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Original Research Article

Character Association and Path Analysis Studies for Pod Yield and Its Components in Early Segregating Population of Groundnut (*Arachis hypogaea* L.)

K. John[1]* and P. Raghava Reddy[2]

[1]Regional Agricultural Research Station, Tirupati-517 502, Andhra Pradesh, India
[2]Acharya N.G.Ranga Agricultural University, Rajendranagar, Hyderabad-500 030, Andhra Pradesh, India

**Corresponding author.*

A b s t r a c t

The estimate of genotypic correlation coefficients in general higher than their corresponding phenotypic correlations indicating strong inherent association among the traits. Pod yield per plant had significant positive association with days to 50 per cent flowering, days to maturity, number of well-filled and mature pods per plant, shelling per cent, sound mature kernel per cent, 100-kernel weight, protein per cent and kernel yield per plant. These characters can be considered as criteria for selection for higher yield, as these were mutually and directly associated with pod yield. The kernel yield per plant exhibited significant and positive association with number of secondary branches per plant, number of well filled and mature pods per plant, shelling per cent, 100-kernel weight, and protein per cent. The maximum positive direct effect contribution to pod yield per plant was from kernel yield per plant followed by days to 50 per cent flowering, 100-kernel weight. The direct effects of dry haulms yield per plant, protein per cent, days to maturity, number of well-filled and mature pods per plant, number of primary branches per plant and oil per cent were found to be positive kernel yield per plant had maximum positive direct effect on pod yield per plant indicating kernel yield is the important yield contributing character. The high direct effect of pods per plant was appeared to be the main factor for its strong positive correlation with pod yield. Hence, a direct selection for this trait would be effective.

K e y w o r d s

Characters association
Groundnut
Path analysis
Segregating population

Introduction

Pod yield in groundnut (*Arachis hypogaea* L.) is a complex and depends upon the interplay of number of components attributes. A clear picture of contribution of each component is the final expression of character would emerge through the study of correlation and causation of path concept revealing different ways in which component attributes influence the complex traits. In order to achieve the goal of increased production by increasing the yield potential of crop, knowledge of direction and magnitude of association between various traits is essential for plant breeders. Understanding the relationships among yield and yield components is of paramount importance for making the best use of these relationships in selection. The correlation coefficient

may be confounded with indirect effect due to common association inherent in trait interrelationships. Therefore information derived from the correlation coefficients can be augmented by partitioning correlations into direct and indirect effects by path coefficient analysis. Accordingly, the present investigation was aimed to study the association of pod yield and its component traits in the crosses of F_2 generation in groundnut.

Materials and methods

The experimental material comprised of twenty eight F_2 crosses. All the twenty-eight F_2s were evaluated at Agricultural Research Station, Tirupati (Andhra Pradesh), India under irrigated conditions during *rabi* 2009. All the twenty eight F_2s were randomized in each replication and were raised in three rows of 3.0 m length with a spacing of 22.5 × 10 cm. Thirty random plants per replication were sampled for recording observations from each cross and replication and their mean values were used. The experiment was conducted in a red sandy loam soil with a neutral pH, low in organic carbon. Recommended agronomic and plant protection measures were adopted for the conduct of experiment.

The data were recorded for fifteen quantitative traits *viz*., days to 50% flowering, days to maturity, plant height, number of primary branches per plant, number of secondary branches per plant, number of well-filled and mature pods per plant, shelling per cent, sound mature kernel per cent, 100-kernel weight, dry haulm weight per plant, harvest index, oil per cent, protein content, kernel yield per plant and pod yield per plant. Genotypic and phenotypic correlation coefficients were calculated among the genotypes using the formulae suggested by Al-Jibouri et al. (1958). Path coefficient analysis was carried out by using phenotypic and genotypic correlation coefficients as per the method suggested by Dewey and Lu (1959).

Results and discussion

Characters association

The association studies provide reliable information on nature and extent of relationship between different characters. The information on the association between traits of the economic worth is of great value to the plant breeders as it will help in assessing the scope of simultaneous improvement of two or more characters. Hence, understanding of the inter-relationships of characters with yield and among themselves will be of great value in any crop improvement programme. Yield is a highly complex character and polygenic nature which is influenced by the environment. Hence, the study of inter-association is essential to understand the relationship of simple traits with complex yield contributing traits. These relationships may be positive or negative.

In the present study, genotypic correlations were higher than phenotypic correlations for most of the characters F_2's. These indicate that the strong inherent association between the characters governed largely by genetic causes and reduced by environmental forces. The environment and genotype x environment interaction played a major role in determining these associations between the characters.

The correlation coefficients worked-out for yield and its components in F_2 generation evaluated during *rabi*, 2009 are furnished in Table 1. Pod yield per plant had significant positive association with days to 50 per cent flowering, days to maturity, number of well-filled and mature pods per plant, shelling per cent, sound mature kernel per cent, 100-kernel weight, protein per cent and kernel yield per plant. The relationship of pod yield per plant with oil per cent was significant and negative while it's association with other characters *viz.*, dry haulms yield per plant was found to be positive but non-significant (Table 2). On contrary it had non-significant and negative correlation with number of primary branches per plant and harvest index. These characters can be considered as criteria for selection for higher yield, as these were mutually and directly associated with pod yield. Similar results were obtained by Jonah et al. (2010) and Korat et al. (2010).

The kernel yield per plant exhibited significant and positive association with number of secondary branches per plant, number of well filled and mature pods per plant, shelling per cent, 100-kernel weight, and protein per cent. Its relationship with oil per cent was found to be non-significant and positive, while it had significant negative association with harvest index and non-significant and negative association with days to maturity, plant height, number of primary branches per plant and dry haulms yield per plant.

Days to 50 per cent flowering possessed significant and positive association with days to maturity), plant height, number of primary branches per plant, number of

secondary branches per plant, and dry haulms yield per plant, while it had significant negative relationship with shelling per cent and oil per cent. Days to 50 per cent flowering expressed non-significant and negative association with number of well-filled and mature pods per plant, sound mature kernel per cent and protein per cent, while it had non-significant and positive association with harvest index.

The association of days to maturity with days to 50 per cent flowering, plant height, number of primary branches per plant, number of secondary branches per plant, dry haulms yield per plant and harvest index was found to be significant and positive, while its significant and negative association was observed with shelling per cent and oil per cent. On contrary, it displayed non-significant negative association with number of well-filled and mature pods per plant, sound mature kernel per cent, protein per cent and kernel yield per plant and non significant positive association was observed with 100-kernel weight.

The association between plant height and number of primary branches per plant, number of secondary branches per plant, dry haulms yield per plant and harvest index was found to be significant and positive. It possessed significant and negative association with harvest index (r_g = -0.5822), specific leaf weight, shelling per plant and oil per cent, it had weak positive relationship with number of well-filled and mature pods per plant, it's non-significant and negative association was observed with protein per cent. The association of number of primary branches per plant with number of secondary branches per plant, transpiration rate, dry haulms yield per plant and harvest index was highly significant and positive, whereas it's correlation with shelling per cent, sound mature kernel per cent, 100-kernel weight and oil per cent was significant and negative. The relationship between number of primary branches per plant and protein per cent was weak and positive and with number of well-filled and mature pods per plant is non-significant and negative. Number of secondary branches per plant possessed significant and positive association with dry haulms yield per plant, harvest index and protein per cent, while it had non-significant positive relationship with sound mature kernel per cent. Significant negative association was found with shelling per cent, 100-kernel weight and oil per cent. On contrary, it displayed non-significant negative association with number of well-filled and mature pods per plant.

Number of well-filled and mature pods per plant established a significant and positive relationship with dry haulms yield per plant and non-significant and positive association of it with shelling per cent, 100-kernel weight, harvest index, oil per cent and protein per cent indicating the positive linear relationship of these characters with kernel yield. The results indicate that with the improvement in these characters improvement in pod yield can be achieved. Similar kind of positive significant association of kernel yield with mature pods per plant were also reported by Jayalakshmi et al. (2000), Venkataravana et al. (2000), Venkataramana (2001), Makhan Lal et al. (2003), Trivikrama Reddy (2003), Hemanth Kumar (2004) and Lakshmidevamma et al. (2004), Abraham (1990), and Venkateswarlu (2007). It also expressed non-significant negative relation with sound mature kernel per cent. Shelling per cent expressed significant and positive association with sound mature kernel per cent, 100-kernel weight and oil per cent, while its association with dry haulms yield per plant and harvest index was significant and negative and non-significant and negative correlation with protein per cent.

The relationship of sound mature kernel per cent with protein per cent was significant and positive, while it's association with other characters *viz.*, 100-kernel weight and oil per cent was found to be positive but non-significant. These results were confirmed with the findings of Sumathi and Muralidharan (2009). On contrary negative correlation of 100-kernel weight with protein content was reported by Johar Singh and Mohinder Singh (2001). Dry haulms yield per plant and harvest index registered negative non-significant association with sound mature kernel per cent. Hundred kernel weight established a significant and positive relationship with protein per cent and significant negative relationship with oil per cent.

On contrary, its negative direct effect was through plant height, number of secondary branches per plant, shelling per cent, 100-kernel weight, harvest index, oil per cent and kernel yield per plant. Number of secondary branches per plant exhibited positive indirect effect days to 50 per cent flowering, days to maturity, number of primary branches per plant, sound mature kernel per cent, dry haulms yield per plant, and protein per cent and negative indirect effect through plant height, number of well-filled and mature pods per plant, shelling per cent, 100-kernel weight, harvest index, oil per cent and kernel yield per plant.

Table 1. Phenotypic (P) and genotypic (G) correlation coefficients among yield and yield component characters in F_2 generation in groundnut.

Character		Days to 50% flowering	Days to maturity	Plant height	No. of primary branches per plant	No. of secondary branches per plant	No. of well-filled and mature pods per plant	Shelling%	SMK%	100 kernel weight	Dry haulm weight per plant	Harvest index	Oil per cent	Protein per cent	Kernel yield per plant	Pod yield per plant
Days to 50% flowering	P	1.0000	0.6474**	0.3112	0.3076	0.3659	-0.1695	-0.1719	-0.1511	-0.0910	0.2925	0.2766	-0.2970	-0.0843	-0.0003	0.1328
	G	1.0000	0.8362**	0.5259**	0.6093**	0.4630*	-0.1910	-0.4941**	-0.3483	0.1040	0.4772*	0.3636	-0.4743*	-0.0659	0.1670	0.5656**
Days to maturity	P		1.0000	0.2547	0.2276	0.2920	-0.1204	-0.0703	-0.0350	0.0852	0.2621	0.2010	-0.3490	-0.1363	-0.0153	0.1585
	G		1.0000	0.6172**	0.6496**	0.4466*	-0.3011	-0.4295*	-0.3729	0.1615	0.5980**	0.4845**	-0.7457**	-0.2991	-0.0458	0.3852*
Plant height	P			1.0000	0.0974	0.5245**	0.0974	-0.3078	-0.0571	-0.0743	0.3605	0.3952*	-0.2143	0.0289	-0.0991	-0.1259
	G			1.0000	0.5256**	0.8208**	0.1176	-1.0302**	0.3002	0.0347	0.8153**	0.5957**	-0.3968*	0.2374	-0.2286	0.1988
No. of primary branches per plant	P				1.0000	0.3360	-0.0472	-0.2096	-0.2125	-0.0706	0.4152*	0.4350*	-0.2704	0.0892	-0.1677	-0.0208
	G				1.0000	0.6434**	-0.3657	-1.0964**	-0.5921**	-0.3943*	0.6221**	0.6628**	-0.6098**	0.1902	-0.3377	-0.0441
No. of secondary branches per plant	P					1.0000	0.0032	-0.3746*	-0.1053	-0.1092	0.3361	0.3351	-0.2299	0.2002	-0.0604	0.0343
	G					1.0000	-0.0518	-1.9147**	-0.2480	-0.4009*	0.5574**	0.5511**	-0.5233**	0.7242**	-0.4017*	-0.1834
No. of well-filled and mature pods per plant	P						1.0000	0.1008	-0.0267	0.2699	0.2427	0.0519	0.1398	0.0192	0.3165	0.2725
	G						1.0000	0.2081	-0.0830	0.2684	0.4390*	0.2625	0.2952	0.1284	0.5769**	0.3926*
Shelling per cent	P							1.0000	0.2316	0.3754*	-0.1952	-0.3553	0.2157	-0.1208	0.2816	0.0020
	G							1.0000	0.6535**	0.8639**	-0.5048**	-0.5526**	0.4137*	-0.2065	0.4763*	0.3951*
Sound mature kernel per cent	P								1.0000	0.1724	-0.1530	-0.2775	0.0296	0.1666	-0.0919	0.1542
	G								1.0000	0.2665	-0.1479	-0.2631	0.1768	1.3381**	0.3115	0.3742*
100- kernel weight	P									1.0000	-0.0838	-0.3228	-0.1328	0.0504	0.4180*	0.2950
	G									1.0000	0.1982	0.0064	-0.5048**	0.7318**	0.4614*	0.4651*
Dry haulm weight per plant	P										1.0000	0.8183**	-0.2331	0.0580	-0.1088	0.0282
	G										1.0000	0.9331**	-0.4366*	-0.2554	-0.1363	0.1726
Harvest index	P											1.0000	-0.2027	-0.0615	-0.4076	-0.2733
	G											1.0000	-0.2086	-0.7696**	-0.4550*	-0.3141
Oil per cent	P												1.0000	-0.2219	0.1001	0.0441
	G												1.0000	-0.9240**	0.1267	-0.3755*
Protein per cent	P													1.0000	0.1144	0.1901
	G													1.0000	0.9198**	0.7166**
Kernel yield per plant	P														1.0000	0.7865**
	G														1.0000	1.1602**
Pod yield per plant	P															1.0000
	G															1.0000

* Significant at 5% level ** Significant at 1% level

Table 2. Changes in character association in F_2 generation in groundnut.

S. No.	Association between the character	Association in F_2 s
I	**Days to 50 per cent flowering with**	
1	Plant height	Positive significant
2	Number of primary branches per plant	Positive significant
3	Number of secondary branches per plant	Positive significant
4	Shelling per cent	Negative significant
5	Sound mature kernel per cent	Negative non-significant
6	100 -kernel weight	Positive non-significant
7	Harvest index	Positive non-significant
8	Oil per cent	Negative significant
9	Protein per cent	Negative non-significant
10	Kernel yield per plant	Positive non-significant
11	Pod yield per plant	Positive significant
II	**Days to maturity with**	
1	Number of secondary branches per plant	Positive significant
2	Shelling per cent	Negative significant
3	Sound mature kernel per cent	Negative non-significant
4	100 -kernel weight	Positive non-significant
5	Harvest index	Positive significant
6	Oil per cent	Negative significant
7	Protein per cent	Negative non-significant
8	Kernel yield per plant	Negative non-significant
9	Pod yield per plant	Positive significant
III	**Plant height with**	
1	Number of primary branches per plant	Positive significant
2	Number well-filled and mature pods per plant	Positive non-significant
3	Shelling per cent	Negative significant
4	Sound mature kernel per cent	Positive non-significant
5	100 -kernel weight	Positive non-significant
6	Dry haulms yield per plant	Positive significant
7	Harvest index	Positive significant
8	Oil per cent	Negative significant
9	Protein per cent	Positive non-significant
10	Kernel yield per plant	Negative non-significant
11	Pod yield per plant	Positive non-significant
IV	**Number of primary branches per plant with**	
1	Number of secondary branches per plant	Positive significant
2	Shelling per cent	Negative significant
3	Sound mature kernel per cent	Negative significant
4	100 -kernel weight	Negative significant
5	Oil per cent	Negative significant
6	Protein per cent	Positive non-significant
7	Kernel yield per plant	Negative non-significant
8	Pod yield per plant	Negative non-significant
V	**Number of secondary branches per plant with**	
1	Number well-filled and mature pods per plant	Negative non-significant
2	Shelling per cent	Negative significant
3	100 -kernel weight	Negative significant
4	Harvest index	Positive significant
5	Oil per cent	Negative significant
6	Protein per cent	Positive significant
7	Kernel yield per plant	Negative significant
8	Pod yield per plant	Negative non-significant

S. No.	Association between the character	Association in F_2 s
VI	**Number well-filled and mature pods per plant with**	
1	Shelling per cent	Positive non-significant
2	Sound mature kernel per cent	Negative non-significant
3	Dry haulms yield per plant	Positive significant
4	Harvest index	Positive non-significant
5	Oil per cent	Positive non-significant
6	Protein per cent	Positive non-significant
VII	**Shelling per cent with**	
1	Sound mature kernel per cent	Positive significant
2	Dry haulms yield per plant	Negative significant
3	Harvest index	Negative significant
4	Oil per cent	Positive significant
5	Kernel yield per plant	Positive significant
6	Pod yield per plant	Positive significant
VIII	**Sound mature kernel per cent with**	
1	100 -kernel weight	Positive non-significant
2	Dry haulms yield per plant	Negative non-significant
3	Harvest index	Negative non-significant
4	Oil per cent	Positive non-significant
5	Kernel yield per plant	Positive non-significant
6	Pod yield per plant	Positive significant
7	100 -kernel weight	Positive non-significant
8	Harvest index	Positive non-significant
9	Protein per cent	Positive significant
IX	**Dry haulms yield per plant with**	
1	Harvest index	Positive significant
2	Oil per cent	Negative significant
3	Kernel yield per plant	Negative significant
4	Pod yield per plant	Positive non-significant
X	**Harvest index with**	
1	Protein per cent	Negative significant
2	Kernel yield per plant	Negative significant
3	Pod yield per plant	Negative non-significant
XI	**Oil per cent with**	
1	Protein per cent	Negative significant
2	Kernel yield per plant	Positive non-significant
3	Pod yield per plant	Negative significant
XII	**Protein per cent with**	
1	Pod yield per plant	Positive significant

The character number of well-filled and mature pods per plant had positive indirect effect through shelling per cent, sound mature kernel per cent, 100-kernel weight, harvest index, oil per cent, protein per cent and kernel yield per plant and negative indirect effect through days to 50 per cent flowering, days to maturity, plant height, number of primary branches per plant, number of secondary branches per plant and harvest index.

Shelling per cent showed positive indirect effect through plant height, number of secondary branches per plant, 100-kernel weight, harvest index, oil per cent and kernel yield per plant. Earlier Korat *et al.* (2010) reported that harvest index and 100- kernel weight were identified as the most important yield contributing characters. Similar kinds of findings were also reported by Azad and Hamid (2000), Siddiquet et al. (2006), Parameswarappa et al. (2008) and Vaithiyalingan et al. (2010). But days to 50 per cent flowering, days to maturity, number of primary branches per plant, number of well-filled and mature pods per plant, sound mature kernel per cent, dry haulms yield per plant and protein per cent it showed negative indirect effect.

Table 3. Path coefficients for pod yield and its components in F_2 generation in groundnut.

Character		Days to 50% flowering	Days to maturity	Plant height	No. of primary branches per plant	No. of secondary branches per plant	No. Of well filled and mature pods per plant	Shelling%	SMK%	100 kernel weight	Dry haulm weight per plant	Harvest index	Oil per cent	Protein per cent	Kernel yield per plant	Correlation with pod yield per plant
Days to 50% flowering	P	**0.2093**	0.0739	-0.0008	0.0111	-0.0218	0.0068	-0.0171	0.0127	-0.0163	0.0475	-0.0374	-0.0035	-0.0106	-0.0002	0.1328
	G	**0.1720**	0.2683	0.3978	0.7463	-0.0189	-0.0333	-0.0393	-0.0260	0.1172	-0.1508	-0.2107	-0.4037	-0.0153	0.0936	0.5656**
Days to maturity	P	0.1355	**0.1141**	-0.0007	0.0082	-0.0174	0.0049	-0.0070	0.0029	0.0153	0.0426	-0.0272	-0.0041	-0.0171	-0.0102	0.1585
	G	0.1438	**0.3208**	0.4669	0.7957	-0.0183	-0.0524	-0.0342	-0.0279	0.1821	-0.1890	-0.2807	-0.6347	-0.0694	-0.0257	0.3852*
Plant height	P	0.0651	0.0291	**-0.0026**	0.0035	-0.0313	-0.0039	-0.0307	0.0048	-0.0133	0.0586	-0.0535	-0.0025	0.0036	-0.1533	-0.1259
	G	0.0904	0.1980	**0.7564**	0.6438	-0.0335	0.0205	-0.0820	0.0224	0.0392	-0.2577	-0.3451	-0.3378	0.0551	-0.0555	0.1988
No. of primary branches per plant	P	0.0644	0.0260	-0.0002	**0.0362**	-0.0200	0.0019	-0.0209	0.0179	-0.0127	0.0674	-0.0589	-0.0032	0.0112	-0.1125	-0.0208
	G	0.1048	0.2084	0.3976	**1.2249**	-0.0263	-0.0637	-0.0873	-0.0442	-0.4446	-0.1966	-0.3840	-0.5190	0.0442	-0.1893	-0.0441
No. of secondary branches per plant	P	0.0766	0.0333	-0.0013	0.0122	**-0.0597**	-0.0001	-0.0374	0.0088	-0.0196	0.0546	-0.0453	-0.0027	0.0252	-0.0405	0.0343
	G	0.0796	0.1433	0.6209	0.7880	**-0.0409**	-0.0090	-0.1525	-0.0185	-0.4520	-0.1762	-0.3193	-0.4454	0.1681	-0.2251	-0.1834
No. of well -filled and mature pods per plant	P	-0.0355	-0.0137	-0.0002	-0.0017	-0.0002	**-0.0404**	0.0101	0.0022	0.0484	0.0394	-0.0070	0.0017	0.0024	0.2122	0.2725
	G	-0.0329	-0.0966	0.0890	-0.4480	0.0021	**0.1742**	0.0166	-0.0062	0.3026	-0.1387	-0.1521	0.2513	0.0298	0.3233	0.3926*
Shelling per cent	P	-0.0360	-0.0080	0.0008	-0.0076	0.0224	-0.0041	**0.0997**	-0.0195	0.0673	-0.0317	0.0481	0.0026	-0.0152	0.3194	0.0020
	G	-0.0850	-0.1378	-0.7793	-1.3430	0.0783	0.0362	**0.0796**	0.0488	0.9740	0.1595	0.3202	0.3522	-0.0479	0.1578	0.3951*
Sound mature kernel per cent	P	-0.0316	-0.0040	0.0001	-0.0077	0.0063	0.0011	0.0231	**-0.0840**	0.0309	-0.0249	0.0375	0.0004	0.0210	0.2089	0.1542
	G	-0.0599	-0.1196	0.2271	-0.7253	0.0101	-0.0145	0.0520	**0.0747**	0.3004	0.0467	0.1524	0.1505	0.3106	-0.0515	0.3742*
100- kernel weight	P	-0.0190	0.0097	0.0002	-0.0026	0.0065	-0.0109	0.0374	-0.0145	**0.1793**	-0.0136	0.0437	-0.0016	0.0063	0.2803	0.2950
	G	0.0179	0.0518	0.0263	-0.4830	0.0164	0.0467	0.0688	0.0199	**1.1275**	-0.0626	-0.0037	-0.4297	0.1699	0.2585	0.4651*
Dry haulm weight per plant	P	0.0612	0.0299	-0.0009	0.0150	-0.0201	-0.0098	-0.0195	0.0129	-0.0150	**0.1625**	-0.1107	-0.0028	0.0073	-0.0730	0.0282
	G	0.0821	0.1919	0.6167	0.7620	-0.0228	0.0765	-0.0402	-0.0111	0.2234	**-0.3160**	-0.5406	-0.3717	-0.0593	-0.0764	0.1726
Harvest index	P	0.0579	0.0229	-0.0010	0.0157	-0.0200	-0.0021	-0.0354	0.0233	-0.0579	0.1329	**-0.1353**	-0.0024	-0.0077	-0.3051	-0.2733
	G	0.0625	0.1555	0.4506	0.8119	-0.0225	0.0457	-0.0440	-0.0197	0.0072	-0.2949	**-0.5794**	-0.1776	-0.1786	-0.2284	-0.3141
Oil per cent	P	-0.0622	-0.0398	0.0005	-0.0098	0.0137	-0.0056	0.0215	-0.0025	-0.0238	-0.0379	0.0274	**0.0118**	-0.0279	0.0849	0.0441
	G	-0.0816	-0.2393	-0.3002	-0.7469	0.0214	0.0514	0.0329	0.0132	-0.5692	0.1380	0.1209	**0.8512**	-0.2145	0.0561	-0.3755*
Protein per cent	P	-0.0176	-0.0156	-0.0001	0.0032	-0.0119	-0.0008	-0.0120	-0.0140	0.0090	0.0094	0.0083	-0.0026	**0.1258**	0.0767	0.1901
	G	-0.0113	-0.0960	0.1796	0.2330	-0.0296	0.0224	-0.0164	0.1000	0.8251	0.0807	0.4459	-0.7865	**0.2321**	0.5154	0.7166**
Kernel yield per plant	P	-0.0001	-0.0017	0.0006	-0.0061	0.0036	-0.0128	0.0475	-0.0262	0.0749	-0.0177	0.0616	0.0015	0.0144	**0.6706**	0.7865**
	G	0.0287	-0.0147	-0.0750	-0.4137	0.0164	0.1005	0.0224	-0.0069	0.5202	0.0431	0.2361	0.0852	0.2135	**0.5604**	1.1602**
RESIDUAL EFFECT (PHENOTYPIC)			0.4391													
ESIDUAL EFFECT (GENOTYPIC)			-0.3790													

* Significant at 5% level ; ** Significant at 1% level; Diagonal values (Bold): Direct effects.

Sound mature kernel per cent exhibited positive indirect effect through plant height, number of primary branches per plant, number of well-filled and mature pods per plant, shelling per cent, 100-kernel weight, harvest index, oil per cent, protein per cent and kernel yield per plant and negative direct effect through days to 50 per cent flowering, days to maturity, number of primary branches per plant and dry haulms yield per plant. The character hundred kernel weight had positive indirect effect through days to maturity, plant height, number of secondary branches per plant, shelling per cent, harvest index, protein per cent and kernel yield per plant and negative indirect effect through days to 50 per cent flowering, number of primary branches per plant number of well-filled and mature pods per plant, dry haulms yield per plant and oil per cent.

Dry haulms yield per plant had a positive indirect effect through days to 50 per cent flowering, days to maturity, number of primary branches per plant, sound mature kernel per cent, and protein per cent and negative indirect effect through plant height, number of secondary branches per plant, number of well-filled and mature pods per plant, shelling per cent, 100-kernel weight, harvest index, oil per cent and kernel yield per plant. Harvest index had positive indirect effect through days to 50 per cent flowering, days to maturity, number of primary branches per plant, sound mature kernel per cent, and dry haulms yield per plant and negative indirect effect through plant height, number of secondary branches per plant, number of well-filled and mature pods per plant, shelling per cent, 100-kernel weight, harvest index, oil per cent and kernel yield per plant.

Oil per cent had a positive indirect effect through plant height, number of primary branches per plant, shelling per cent, harvest index and kernel yield per plant and negative indirect effect days to 50 per cent flowering, days to maturity, number of primary branches per plant, number of well-filled and mature pods per plant, sound mature kernel per cent, 100-kernel weight, dry haulms yield per plant and kernel yield per plant. The character protein per cent had positive indirect effect through number of primary branches per plant, 100-kernel weight, dry haulms yield per plant, harvest index and kernel yield per plant and negative indirect effect through days to 50 per cent flowering, days to maturity, plant height, number of secondary branches per plant, number of well-filled and mature pods per plant, shelling per cent, sound mature kernel per cent and oil per cent.

From the above discussion on path coefficient analysis it can be concluded that, kernel yield per plant and number of well-filled and mature pods per plant had maximum positive direct effect on pod yield per plant indicating that these traits are the important yield contributing characters.

References

Abraham, M. J., 1990. Correlation, path and discriminate function analysis in groundnut grown on a P - deficient acid soil. Crop Improv. 17(1), 34-37.

Al-Jibouri, H. A., Miller, P.A., Robinson, H. F., 1958. Genotypic and environmental variance and covariance in an upland cotton cross of inter-specific origin. Agron. J. 50, 633-637.

Azad, M. A. K., Hamid, M. A., 2000. Genetic variability, character association and path analysis in groundnut (*Arachis hypogaea* L.). Thailand J. Agric. Sci. 33, 153-157.

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

Giri, R. R., Toprope, V.N., Jagtap, P. K., 2009. Genetic variability, character association and path analysis for pod yield, its component traits and late leaf spot, *Phaeoisariopsis personata* (Berk and curt), in groundnut. Int. J. Plant Sci., 4(2), 551-555.

Gomes, R. L. F., Lopes, A.C., De, A., 2005. Correlations and path analysis in peanut. Crop Breed. Appl. Biotechnol. 5(1), 105-110.

Hemanth Kumar, M., 2004. Genetic analysis of morphological, physiological and biochemical characters in relation to yield and quality in groundnut (*Arachis hypogaea* L.). Thesis submitted to Acharya N.G. Ranga Agricultural University, Hyderabad.

Jayalakshmi, V., Reddy, C. R., Reddy, P. V., Reddy, G. L. K., 2000. Character association among morphological attributes in parental genotypes and groundnut hybrids. Legume Res. 23, 102-105.

Johar Singh and Mohinder Singh. 2001. Character association in spring / summer grown groundnut (*Arachis hypogaea* L.) genotypes. J. Res. Punjab Agric. Univ. 38(3-4), 147-152.

Jonah, P .M, Adeniji, O. T., Wammanda, D. T., 2010. Variability and genetic correlations for yield and yield characters in some bambara groundnut (*Vigna subterranea*) cultivars. Int. J. Agric. Biol. 12(20), 303-307.

Korat, V. P., Pithia, M.S., Savaliya, J.J., Pansuriya, A.G., Sodavadiya, P.R., 2010. Studies on characters association and path analysis for seed yield and its components in groundnut (*Arachis hypogaea* L.). Legume Res. 33(3), 211-216.

Lakshmidevamma, T. N., Byregowda, M., Mahadevu, P., 2004. Character association and path analysis in groundnut (*Arachis hypogaea* L.). Mysore J. Agric. Sci. 38(2), 221-226.

Makhan Lal, Roy, D., Ojha, O. P., 2003. Genetic variability and selection response for root and other characters in groundnut. Legume Res., 26(2), 128-130.

Mathews, C., Nagda, A. K., Sharma, U.C., 2000. A study of path analysis in groundnut. Madras Agric. J. 87, 480-481.

Ofori, I., 1996. Correlation and path coefficient analysis of components of seed yield in Bambara groundnut (*Vigna subterranean*). Euphytica (91), 103-107.

Parameshwarappa, K. G., Malabaari, T.A., Lingaraju, B. S., 2008. Analysis of correlation and path effects among yield attributing traits in two crosses of large seeded groundnut, *Arachis hypogaea* L. J. Oilsseds Res. 25(10), 4-7.

Parmar, D. L., Kumar, A. L. R., Bharodia, P. S., 2000. Genetic analysis of pod and seed characters in crosses of large seeded Virginia genotypes of groundnut. Int. *Arachis* Newslett. 20, 10-11.

Reddi, M. V., Subramanayam, D., Ramachandra Reddy, Krishna Murthy, J., Reddy, N. S., Dhan Raj, A., 1986. Character association in Virginia bunch and runner types of groundnut (*Arachis hypogaea* L.). Indian J. Genet. Plant Breed. 46, 360-365.

Siddiquey, M. N., Haque, M.M., Ara, M. J. F., Ahmed, M. R., Roknuzzaman, M., 2006. Correlation and Path analysis of groundnut (*Arachis hypogaea* L.). Int. J. Sustain. Agric. Technol. 2(7), 22-27.

Sumathi, P., Muralidharan, V., 2009. Geentic analysis for quality traits in large seeded groundnut (*Arachis hypogaea* L.) genotypes. J. Res. ANGRAU 37 (1&2), 26-33.

Trivikrama Reddy. 2003. Heterosis and combining ability studies in a 6 × 6 Diallel set of cross for yield attributes in groundnut (*Arachis hypogaea* L.). M.Sc. (Ag.) Thesis submitted to Acharya N.G. Ranga Agricultural University, Hyderabad.

Vaithiyalingam, M., Manoharan, V., Ramamoorthi, N., 2010. Association analysis among the yield attributes of early season drought tolerant groundnut (*Arachis hypogaea* L.). Electronic J. Plant Breed. 1(5), 1347-1350.

Venkataramana, P., 2001. Variability and correlation studies in groundnut. Crop Res. 21, 81-83.

Venkataravana, P., Sheriff, R. A., Kulakarni, R. S., Shankaranarayan, V., Fathima, P. S., 2000. Correlation and path analysis in groundnut (*Arachis hypogaea* L.). Mysore J. Agric. Sci. 34, 321-325.

Venkateswarlu, O., Raja Reddy, K., Reddy, P. V., Vasanthi, R. P., Hariprasad Reddy, K., Eswara Reddy, N. P., 2007. Character association and path analysis for morphophysiological traits in groundnut *Arachis hypogaea* L. J. Oilseeds Res. 24(1), 20-22.