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Morphogenetic Evaluation for Pod Yield and its Components in Early Spanish Genotypes of Groundnut (*Arachis hypogea* L.).

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Abstract: Sixteen early maturing genotypes of groundnut showed significant variation for all characters studied expect 100 kernal weight. Phenotypic Coefficient of Variation (PCV) was higher than Genotypic Coefficient of Variation (GCV) for all the characters. High heritabilities (h^2) for days taken to flowering and maturity were found very high. At genotypic level all the traits under study except days taken to maturity exhibited significant positive association with pod yield while it showed significantly negative correlation. Sound Mature Kernal (SMK) %age by weight longwith shelling %age and No of pods per plant had fairly high h^2, high Genetic Advance (G.A.), significantly positive genotypic correlation and positive direct effect on pod yield. Hence selection for these traits would be effective in improving pod yield and oil contents in early maturing genotypes.

Key words: *Arachis hypogect* L. Genotypes, Morphogenetic traits, podyield Pakistan

Introduction

Groundnut is an important oilseed crop and its area in Pakistan is next to rapeseed and mustard. It is a rich source of protein and high quality edible oil. Its cultivation is generally limited to barani areas but a good scope exists in irrigated areas of Pakistan (Frederick *et al.*, 1991). In order to increase total production of crop, yield potential per unit area will have to be raised. There is a dire need of short duration genotypes to incorporate groundnut in our existing cropping pattern. Success of any plant breeding programme depends on the information of existing genetic variability, its heritability and degree of association among different characters which are limited. Rao *et al*. (1993) observed a significant positive association of oil %age with shelling %age. Chauhan and Shakla (1985) observed more or less same phenotypic and genotypic variances for No. of yield attributing traits in both Virginia bunch and Runner varieties. Syamasonta (1992) reported positive correlation of seed yield with 100 seed weight and No. of pods per plant. Deshmukh *et al*. (1986) obtained higher values of Phenotypic Coefficients of Variation (PCV) as compared to Gonotypic Coefficients of variation (GCV). Moreover, he reported positively significant correlation of 100 kernel weight and SMK %age with pod yield. He also observed high positive direct effect of 100 kernel weight and SMK %age on pod yield. Sahu and Roy (1989) reported positively significant association of number of pods per plant with pod yield.

Materials and Methods

The material comprising 16 Spanish groundnut genotypes viz, ICGV-86015, ICGV-86054, ICGV-86055, ICGV-86124, ICGV-86125, ICGV-86143, ICGV-86145, ICGV-86149, ICGV-87005, ICGV-87018, ICGV-87052, ICGV-87055, ICGV-87069, BARD-699, Spanhoma-17-73 and Banki were grown in randomized complete block design with four replications during kharif 1995 at Oilseeds Research Institute, Faisalabad. Seeds of each entry were dibbled in 3 rows of 5 m length, 45 cm apart with plant to plant distance of 15 cm. Normal package of practices was followed. At maturity, 10 random plants were selected and data were recorded for days taken to flowering, days taken to maturity, No. of pods per plant, pods yield per plant, shelling %age, 100 kernel weight(g), SMK %age by No., SMK %age by weight and oil contents %age. Oil contents %age was estimated with the help of soxhlet's apparatus. Mean of 10 plants was used to compute PCV, GCV, h^2 and G.A. by using the standard methods. Genetic correlations(rg) were tested according to Robertson (1959) while that of phenotypic correlations(rp) were tested by method of Snedecor and Cochran (1967). Path coefficient analysis was made as per method of Dewey and Lu (1959).

Results and Discussion

The analysis of variance revealed that differences among varietal mean squares for all the characters were significant except 100 kernel weight. PCV was although higher than the GCV for all the characters. The differences were remarkably low for days taken to flowering and maturity. h^2 for these characters was also high as depicted in Table 1. Chauhan and Shakla (1985) observed more or less equal phenotypic and genotypic variances for a number of yield attributing characters in both Virginia bunch and Runner genotypes of groundnut. Whereas, Deshmukh *et al.* (1986) have reported higher values of PCV than GCV confirming the results achieved in this study. Among all of these characters, days taken to flowering and days taken to maturity showed highest h^2 coupled with high G.A of 9.21 and 9.35 respectively. Although No. of pods per plant have shown low h^2 in comparison with days taken to flowering and maturity but its expected GA was maximum (10.34). High GCV, h^2 and G.A. depicted the role of additive gene action.

At the genotypic level pod yield showed significant positive association with days taken to flowering, No. of pods per plant, shelling %age, 100 kernel weight, SMK %age both by No. and weight and oil content %age, while negative and significant association with days taken to maturity as shown in Table 2. Likewise Deshmukh *et al*. (1986) have also reported positive significant association of pod yield with No. of pods per plant and SMK %age. Sahu and Roy (1989) and Syamasonta (1992) have also reported positive association of No. of pods per plant with pod yield. Days taken to flowering showed positive and significant association with days taken to maturity, No. of pods per plant, shelling %age and pod yield per plant but significantly negative with 100 kernel weight, SMK %age by No. and weight. Days taken to maturity have shown significantly negative correlation with No. of pods per plant, SMK %age both by No. and weight and oil contents %age but positive and significant with 100 kernel weight. No. of pods per Plant showed significantly positive association with shelling %age, SMK %age both by No. and weight, oil contents %age and pod yield per plant but negative with 100 kernel weight. Shelling %age showed significantly positive association with SMK %age both by No. and weight and oil content %age but negative with 100 kernel weight. Rao *et al*. (1993) also reported significant positive association of shelling %age with oil content %age. 100 kernel weight showed positive and significant association with SMK %age by weight and pod yield per plant but negative with oil content %age. SMK %age by weight showed positive and significant association with SMK %age by No., oil content %age and pod yield per plant, whereas SMK %age by No. showed significantly positive association with oil content %age and pod yield per plant.

The genotypic correlation coefficients between pod yield and different characters were partitioned into direct and indirect effects as given in Table 3. SMK %age by weight, shelling %age, days taken to flowering and No. of pods per plant showed high positive direct effect on pod yield. While SMK %age by No. followed by days taken to maturity contributed high negative effects on pod yield but their rg with pod yield was positive which was due to indirect high positive effect of SMK %age by weight. SMK %age by weight had fairly high G.A, positive significant

Table 1: Estimation of Varietal Mean Squares, Coefficients of Variability, h^2 and G.A. for Yield and its Components in 16 Early Spanish Genotypes of Groundnut

Character	VMS	PCV	GCV	h^2 (%)	G.A. (5%)
Days taken to flowering	61.8**	12.41	11.93	91	9.21
Days taken to maturity	64.8**	3.23	3.01	87	9.35
No. of pods per plant	113.9**	31.28	19.82	40	10.34
Shelling %age	71.0**	9.33	6.66	51	8.74
100 kernel weight (g)	70.9NS	22.16	7.14	10	5.10
SMK %age by weight (g)	23.12**	5.48	3.45	40	8.20
SMK %age by No	42.0**	4.15	2.15	27	6.29
Oil content %age	11.8**	4.1	2.95	50	3.55
Pod yield per plant (g)	88.7*	33.10	14.81	20	7.34

** Highly significant * Significant NS Non Significant VMS Varietal Mean Squares

Table 2: Genotypic and Phenotypic Correlation Coefficients of Pod Yield and its Components

Character		Days to muturity	Pods per plant	Shelling (%)	100 Kernal wt. (g)	SMK (%) by wt.	SMK (%) by No.	Oil Cont.	Pod yield Per plant
Days taken	rg	0.45*	0.14*	0.08*	-0.34*	-0.30*	-0.28*	0.08	0.28*
to flowering	rp	0.38	0.04	0.10	-0.14	-0.17	-0.19	0.01	0.13
Days taken	rg		-0.41*	0.07	0.33*	-0.52*	-0.63*	-0.12*	-0.19*
to maturity	rp		-0.15	0.06	0.11	-0.02	-0.30	-0.20	0.03
No. of pods	rg			0.84*	-0.22*	0.69*	0.71*	0.26*	0.73*
per plant.	rp			0.38	-0.05	0.21	0.26	0.04	0.64**
Shelling	rg				-0.58*	1.00*	1.00*	0.17*	0.43*
%age.	rp				0.15	0.29	0.34	0.02	0.11
100 Ker-	rg					0.73*	-0.11	-0.34*	0.44*
nal wt (g)	rp					0.19	0.11	-0.18	0.13
SMK %age	rg						0.99*	0.22*	0.49*
by wt.	rp						0.82**	0.14	0.19
SMK %age	rg							0.18*	0.65*
by No.	rp							0.02	0.19
Oil cont.	rg								0.43*
%age	rp								-0.09

** Highly Significant. * Significant. rg = Genotypic correlation coefficient. rp = Phenotypic correlation coefficient.

Table 3: Direct and Indirect Effect of Various Characters on Pod Yield in Sixteen Spanish Early Maturing Genotypes of Groundnut.

Character	Days to flowering	Days to muturity	Pods per plant	Shelling (%)	100 Kernal wt. (g)	SMK (%) by wt.	SMK (%) by No.	Oil Cont.	Pod yield Per plant
Days taken to flowering	(0.31)	-0.51	0.03	0.08	0.10	-0.63	0.90	0.01	0.28
Days taken to maturity	0.14	(-1.14)	-0.09	0.06	-0.10	-1.08	2.04	-0.01	-0.19
No. of pods per plant	0.04	0.46	(0.23)	0.80	0.07	1.44	-2.33	0.03	0.73
Shelling %age	0.02	-0.07	0.19	(0.96)	0.17	2.58	-3.44	0.02	0.43
100 Ker-nal wt (g)	-0.10	-0.38	-0.05	-0.55	(-0.30)	1.51	0.34	-0.03	0.44
SMK %age by wt	-0.09	0.60	0.16	1.00	-0.21	(2.71)	-3.24	0.02	0.49
SMK %age by No.	-0.08	0.71	0.17	1.00	0.03	2.06	(-3.26)	0.02	0.65
Oil cont. %age	0.02	0.14	0.06	0.16	0.10	0.45	-0.59	(0.01)	0.43

correlation with pod yield per plant and positive direct and indirect effects on pod yield per plant.

So selection for SMK %age by weight along with shelling %age and No. of pods per plant would be effective for improving pod yield per plant and oil contents %age in early maturing genotypes.

References

Chauhan, R.M. and P.T. Shakla, 1985. Variability, heritability and genetic advance in bunch and spreading types of groundnut. Indian J. Agric. Sci., 55: 71-74.

Deshmukh, S.N., M.S. Basu and P.S. Reddy, 1986. Genetic variability, character association and path coefficients of quantitative traits in Virginia bunch varieties of groundnut. Indian J. Agric. Sci., 56: 816-821.

Dewey, D.R. and K.H. Lu, 1959. A correlation and path-coefficient analysis of components of crested wheatgrass seed production. Agron. J., 51: 515-518.

Frederick, W.S., B.W. Stephen, A. Rehman and S.N. Malik, 1991. Groundnut Production in Pakistan. PARC., Pakistan.

Rao, S.K., V.P. Kataria, A.K. Gupta and J.S. Kushwaha, 1993. Factors influencing pod yield and oil production and their implications in selection of high yielding groundnuts. Legume Res., 6: 64-74.

Robertson, A., 1959. The sampling variance of the genetic correlation coefficient. Biometrics, 15: 469-485.

Sahu, S. and D. Roy, 1989. Character association and path coefficient analysis in two species of groundnut. Crop Improvment, 16: 53-56.

Snedecor, G.W. and W.G. Cochran, 1967. Statistical Methods. 6th Edn., Iowa State University Press, Iowa.

Syamasonta, M.B., 1992. 'Pops' screening in groundnut. Proceedings of the Progress of the 5th Regional Groundnut Workshop for Southern Africa, March 9-12, 1992, Patanchesu, Andhra Pradesh, India.