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Research Note

Genetic Divergence Analysis in Groundnut (*Arachis hypogaea* L.)

Yaikhom Vivekananda, Pramesh Khoyumthem and N. Brajendra Singh
Department of Plant Breeding and Genetics, College of Agriculture,
Central Agricultural University, Imphal-795004
Email: boneybi@gmail.com

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Abstract
Genetic diversity among 31 genotypes of groundnut were estimated using Mahalanobis D^2 statistic for five agro-morphological characters. The analysis of variance revealed significant differences among the genotypes for all characters. Based on Tocher's method, 31 genotypes were grouped into seven clusters, where cluster I was the largest containing 11 genotypes followed by cluster II and III with 7 genotypes each. The inter-cluster distance was maximum between cluster I and cluster VI followed by cluster I and cluster V, cluster III and VI and cluster I and IV. Considering the cluster distances and cluster means the genotypes from cluster I, III, V and VI could be selected for hybridization programme.

Keywords
Groundnut, D^2, genetic divergence,

Groundnut is one of the important oilseeds crop grown among the world. It is native to South America and it belongs to the family 'Leguminosae'. It is a self-pollinated crop, allotetraploid with diploid chromosome number 2n = 40. It has wide variety of uses *viz*., kernel directly used for table purposes or can be crushed for oil, vine with leaves as fodder and shell can be made to particleboard. Groundnut oil contains 46 and 32 percent of monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA) respectively. Rasmussen *et al.* (1993) noted a reduction in peak plasma glucose concentration with the consumption of a monounsaturated fatty acid-rich diet.

Assessment of genetic diversity is an important step in any crop improvement programme and it plays an important role because of hybrids between genetically diverse parents manifest greater heterosis than those between more closely related parents (Arunachalam *et al.*, 1981). In order to have an improved line we need to have good diverse parental lines with favourable traits. Thus, present experiment was carried out to assess the nature and magnitude of genetic diversity present in 31 groundnut genotypes.

The experiment consisting of 31 genotypes for 5 agro-morphological traits was conducted in a randomized block design with four replication at the Research Farm of Central Agricultural University, Imphal during *Kharif* season (2012-13). Each genotype was grown in a raised bed having plot size of 5 x 1.5 m^2 with a spacing of 30 cm x 10 cm. Recommended package of practices were followed to raise the crop. The data of 5 agro-morphological characters *viz.* days to maturity, dry pod yield per plant (g), shelling (%), 100-kernel weight (g), oil (%) were recorded. The genetic diversity between genotypes was worked out using Mahalanobis D^2 (1936) extended by Rao (1952). On the basis of D^2 values the genotypes were grouped into clusters according to Tocher's method (Rao, 1952). The method of Singh and Chaudhary (1985) were used to calculate the intra and inter-cluster distances. The contribution of individual character towards divergence was estimated using Singh (1981). All the statistical calculations were done using GENES software (Cruz, 2001).

The 31 genotypes of groundnut were grouped into seven clusters based on D^2 value (Table 1). Among the clusters, cluster I contained maximum number of genotypes (11 genotypes), cluster II and III contained 7 genotypes each, cluster IV and V contained 2 genotypes and cluster VI and VII contained 1 genotypes each.

The inter-cluster distance (Table 2) were larger than the intra-cluster distance which indicated that greater diversity is present among the genotypes of distant group (Zaman *et al.*,2010). The inter-cluster distance analysis shows that the maximum divergence was observed between cluster I and cluster VI (1890.60). The inter-cluster distance between cluster I and cluster V(1299.79), cluster III and cluster VI (1043.33), cluster I and cluster IV(1023.12) were relatively high as compared to other so the genotypes in these clusters can be utilized for selection of parents for hybridization. Minimum inter-cluster distance was observed between cluster V and cluster VI (81.23) followed by cluster II and cluster V (91.46). The highest intra-cluster distance was observed in cluster V (66.22) followed by cluster IV (53.17) and lowest intra-cluster distance was observed in cluster VI (0.00) and cluster VII (0.00).

The cluster mean value (Table 3) for days to maturity was highest in cluster VII (124 days), the cluster mean value of cluster VI were highest for dry pod yield per plant (16.25 g) and 100- kernel weight (75.6 g), cluster I and cluster II have highest cluster mean for oil % (51.27) and shelling % (73.74) respectively.

Contribution of character towards divergence (Table 4) was observed maximum in 100-kernel weight (63.14%) followed by dry pod yield per plant (34.27 %) and minimum in shelling % (0.55 %). Ravi Kumar *et al.* (2012) and Venkateswarlu *et al.* (2011) also recorded the similar results in groundnut where 100-kernel weight contributed maximum towards the total divergence of the genotypes. It has been suggested that the character with

maximum contribution towards divergence should be given importance for undergoing hybridization programme.

Considering the cluster distances and cluster means in the present investigation, emphasis should be given to genotypes belonging cluster I , III, V and VI for selection of parents for hybridization programme.

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Table 1. Distribution of 31 groundnut genotypes in different clusters

Cluster No.	No. of genotypes	Name of the genotypes
I	11	CTMG 7, K 1392, R 2001-2, J 71, Dh 218, CSMG 2006-6, TCGS 876, TG 68, RTNG 2, OG 52-1, ICGV 00351
II	7	RG 578, ICGS 76, HNG 137, K 1451, JSP 49, ICGV 87846, JSSP 36
III	7	UG 6, K 1470, PBS 30086, K 1333, TCGS 901 A, RTNG 1, K 1463
IV	2	JSSP 37, BAU 13
V	2	RG 530, K 1468
VI	1	CSMG 2006-26
VII	1	JSP 48

Table 2. Average intra-cluster (bold) and inter-cluster distances D^2 values

Cluster	I	II	III	IV	V	VI	VII
I	**37.32**						
II	850.51	**44.69**					
III	230.53	410.25	**35.22**				
IV	1023.12	291.22	339.07	**53.17**			
V	1299.79	91.46	658.23	277.03	**66.22**		
VI	1890.60	254.18	1043.33	391.65	81.23	**0.00**	
VII	563.44	92.20	172.54	178.04	203.33	423.83	**0.00**

Table 3. Cluster means of different characters in groundnut genotypes

	Days to maturity	Dry pod yield per plant(g)	Shelling(%)	100-kernel weight(g)	Oil(%)
Cluster I	121.56	8.64	67.90	40.10	51.27
Cluster II	121.86	14.48	72.87	61.64	49.86
Cluster III	121.86	8.82	68.28	53.73	49.86
Cluster IV	121.50	10.26	69.26	70.30	49.00
Cluster V	121.50	15.23	73.74	68.55	49.00
Cluster VI	123.00	16.25	72.35	75.60	48.00
Cluster VII	124.00	12.13	69.68	60.20	46.00

Table 4. Relative contribution of each character towards divergence

Character	Contribution(%)
Days to maturity	1.20
Dry pod yield per plant(g)	34.27
Shelling (%)	0.55
100-kernel weight(g)	63.14
Oil (%)	0.84