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RESEARCH ARTICLE

CORRELATION AND PATH ANALYSIS IN GROUNDNUT (*ARACHIS HYPOGAEA L.*)

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ABSTRACT

Correlation and path co-efficient analysis were carried out for pod yield and its component characters in 24 genotypes of groundnut. The genotypic correlation coefficients were found to be of relatively higher magnitude than the corresponding phenotypic correlation coefficients, indicating strong inherent association between the characters. Pod yield per plant displayed significant positive association with kernel yield per plant, mature pods per plant and plant height. Path co-efficient analysis revealed high direct effects of kernel yield per plant, plant height and matured pods per plant on pod yield per plant. Hence, it would be rewarding to give due importance on the selection of these characters for rapid improvement in pod yield of groundnut.

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INTRODUCTION

Groundnut (*Arachis hypogaea L.*) is the king of oilseeds is commonly known as "peanut" or "monkey nut" or "wonder nut" or "poor man's cashew nut". It belongs to the subfamily papilionaceae of the family fabaceae. It is self-pollinated crop with the basic chromosome number of 2n = 4x=40. It is also being one of the most important oilseed crops of India, still stands one of the lowest in terms of productivity. In groundnut, overall pod yield is constituted by different yield components which make it a quantitatively inherited trait. Direct selection of pod yield would not be a reliable approach without giving due importance to its genetic nature, owing to its complex nature of inheritance. Information on the correlation co-efficient between the yield components and pod yield is the pre-requisite for crop improvement. Though the correlations give information about the component traits, they do not provide a true picture of relative importance of direct and indirect effects of these component traits on pod yield. Hence, the present study was carried out to obtain information on the magnitude of relationship of individual yield components on yield, interrelationships among themselves and to measure their relative importance.

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MATERIALS AND METHODS

The material for the present study comprised 24 groundnut genotypes, grown in a Randomized Block Design with three replications during *Kharif* 2015 at CTAE, Instructional Farm (MPUAT), Udaipur. All agronomic practices were followed for raising the crop as per recommendations of the concerned crop. Intra and inter row spacing of 30 cm and 10 cm were also followed. Five plants were selected at random each genotype in each replication for recording observations on 12 quantitative and qualitative characters. The phenotypic and genotypic correlation coefficients were estimated using the method suggested by Al-Jibouri *et al.* (1958). The correlation coefficients were used to find out the direct and indirect effects of the component characters on pod yield as per the method of Dewey and Lu (1959).

RESULTS AND DISCUSSION

Correlation Co-efficient Studies

Significant differences were observed among the 24 genotypes for all the 12 characters studied. In general, the genotypic correlation coefficients were greater than their respective phenotypic correlation coefficients (Table 1 and 2). This may be due to depressed phenotypic expression by environmental influence.

Table 1. Phenotypic correlation coefficients among different characters in Groundnut (*Arachis hypogaea* L.)

Character	Dry Pod Yield/ Plnat	Kernel Yield/ plant	Shelling %	100-Kernel Wt. (g)	Sound Mature Kernel %	Days to 50 % Flowering	Days to Maturity	Oil yield	Plant Height (cm)	Pods/ Plant	Weight of Single Pod	Kernels/ Pod
Dry Pod Yield/ Plnat	1.0000	0.9771**	0.1149	0.1244	0.1341	-0.0928	-0.1194	-0.0605	0.2427*	0.2917*	-0.0656	0.2261
Kernel Yield/ plant		1.0000	0.3213**	0.2051	0.1555	-0.1002	-0.0832	-0.0240	0.2286	0.2774*	-0.0710	0.2216
Shelling %			1.0000	0.4035	0.1446	-0.0749	0.1743	0.2017	-0.0553	0.0333	-0.0301	-0.0177
100-Kernel Wt. (g)				1.0000	0.1071	0.2897*	0.1030	0.1831	-0.0376	-0.1404	-0.0014	0.3020**
Sound Mature Kernel %					1.0000	0.2026	0.1670	0.0876	0.2967*	0.1870	0.0453	0.1030
Days to 50 % Flowering						1.0000	0.0668	-0.0274	0.2794*	-0.3558**	-0.0521	0.2208
Days to Maturity							1.0000	0.0081	0.0169	-0.2351*	-0.0218	-0.1082
Oil yield								1.0000	-0.2013	0.0759	0.1116	-0.2607*
Plant Height (cm)									1.0000	-0.2571*	-0.1811	0.1992
Pods/ Plant										1.0000	0.2169	-0.0709
Weight of Single Pod											1.0000	0.0588
Kernels/ Pod												1.0000

Table 2. Genotypic correlation coefficients among different characters in Groundnut (*Arachis hypogaea* L.)

Character	Dry Pod Yield/ Plnat	Kernel Yield/ plant	Shelling %	100-Kernel Wt. (g)	Sound Mature Kernel %	Days to 50 % Flowering	Days to Maturity	Oil yield	Plant Height (cm)	Pods/ Plant	Weight of Single Pod	Kernels/ Pod
Dry Pod Yield/ Plnat	1.0000	0.9705**	0.1371	0.2062	0.2270	-0.2377*	-0.2538*	-0.1566	0.3590**	0.4376**	-0.0982	0.5614**
Kernel Yield/ plant		1.0000	0.3709**	0.3620**	0.2594*	-0.2232	-0.2019	-0.0974	0.3162**	0.4257**	-0.0843	0.5366**
Shelling %			1.0000	0.6770**	0.2197	-0.0481	0.1825	0.2493*	-0.1262	0.1028	0.0620	-0.0073
100-Kernel Wt. (g)				1.0000	0.1724	0.3387**	0.2419*	0.1543	-0.0141	-0.1796	-0.0921	0.7333**
Sound Mature Kernel %					1.0000	0.2634*	0.3656**	0.1549	0.3088**	0.2547*	0.0405	0.0831
Days to 50 % Flowering						1.0000	0.1172	0.0393	0.3235**	-0.5252**	-0.1043	0.5391**
Days to Maturity							1.0000	-0.0188	0.1185	-0.3391**	-0.0524	0.0387
Oil yield								1.0000	-0.2554*	0.1126	0.1623	-0.5894**
Plant Height (cm)									1.0000	-0.2614*	-0.2245	0.5055**
Pods/ Plant										1.0000	0.3828**	-0.1718
Weight of Single Pod											1.0000	0.4055**
Kernels/ Pod												1.0000

Table 3. Direct (diagonal) and indirect effects of different correlated characters towards dry pod yield per plant in Groundnut (*Arachis hypogaea* L.)

Character	Kernel Yield/ plant	Shelling %	100-Kernel Wt. (g)	Sound Mature Kernel %	Days to 50 % Flowering	Days to Maturity	Oil yield	Plant Height (cm)	Pods/ Plant	Weight of Single Pod	Kernels/ Pod
Kernel Yield/ plant	1.0517	0.3380	0.2157	0.1635	-0.1054	-0.0875	-0.0252	0.2405	0.2917	-0.0747	0.2330
Shelling %	-0.0730	-0.2273	-0.0917	-0.0329	0.0170	-0.0396	-0.0458	0.0126	-0.0076	0.0068	0.0040
100-Kernel Wt. (g)	0.0002	0.0003	0.0009	0.0001	0.0002	0.0001	0.0002	0.0000	-0.0001	0.0000	0.0003
Sound Mature Kernel %	0.0005	0.0005	0.0003	0.0032	0.0006	0.0005	0.0003	0.0009	0.0006	0.0001	0.0003
Days to 50 % Flowering	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	-0.0001	0.0000	0.0000
Days to Maturity	-0.0006	0.0014	0.0008	0.0013	0.0005	0.0078	0.0001	0.0001	-0.0018	-0.0002	-0.0008
Oil yield	-0.0002	0.0013	0.0012	0.0006	-0.0002	0.0001	0.0064	-0.0013	0.0005	0.0007	-0.0017
Plant Height (cm)	-0.0017	0.0004	0.0003	-0.0021	-0.0020	-0.0001	0.0015	-0.0072	0.0019	0.0013	-0.0014
Pods/ Plant	0.0017	0.0002	-0.0009	0.0012	-0.0022	-0.0015	0.0005	-0.0016	0.0063	0.0014	-0.0004
Weight of Single Pod	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0001	0.0001	-0.0001	-0.0007	0.0000
Kernels/ Pod	-0.0016	0.0001	-0.0022	-0.0007	-0.0016	0.0008	0.0019	-0.0014	0.0005	-0.0004	-0.0071
Dry Pod Yield/ Plant	0.9771**	0.1149	0.1244	0.1341	-0.0928	-0.1194	-0.0605	0.2427*	0.2917*	-0.0656	0.2261
Partial R^2	1.0276	-0.0261	0.0001	0.0004	0.0000	-0.0009	-0.0004	-0.0018	0.0018	0.0000	-0.0016

Residual=0.028

The results indicated that the trends of genotypic and phenotypic correlation was almost similar for all the characters. The estimates of genotypic correlations were slightly higher than their respective phenotypic correlation. The dry pod yield per plant was positively and significantly correlated at both genotypic and phenotypic level with kernel yield per plant, number of pods per plant and plant height. Such positive association of pod yield per plant with kernel yield per plant (Kumar *et al.,* 1998), mature pods per plant (Balaiah *et al*., 1980) were reported earlier. The estimates of genotypic parameters revealed that the phenotypic coefficient of variation along with least difference from genotypic coefficient of variation observed for characters viz., days to maturity (GCV 1.48% and PCV 1.93%), plant height (GCV 8.18% and PCV 8.99%), sound mature kernel (GCV 3.32% and PCV 3.74%) and shelling percentage (GCV 3.01% and PCV 3.70%), indicating that without much influence of environment, entire genetic determinants are translated into phenotype.

Path Co-efficient Studies

The path co-efficient studies (Table 3) indicated that significant correlation of number of pods per plant with dry pod yield per plant was mainly due to its high indirect effect via kernel yield per plant as well as its direct effect. Days to flowering, days to maturity, plant height and 100-kernel weight had negative indirect effect. Out of these eleven characters only three i.e. kernel yield per plant, plant height and pods per plant exhibited positive significant association with dry pod yield per plant, hence only these characters were described for path analysis study.

Conclusion

Association estimate revealed that dry pod yield was positively correlated at both genotypic and phenotypic levels with kernel yield per plant, number of pods per plant, plant height, 100-kernel weight, sound mature kernels, shelling percent and number of kernels per pod. Correlation for dry pod yield was divided into direct and indirect effects by different characters. Highest positive direct effect on dry pod yield was exhibited by kernel yield (0.97) followed by number of pods per plant (0.29) and plant height (0.24). However as revealed traits like kernel yield per plant, 100-kernel weight per plant, shelling percentage can be selected for further crop improvement in groundnut.

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