Electronic Journal of Plant Breeding, 9 (3) : 1244 - 1246 (Sep 2018) DOI: 10.5958/0975-928X.2018.00154.0
ISSN 0975-928X

Research Note

Correlation and path analysis in large seeded groundnut genotypes

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(Received:17 May 2018; Revised:22 Jul 2018; Accepted: 20 Aug 2018)

Abstract
Groundnut is a self pollinated leguminous oilseed crop cultivated in 3.35 lakh ha in Tamil Nadu for oil and food purposes. It is rich in protein and provides nutritious fodder to live stock. Breeding for quality parameters in addition to yield enhances the economic returns to the farmers and other stakeholders along the value chain, the large seeded groundnut fetches higher price in the market because of its export potential. To develop an elite genotypes, knowledge on inter relationship among the yield and its component characters and direct and indirect contribution towards yield is an important. Hence, the present study was undertaken to assess the nature and magnitude of association between pod yield and its components characters in large seeded groundnut genotypes. Observations were recorded on following seven characters viz., days to 50% flowering, plant height, number of branches per plant, number of pods per plant, 100 kernel weight, sound mature kernel, and single plant yield. The trait sound mature kernel and 100 kernel weight had positive and significant association with pod yield per plant. The path analysis disclosed that the character plant height had the highest positive direct effects on sound mature kernel followed by number of pod per plant and 100 kernel weight. The results revealed that the direct selection for the above mentioned traits could improve the pod yield in large seeded groundnut.

Key words
Groundnut, Correlation, Path analysis

Groundnut is an important food crop and in recent year the confectionery types have assumed great significance as snack food in domestic and international markets. Hence, more emphasis should be given to improve and exploit groundnut as a food crop to make its farming more competitive and renumerative. Breeding for quality parameters in addition to yield enhances the economic returns of the farmers and other stake holders along the value chain. Studies have shown that high oil content in groundnut translated into economic benefits to both farmer and millers. Similarly, the produce with desirable traits for confectionery uses fetches higher price in the market because of its export value. The quality requirement of confectionery groundnut is more stringent and distinctly different from groundnut as an oil seed crop. Varieties suitable for confectionery uses that have high seed mass, desirable seed shape and flavor have been released in India and other countries and fetch more price in the market. In Tamil Nadu, the research objectives were targeted towards high yield and high oil content in the past years. But, the area under groundnut cultivation in Tamil Nadu is shrinking very fast. The main reason for this can be attributed to the arrival of other sources of oil and their marketability due to specific consumer preference. Groundnut cultivation can only be revived if its cultivation is more remunerative and attractive for domestic and export purposes.

Before initiating any breeding program, it is essential to obtain information regarding the interrelationship between various yield attributing characters with yield of the crop plants. A knowledge of association between yield and yield components will serve to make simultaneous selection for more characters. Groundnut is largely a small holder's crop, grown under rainfed conditions in semi arid region. To develop an elite genotypes, knowledge on inter relationship among yield and its component characters and direct and indirect contribution towards yield is important. Hence, the present study was undertaken to derive information on phenotypic, genotypic correlation, direct and indirect effects of yield components on large seeded groundnut genotypes.

Thirty elite large seeded groundnut genotypes were raised in a Completely Randomized Block Design with two replications at Oilseeds Research Station, Tindivanam, Tamil Nadu during *Kharif* 2015 under irrigated conditions. Each genotype was raised in a single row of 3 m in length with a spacing of 30cm between the rows and 10 cm between the plants within a row. Observations were recorded on five randomly selected plants from each genotype/replication for the following seven traits

viz., days to 50% flowering, plant height, number of branches per plant, pods per plant, sound mature kernel, 100 kernel weight and single plant yield. The genotypic and phenotypic correlations coefficients (Singh and Chaudhary, 1979) and path analysis were worked out using the technique outlined by Dewey and Lu, 1959.

Analysis of variance revealed that all the entries were significantly different for the characters studied. The genotypic and phenotypic correlation coefficients for seven characters are presented in Table 1. The genotypic correlations were higher than their corresponding phenotypic correlations which may be due to modifying effect of environment on association of characters at genetic level. Pod yield had highly significant and positive association with sound mature kernel and 100 kernel weight. Similar results were obtained by Ladole *et al*., (2009).This reveals the importance of those components in increasing the single plant yield. The highest degree of association between number of pods per plant, sound mature kernel, 100 kernel weight and single plant yield was the most reliable component of yield and could be very well utilized as an indicator of yield. The earlier studies also indicate the importance of sound mature kernel as one of the important yield component (Parameswarappa *et al.*, 2008; Rosemary and Ramlingam, 1997). The traits sound mature kernel and 100 kernel weight showed significant and positive inter correlations among themselves. Similar results were recorded by Reddy and Gupta (1992). Days to 50% flowering had significant negative association with branches per plant, number of pods per plant. The number of branches per plant had negative and significant association with 100 kernel weight but positive association with number of pods per plant. Sound mature kernel had positive and significant correlation with 100 kernel weight. The path coefficient analysis on genotypic correlation in respect of pod yield is given in Table 2. The direct effect was high and positive for number of pods per plant, sound mature kernel, 100 kernel weight followed by plant height and days to 50% flowering. The indirect effect of sound mature kernel and 100 kernel weight through were positive. These results are in conformity with Parameswarappa *et al*. (2008). It could be inferred that reliance on number of pod per plant followed by sound mature kernel and 100 kernel weight will result in improvement of single plant yield in large seeded types in groundnut.

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Table 1. Phenotypic (P) and genotypic (G) correlation coefficients among biometrical traits in groundnut

Genotypic correlation / Phenotypic correlation	Days to 50% flowering	Plant height (cm)	Number of branches per plant	Number of pods per plant	Sound mature kernel (%)	100 kernel weight (g)	Single plant yield (g)
Days to 50% flowering	1.000	-0.205*	-0.452*	-0.720**	1.088**	0.454*	-0.040
	1.000	-0.170	-0.164	-0.109	0.176	0.254	0.074
Plant height (cm)		1.000	0.027	0.126	0.256	-0.089	-0.121
		1.000	-0.032	0.089	-0.060	-0.057	-0.288
Number of branches per plant			1.000	0.815**	-0.070	-0.372*	-0.019
			1.000	0.633**	-.0.066	-0.236	-0.045
Number of pods per plant			1.000	1.000	-0.063	-0.300	0.213
				1.000	-0.007	-0.183	0.156
Sound mature kernel (%)					1.000	0.906**	0.814**
					1.000	0.555**	0.207
100 kernel weight (g)						1.000	0.234
						1.000	0.091
Single plant yield (g)							1.000
							1.000

* Significant at P=0.05% level

Table 2. Path coefficients between yield and yield components in groundnut

Characters	Days to 50% flowering	Plant height (cm)	Number of branches per plant	Number of pods per plant	Sound mature kernel	100 kernel weight (g)	Genotypic correlation with pod yield
Days to 50% flowering	**0.467**	-.0867	0.431	-0.769	1.108	-0.409	-0.040
Plant height (cm)	-0.983	**0.412**	-0.025	0.135	0.260	0.079	-0.121
Number of branches per plant	0.211	0.010	**-0.954**	0.871	-0.070	0.335	-0.019
Number of pods per plant	-.0.336	0.052	-0.778	**1.07**	-0.064	0.271	0.213
Sound mature kernel (%)	0.509	0.105	0.0664	-0.066	**1.019**	0.817	0.814**
100 kernel weight (g)	0.212	-0.036	0.354	-0.321	0.922	**0.903**	0.230

Residual effect: 0.448 *Significant at P=0.05 level, Bold values are direct effects and all others are indirect effects