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Variability and Heritability studies in Groundnut (*Arachis hypogaea* L.)

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ABSTRACT

The experiment was conducted with an objective to know the variability, heritability and genetic advance of fifty Groundnut genotypes for fifteen quantitative characters. Analysis of variance revealed significant amount of variability for all the characters studied. Moderate to high variability and high heritability coupled with high genetic advance as per cent of mean was observed for number of primary branches per plant, number of secondary branches per plant, number of mature pods per plant, pod yield per plant, kernel yield per plant, 100 kernel weight, total dry matter per plant and harvest index, indicating the predominance of additive gene action and hence, direct phenotypic selection may be useful with respect to these traits. High heritability coupled with low genetic advance as per cent of mean was observed for the characters, oil content and protein content indicating that these characters were more influenced by environment and governed by non- additive gene action which may be exploited through breeding methods involving hybridization programme.

Key words: Genetic advance, Groundnut (*Arachis hypogaea* L.), Heritability, Variability.

Groundnut is an important edible oil (46-50%) as well as direct consumption by people. The amount of variability present in the population is a prerequisite for selecting desirable genotypes, hence critical analysis of the genetic variability parameters *viz.,* genotypic coefficient of variation and phenotypic coefficient of variation is essential. Along with variability, the estimates of heritability help the plant breeder in determining the character for which selection would be rewarding. The major function of heritability estimates is to provide information on transmission of characters from the parents to the progeny. Heritability estimates along with genetic advance are normally more helpful in predicting the genetic gain under selection than heritability estimates alone. Thus the present study was conducted to know the Variability parameters for yield and yield contributing traits in groundnut.

MATERIAL AND METHODS

The material for the present investigation comprised of fifty genotypes of groundnut grown in randomized block design with three replications at Agricultural college, Naira during *rabi*, 2015.Observations were recorded for fifteen quantitative characters, viz., days to 50% flowering, days to maturity, plant height, primary branches per plant, secondary branches per plant, mature pods per plant, immature pods per plant, pod yield per plant, kernel yield per plant, shelling percentage, 100- kernel weight, total dry matter per plant, harvest index, oil content, protein content, and subjected to statistical analysis on genetic parameters such as phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV) using the formulae given by Burton (1952), heritability in broad sense was calculated using the formula given by Hanson *et al.* (1956) and genetic advance as per cent of mean was estimated by formula suggested by Johnson *et al*. (1955).

RESULTS AND DISCUSSION

The analysis of variance revealed significant differences among the genotypes for all the characters studied indicating a high degree of variability in the material (Table 1). The genotypic coefficient of variance (GCV) values were close to phenotypic coefficient of variance (PCV) which indicated less influence of environment on expression of these traits (Table 2).

High PCV and moderate GCV were recorded for kernel yield per plant while low PCV and GCV were recorded for days to 50% flowering, days to maturity, oil content and protein content. Similar result was also reported by Teja *et al.* (2014). Moderate PCV, GCV were recorded for

Table 1. Analysis of variance for 15 characters for 50 genotypes of Groundnut.

		Mean sum of squares							
S. No	Source	Degree of freedom	Days to 50% flowering	Days to maturity	Plant height (cm)	Primary Branches Per plant	Secondary Branches Per plant	Mature Pods per plant	Im mature Pods per plant
1	Replications	2	2.4466	0.886	1.369	0.671	0.131	5.446	0.406
2	Treatments	49	13.521**	87.715**	27.937**	4.345**	15.178**	23.401**	2.794**
3	Error	98	1.228	4.791	1.837	0.564	0.163	4.507	0.967

Mean sum of squares							
Pod yield per plant (g)	Kernelyield per plant (g)	Shelling %	100 kernel weight (g)	Dry matter per plant (g)	Harvest index	Oil content (%)	Protein content (%)
0.996	3.213	25.465	25.205	13.670	8.907	0.029	0.036
70.297**	24.101**	150.993**	133.215**	202.951**	145.961**	4.158**	1.428**
3.379	4.373	34.752	14.475	6.533	11.764	0.114	0.022

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

Table 2. Estimates of genetic variability parameters of yield component attributes in groundnut.

S.No	Characters	Genotypic coefficient of variation (%)	Phenotypic coefficient of variation (%)	Heritability (%)	Genetic advance	Genetic advance as per cent of mean
1	Days to 50% flowering	6.37	7.26	76.9	3.65	11.51
2	Days to maturity	4.43	4.80	85.2	9.99	8.43
3	Plant height (cm)	9.46	10.42	82.6	5.52	17.72
4	No.of primary branches/ plant	15.91	19.15	69.1	1.92	27.24
5	No.of secondary branches/ plant	64.90	65.96	96.8	4.53	131.57
6	No.of mature pods / plant	11.47	15.03	58.3	3.94	18.04
7	No.of im mature pods / plant	11.89	18.86	39.8	1.02	15.45
8	Pod yield / plant(g)	19.98	21.44	86.8	9.06	38.36
9	kernel yield / plant(g)	16.49	21.28	60.1	4.09	26.33
10	Shelling %	9.37	12.90	52.7	9.31	14.01
11	100 kernel weight(g)	13.38	15.64	73.2	11.09	23.60
12	Dry matter / plant(g)	16.27	17.07	90.9	15.89	31.97
13	Harvest index	14.01	15.75	79.2	12.26	25.69
14	Oil content %	2.48	2.58	92.2	2.29	4.90
15	Protein content %	2.78	2.85	95.4	1.37	5.61

PCV = Phenotypic coefficient of variation GCV = Genotypic coefficient of variation

number of primary branches per plant, number of mature pods, dry matter per plant, harvest index, earlier by Vasanthi *et al.* (2012). Thus, the study indicates that there is considerable amount of variability for majority of the characters studied.

Heritability estimates were high for days to 50% flowering, days to maturity, plant height, secondary branches per plant, pod yield, oil content and protein content similar result was also obtained by John *et al.* (2011), while mature pods and shelling % recorded moderate heritability. The maximum value for heritability was recorded by the trait secondary branches per plant (96.8%) and minimum was recorded by number of immature pods per plant (39.8 %).

Heritability estimates along with genetic advance are more helpful in predicting the genetic gain under selection than heritability estimates alone. Heritability and genetic advance as per cent of mean were high for the characters *viz.,* secondary branches per plant, pod yield per plant, kernel yield per plant, 100-kernel weight, and dry matter per plant indicating that these characters were less influenced by environment and governed by additive gene action which may be exploited through breeding methods involving simple selection. This result was in agreement with the findings of Rajesh *et al.* (2012). High heritability coupled with moderate genetic advance as per cent of mean was observed for days to 50% flowering, plant height.

High heritability coupled with low genetic advance as per cent of mean was observed for the characters, oil content and protein content indicating that these characters were more influenced by environment and governed by non- additive gene action which may be exploited through breeding methods involving hybridization programme. While moderate heritability coupled with moderate genetic advance as per cent of mean was observed for number of mature pods per plant, shelling% indicating the role of both additive and non-additive gene actions in the inheritance of these traits. This result was in agreement with the findings of Dolma *et al.* (2010).

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