



## Inter-Relation Studies of Yield and Yield Components in Groundnut (*Arachis Hypogaea* L)

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### Abstract

Peanut or groundnut (*Arachis hypogaea*) is a species in legume or bean family. The peanut was probably first domesticated and cultivated in the valleys of Paraguay. India is the second largest producer of groundnut in the world. It is the major oil seed crop in India and it plays a major role in bridging the vegetable oil deficit in the country. The experimental material consisted of Chinthamani groundnut variety popularly cultivated in and around the areas of Tenkasi district. It was conducted in two farmers' fields at Tenkasi district during rabi and kharif of 2021. Two hundred plants in each field were analysed for yield contributing components on pod yield per plant to identify the easily observable trait useful in indirect selection for high yield. During rabi season, the traits height of main axis, number of flowers within 45DAS, number of matured pods, and kernel yield were positively correlated to pod yield while number of branches, number of flowers within 45DAS, matured pods, kernel yield, hundred pods weight and hundred kernels weight are positively correlated to pod yield during Kharif season. The path analysis disclosed that the trait number of matured pods per plant and kernel yield had high direct effect towards pod yield per plant in rabi season and number of matured pods per plant was recorded during kharif season. These results imply that selection for these traits would bring up the improvement in the associated characters and in turn improvement of yield simultaneously.

**Keywords:** Chinthamani Groundnut; Positively Correlated; Direct Effect; Number of Matured Pods; Number of Flowers Within 45DAS

### Introduction

Groundnut, 'The unpredictable legume' is also known as earthnut, peanut, monkey nut and manilla nut. Cultivated groundnut originates from South America. It is the 13<sup>th</sup> most important food crop and 4<sup>th</sup> most important oilseed crop of the world. According to the all India Rabi crop coverage report, Government of India, as on 29<sup>th</sup> January 2021, groundnut was sown in around 4.76 lakh hectares as compared to last year (4.82 lakh ha). The history of growing groundnut in India is around 250 years and it has attained the place of most important oilseed crop of the country with annual production of about 8 million tonnes.

Correlation studies permit only a measure of relationship between pair of traits. The actual contribution of an attribute and its influence through other characters could be arrived only by way of partitioning the correlation coefficient into direct and indirect effects by path coefficient analysis. This will be very much helpful in rationalizing the basis of selection more meaningfully in a breeding programme.

The present study was undertaken to understand the relationship between various characters and their contribution to yield in groundnut to identify the easily observable trait useful in indirect selection for high yield.

## Materials and Method

The groundnut (*Arachis hypogaea L*), also known as peanut is an essential food legume and oilseed crop in tropical and subtropical regions and is grown in about 90 countries around the world in different agro-climatic areas.

The experimental material consisted of Chinthamani groundnut variety popularly cultivated in and around the areas of Tenkasi district. The present study was conducted in two farmers' fields of Tenkasi district during *rabi* and *kharif* of 2021.

The first field taken up for the study was of the farmer Mr.Palanisamy, 5/97, south street, Uthankulam, Sankarankovil (Tk), Tenkasi-627857, which was sown over an area of 1.5 acre during 15 February, 2021 as a continuation of the *rabi* season. The field was harvested on 25 May, 2021. The second field utilised for the study was of the farmer Mr. Senthilkumar, 105, south street, Uthankulam, Sankarankovil (Tk), Tenkasi- 627857, sown on 3<sup>rd</sup>,

May 2021 over an area of one acre and harvested on 1<sup>st</sup> August, 2021. This duration falls on the onset of *kharif*, 2021.

The Chinthamani variety sown in the farmers' fields were sown with a spacing of 10 × 20 cm and all the basic recommended package of practice for groundnut was adopted. The biometrical observations were recorded on randomly selected 200 plants at flowering and maturity in each field. The following observations were recorded and subjected to statistical analysis for Inter-relationship: Height of the main axis (HM), Total number of branches (NB), Number of flowers within 45 days after sowing (NFD), Number of matured pods per plant (NMP), Pod yield per plant (PY), Kernel yield per plant (KY), Hundred Pods weight (HPW), Hundred Kernels weight (HKW) and Shelling per cent (SP). The data analysis was carried over using TNAUSTAT software.

## Results and Discussion

The results on correlation coefficients are presented in tables 1 and 2.

Character	Height of Main Axis (cm)	No. of Branches	No. of Flowers Within 45 DAS	No. of Matured Pods Per Plant	Kernel Yield Per Plant (g)	Hundred Pods Weight (g)	Hundred Kernels Weight (g)	Shelling Percent (%)	Pod Yield Per Plant (g)
Height Of Main Axis (Cm)	1.000								
No. of Branches	0.001	1.000							
No. of Flowers Within 45 DAS	0.202*	0.163	1.000						
No. of Matured Pods Per Plant	0.251*	0.223*	0.941*	1.000					
Kernel Yield Per Plant(g)	0.222*	0.179	0.839*	0.902*	1.000				
Hundred Pods Weight(g)	0.061	0.084	0.141	0.127	0.181	1.000			
Hundred Kernels Weight(g)	0.029	-0.065	0.114	0.076	0.110	0.556*	1.000		
Shelling Percent (%)	-0.040	-0.138	-0.092	-0.097	-0.145	-0.854*	-0.060	1.000	
Pod Yield Per Plant(g)	0.263*	0.190	0.861*	0.930*	0.905*	0.156	0.075	-0.136	1.000

**Table 1:** Correlation coefficients between pod yield and yield component traits in Chinthamani variety during *rabi* 2021.

\*Significance at 5%, n = 200.

Character	Height of Main Axis (cm)	No. of Branches	No. of Flowers Within 45 DAS	No. of Matured Pods Per Plant	Kernel Yield Per Plant (g)	Hundred Pods Weight (g)	Hundred Kernels Weight (g)	Shelling Percent (%)	Pod Yield Per Plant (g)
Height Of Main Axis (Cm)	1.000								
No. of Branches	-0.476*	1.000							
No. of Flowers Within 45 DAS	-0.281*	0.123	1.000						
No. of Matured Pods Per Plant	-0.118	0.005	0.133	1.000					
Kernel Yield Per Plant(g)	0.001	0.153	0.087	0.673*	1.000				
Hundred Pods Weight(g)	-0.048	0.090	0.392*	0.227*	0.138	1.000			
Hundred Kernels Weight(g)	-0.126	0.049	0.370*	-0.04	0.356*	0.377*	1.000		
Shelling Percent (%)	0.075	-0.071	-0.135	0.150	0.394*	-0.323*	0.113	1.000	
Pod Yield Per Plant(g)	-0.104	0.322*	0.198*	0.668*	0.857*	0.260*	0.330*	-0.022	1.000

**Table 2:** Correlation coefficients between pod yield and yield component traits in Chinthamani variety during *kharif* 2021.

\*Significance at 5%, n = 200.

The trait pod yield per plant exhibited positively significant correlation with height of main axis, no of flowers within 45DAS, no of matured pods per plant and kernel yield during rabi season and number of branches, number of flowers within 45DAS, matured pods, kernel yield, hundred pods weight and hundred kernels weight during Kharif season indicating the influence of these traits on pod yield. Thus, increase in these traits would result in increase of pod yield and are useful as selection criteria for the improvement of the trait.

Similar results for positive correlation of these traits with pod yield was reported by [1-5]. For number of pods per plant and kernel yield [6-8] have reported significant positive correlation on pod yield in groundnut.

Especially for days to accumulation of 25 flowers and days to maturity, [7-9] have reported significant positive correlation on pod yield in groundnut.

Hundred pods weight and hundred kernels weight was positively significant in correlation with yield in kharif season. Earlier similar findings were reported by several authors [10-13].

Among the seasons studied in regarding to the inter associations, the trait number of flowers within 45DAS is found to be significantly associated to number of matured pods, kernel yield, hundred pods weight and hundred kernels weight and height of main axis is positively associated to number of flowers within 45DAS, number of matured pods per plant and kernel yield per plant in rabi season and negative correlation with number of branches and number of flowers within 45DAS in kharif season.

Note worthily number of branches recorded positive correlation towards number of matured pods per plant during *rabi* season. In the similar way, kernel yield during rabi season per plant exhibited positively significant association with number of matured pods and in kharif season shows positive significance with kernel yield and hundred pods weight and kernel yield per plant were inter related positively with hundred kernels weight and shelling percent during kharif season.

Hundred pods weight revealed positive interrelation with hundred kernel weight, and negatively significant correlation with shelling percent.

These results imply that selection for these inter-associated traits would bring up the improvement in the associated characters and in turn improvement of yield simultaneously.

The results on path analysis are presented in tables 3 and 4.

In the present study, the traits number of matured pods per plant exerted high direct effects on pod yield per plant in both the seasons. The other traits that impressed direct effects on pod yield include hundred pods weight and kernels yield during rabi season and shelling percent during kharif season. In a similar study [14-

Character	Height of Main Axis	No. of Branches	No. of Flowers Within 45das	No. of Matured Pods Per Plant	Kernel Yield Per Plant(g)	Hundred Pods Weight (g)	Hundred Kernels Weight(g)	Shelling Percent (%)	Pod Yield Per Plant(g)
Height of Main Axis	0.030	0.000	-0.017	0.175	0.076	-0.007	0.001	0.005	0.263*
No. of Branches	0.000	-0.017	-0.014	0.155	0.061	-0.009	-0.003	0.017	0.190
No. of Flowers Within 45 Das	0.006	-0.003	-0.085	0.656	0.286	-0.016	0.005	0.011	0.861*
No. of Matured Pods Per Plant	0.008	-0.004	-0.080	0.697	0.308	-0.014	0.004	0.012	0.930*
Kernel Yield Per Plant(g)	0.007	-0.003	-0.071	0.628	0.341	-0.020	0.005	0.017	0.905*
Hundred Pods Weight(g)	0.002	-0.001	-0.012	0.088	0.062	-0.111	0.026	0.103	0.156
Hundred Kernels Weight(g)	0.001	0.001	-0.010	0.053	0.038	-0.062	0.047	0.007	0.075
Shelling Percent (%)	-0.001	0.002	0.008	-0.068	-0.049	0.095	-0.003	-0.120	-0.136

**Table 3:** Direct and indirect effects as partitioned by path analysis of the variety Chinthamani during *rabi* 2021.

**Residual effect:** 0.3311.

Character	Height of main axis	No. of branches	No. of flowers within 45 DAS	No. of matured pods per plant	Kernel yield per plant	Hundred Pods weight	Hundred Kernels weight	Shelling per cent	Pod yield per plant
Height of main axis	-0.024	-0.003	0.001	0.001	-0.001	-0.001	0.009	-0.086	-0.104
No. of branches	0.021	0.006	-0.002	0.208	0.012	0.007	-0.013	0.083	0.322*
No. of flowers within 45 DAS	0.007	0.003	-0.003	0.094	0.001	0.039	-0.014	0.071	0.198*
No. of matured pods per plant	0.003	0.001	0	0.727	0.009	-0.009	0.002	-0.073	0.668*
Kernel yield per plant	0	0.001	0	1.08	0.006	0.005	-0.014	-0.191	0.857*
Hundred Pods weight	0.001	0.002	-0.001	0.149	-0.04	0.022	-0.03	0.157	0.260*
Hundred Kernels weight	0.005	0.002	-0.001	0.384	0	0.034	-0.039	-0.055	0.330*
Shelling per cent	-0.004	-0.055	0	0.425	0.109	-0.007	-0.004	-0.486	-0.022

**Table 4:** Direct and indirect effects as partitioned by path analysis of the variety Chinthamani during *kharif* 2021.

**Residual effect:** 0.4.

18] and Hoque and Chowdhury (1997) have reported direct effect of number of matured pods on pod yield.

In the concern of indirect effects number of branches effected positively on pod yield per plant through number of matured pods in both the seasons. The traits number of flowers within 45 DAS, height of main axis, number of branches and kernel yield per plant in the rabi season, affected the pod yield through number of matured pods per plant. In the kharif season the same effect was done by number of branches, kernel yield per plant, hundred pods weight, hundred kernels weight and shelling percentage through number of matured pods per plant. These findings are in line with that reported by [7,19,20].

The indirect effects of number of matured pods and number of flowers within 45DAS over pod yield per plant in the rabi season were revealed through kernel yield per plant.

Hundred pod weight imposed indirect effects through number of matured pods and shelling percentage on pod yield while shelling percentage exhibited indirect effects through number of matured pods and kernel yield per plant in the kharif season where the traits show significant correlation on pod yield.

The component of residual effect of path analysis is 0.3311 and 0.43. The lower values of residual effect indicated that the characters chosen for path analysis were adequate and appropriate.

The kernel yield exerted negative indirect effect through shelling percent in the kharif season.



Figure 1: Field view and the plant of Chintamani Groundnut cultivated in farmers field of Tenkasi.

**Conclusion**

In the present investigation it is inferred that, the traits number of matured pods per plant is the major yield contributing traits which have highest positive direct effects and indirect effects in-

dicating the scope of improving pod yield per plant by selection of these traits in the segregating material of the selected seasons. Also, the visible trait number flowers within 45 DAS could be good selection criteria for the improvement of yield.

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