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Research Notes

Character association and path coefficient analysis in confectionery type groundnut *(Arachis hypogaea* L.)

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Groundnut *(Arachis hypogaea L.)* is a major oilseed crop of India. Hand picked selection or large seeded groundnut is gaining much importance in recent years in view of its export potential. In the yield improvement programme of groundnut, the knowledge on the phenotypic and genotypic inter-relationships between pod and kernel characteristics would help the breeder to formulate effective selection programme. But yield is a complex character and is influenced by a number of traits which in turn are interrelated. The interdependence of these characters will influence pod yield either directly or indirectly and as a result the information obtained in the association of these traits becomes unreliable. Therefore, path coefficient analysis permits the separation of direct effects from indirect effects and gives more realistic relationship of the characters and helps in effective selection. Hence the present study is aimed to analyse and determine the pod and kernel characters having greater inter relationship with pod yield.

The material for the present study consisted of 48 diverse genotypes of groundnut, raised in randomized block design with three replications at the Department of Oilseeds, TNAU, Coimbatore during *rabi* 2002-2003. The plant to plant distance of 10cm was maintained within rows which were spaced at 30cm. Each entry was sown in 5 rows of 3 m length. All the recommended package of practices was followed to raise a good crop. Observations were recorded on 10 randomly chosen competitive plants from each entry in each replication for eleven characters *viz.*, plant height (cm), number of secondary branches per plant, number of mature pods per plant, total number of kernels per plant, kernel yield per plant (g), number of sound mature kernels (hand picked selections) per plant, sound mature kernel weight per plant (g), shelling percentage, 100 seed weight (g), oil content (%) and pod yield per plant (g). The data were subjected to statistical analysis. Correlation coefficients for pod yield and yield components were evaluated utilizing the formula suggested by Al-jibouri *et al.* (1958). Further partitioning of correlations into direct and indirect effects by path coefficient analysis was estimated by using the procedure suggested by Dewey and Lu (1959).

The character pod yield per plant had significant positive association with kernel yield, sound mature kernel weight and 100 seed weight both at genotypic and phenotypic levels. These characters could be considered as criteria for selection of higher yield as well as for large seed as they are mutually and directly associated with pod yield per plant. Venkateswaralu *et al*. (2007) reported the same results for kernel yield per plant. The character shelling percentage and oil content had negative association with pod yield per plant both at genotypic and phenotypic level. Manivannan *et al.* (2007)

Table 1. Genotypic (G) and Phenotypic (P) Correlation Coefficients between different characters

Characters		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)	G	0.24	0.35	0.12	0.24	01.3	0.22	-0.14	0.51	0.02	0.32
	P	0.14	0.25	0.09	0.18	0.09	0.17	-0.14	0.38	0.03	0.27
X_2 - No.of secondary branches per plant	G		0.15	0.15	0.04	0.35	0.12	-0.13	0.26	0.19	0.11
	P		0.12	0.09	0.02	0.19	0.06	-0.10	0.19	0.10	0.07
X_3 - No. of mature pods per plant	G			0.71**	0.30	0.63**	0.36	-0.06	0.11	0.20	0.34
	P			0.81**	0.41	0.70*	0.40	-0.03	0.07	0.15	0.46
X_4 - Total no. of kernels per plant	G				0.26	0.87**	0.31	0.004	-0.07	0.02	0.26
	P				0.39	0.88**	0.38	0.09	-0.06	0.03	0.38
X_5 - Kernel yield per plant (g)	G					0.31	0.97**	0.37	0.64*	-0.08	0.90**
	P					0.40	0.95**	0.38	0.60*	-0.07	0.90**
X_6 - No. of sound mature kernel	G						0.40	0.08	0.07	-0.11	0.28
	P						0.46	0.12	0.05	-0.07	0.37
X_7 - Sound mature kernel weight (g)	G							0.37	0.62*	-0.14	0.88**
	P							0.35	0.59*	-0.12	0.86**
X_8 - shelling percentage	G								0.11	-0.17	-0.06
	P								0.10	-0.15	-0.06
X_9 - 100 seed weight (g)	G									-0.18	0.65*
	P									-0.18	0.60*
X_{10}- Oil content (%)	G										-0.009
	P										-0.0004

* Significant at P = 0.05 ** Significant at P = 0.01

Table 2. Direct and indirect effects of different characters towards pod yield at genotypic level in groundnut.

Characters	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)	**0.004**	0.0008	0.0013	0.0004	0.0008	0.0005	0.0008	-0.0005	0.0018	0.0001	0.32
X_2 - No.of secondary branches per plant	0.001	**0.0058**	0.0009	0.0009	0.0002	0.002	0.0007	-0.0007	0.0015	0.001	0.11
X_3 - No. of mature pods per plant	-0.008	-0.003	**-0.0210**	-0.0148	-0.0063	-0.01	-0.008	-0.0022	0.0013	-0.004	0.34
X_4 - Total no. of kernels per plant	0.0054	0.0065	0.0307	**0.0435**	0.0111	0.038	0.014	0.0002	-0.003	0.0008	0.26
X_5 - Kernel yield per plant (g)	0.214	0.0385	0.2688	0.2281	**0.8916**	0.274	0.868	0.3322	0.5720	-0.072	0.90
X_6 - No. of sound mature kernel	-0.0085	-0.0223	-0.0403	-0.0558	-0.0196	**-0.06**	-0.03	-0.005	-0.005	0.007	0.28
X_7 - Sound mature kernel weight (g)	0.008	0.004	0.002	-0.0010	0.01	0.001	**0.009**	0.002	0.02	-0.003	0.88
X_8 - shelling percentage	0.0648	0.0572	0.0288	-0.0017	-0.169	-0.04	-0.17	**-0.4535**	-0.04389	0.078	-0.06
X_9 - 100 seed weight (g)	0.0077	0.0039	0.0016	-0.0010	0.0096	0.001	0.009	0.0016	**0.0150**	-0.003	0.65
X_{10}- Oil content (%)	0.0002	0.0017	0.0018	0.0002	-0.0007	-0.001	-0.001	-0.002	-0.002	**0.009**	-0.009

Residual effect = 0.3695 Bold figures are direct effects

reported negative and significant association of shelling percentage with pod yield.

The genotypic and phenotypic correlation coefficients among different characters revealed that in general genotypic correlations in most characters were higher than the phenotypic correlation coefficients thereby suggesting strong inherent association between genotypic and phenotypic levels. Therefore, phenotypic selection may be rewarding. Similar results were also reported by Srivastava and Singh (2002). In some cases the phenotypic correlations were slightly higher than the genotypic correlation coefficients which might be the result of modifying effect of environment on the association of the characters. The inter correlations of kernel yield with sound mature kernel weight, 100 seed weight were also positive and significant at both genotypic and phenotypic levels. The number of mature pods per plant exhibited positive, significant association with total number of kernels per plant and sound mature kernel number. Vaddoria and Patel (1992) and Vasanthi *et al.* (1988) reported a significant and positive relationship between 100 seed weight and pod yield. Total number of kernels per plant also had significantly positive associations with sound mature kernel number and shelling percent and oil content had negative association with most of the characters but non significant. The present study suggested that for the improvement of pod yield, more emphasis had been given for kernel yield, sound mature kernel weight and 100 seed weight.

Path coefficient analysis was developed to study the relationship between two characters through their direct and by way of indirect influence of the other characters. Genotypic correlations were partitioned into direct and indirect effects on pod yield. The analysis indicated that among eleven characters kernel yield per plant exerted maximum positive direct effect on pod yield per plant which is in agreement with the results of Makhan Lal *et al.* (2003) and Venkateswarlu *et al.* (2007). The direct effects of all the other traits were also positive except number of mature pods per plant, sound mature kernel weight and shelling percentage. They showed negative direct effects on pod yield per plant. Sound mature kernel weight, shelling percentage and 100 seed weight exerted high positive indirect effects through kernel yield per plant and contributed directly and positively to pod yield per plant. When both direct and indirect positive contributions were considered, kernel yield per plant, sound mature kernel weight and 100 seed weight were proved to be the outstanding characters influencing pod yield per plant in groundnut.

Further, the residual factor was low which suggested that the variables chosen in the present study were sufficient to explain pod yield per plant. These findings were in agreement with the findings of Azad and Hamid (2000).

References

Al- jibouri, H.A., Miller, P.A. and Robinson, H.E. (1958). Genotypic and environmental variances and covariances in upland cotton cross of interspecific origin. *Agron J.,* **50 :** 633-35.

Azad, M.A.K. and Hamid, M.A. (2000). Genetic variability, character association and path analysis in groundnut *(Arachis hypogaea* L). *Thailand Journal of Agricultural Sciences,* **33:** 153-157.

Dewey, D.R. and Lu, K.H. (1959). A correlation and path coefficient analysis of components of crested wheat grass seed production. *Agron. J.,* **51 :** 515-18.

Makhan Lai, Roy, D. and Ojha, O.P. (2003). Genetic variability and selection response for root and other characters in groundnut. *Legume Research*, **26:** 128-130.

Manivannan, N., Puppala, N. and Delikostadinov, S.G. (2007). Association between pod and kernel characteristics in Valencia groundnut, *Arachis hypogaea* L.subsp. *fastigiata var. fastigiata. J. Oilseeds Res.*, **24 :** 170-171.

Srivastava, M.K. and Singh, R.P. (2002). Correlation and path coefficient analysis in Indian mustard (*Brassica juncea* Z. Czern and Coss). *Crop Research*, **23:** 517-521.

Vaddoria, M.A. and Patel, V.J. (1992). Character association and path analysis in Virginia runner groundnut *(Arachis hypogaea* L.). *Madras Agric. J.*, **79:** 500-504.

Vasanthi, R.P., Naidu, P.H. and Rao, A.S.(1998). Inter relation among yield, yield attributes and later leaf spot severity in groundnut. *J. Oilseeds Res.*, **15:** 383-385.

Venkateswarlu, G., Raja Reddy, K., Reddy, P.V., Vasanthi, R.P., Hari Prasada Reddy, K. and Eswara Reddy, N.P. (2007). Character association and path analysis for morpho-physiological traits in groundnut, *Arachis hypogaea L. J. Oilseeds Res.*, **24:** 20-22.

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Research Notes

Genetic parameter studies on quality traits in rice

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Grain quality has always been an important consideration in rice variety selection and development. The physico-chemical characteristics of rice grains are important indicators of grain quality. The consumer mainly prefers good quality rice. The cooking quality is a complex character which is very much influenced by physico-chemical characteristics of rice grain. (Tomar and Nanda, 1981; Hussain *et al.*, 1987). The knowledge of variability and heritability of different quality characters will help the breeder in choosing the parents for hybridization programme. In the development of improved breeding lines having superior quality, the correlation between the grain quality characters is useful in the choice of parents, screening and selection procedures. Hence the present experiment was undertaken to study the different genetic parameters and correlation of quality characters of promising cultures / varieties/ hybrids of rice.

Fifty five rice cultures / varieties/hybrids were analyzed for quality parameters at Rice Quality Laboratory, Department of Rice, Centre for Plant Breeding and Genetics, TNAU, Coimbatore during 2004. The grains of fifty five cultures /varieties were utilized for recording fourteen quality characteristics *viz.*, hulling, milling, head rice recovery, kernal length, kernel breadth, after cooking linear elongation ratio, volume expansion, gelatinization temperature, gel consistency and amylose content. The quality characters were estimated