhibited highly significant and positive genotypic correlation with pod weight, pod length, pod width and L/W ratio. Coffelt and Hammons (1974) also reported that pod and seed weight were highly correlated. The inter-correlations of pod weight with pod length, pod width and L/W ratio, of pod length with pod width and L/W ratio and of shelling percentage with SMK percentage were also positive. Merchant and Munshi (1970) also reported positive correlations among pod length, pod width and pod weight. This indicates the possibility of simultaneous improvement of these traits by a single selection programme.

SMK percentage was negatively associated with pod length and L/W ratio. When two characters show negative association between them it would be difficult to exercise simultaneous selection of these characters in developing a variety (Newell and Eberhart, 1961).

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