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Research Article

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Genetic Variability Studies and Estimation of Genetic Parameters for Seed Yield and Its Component Characters in Groundnut (*Arachis hypogaea* L.)

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ABSTRACT

Nineteen advance breeding lines of groundnut were evaluated in randomized block design with three replications for variability, heritability and genetic advance during kharif 2018. Observations on eight characters were recorded. Analysis of variance revealed significant differences among the genotypes for all the characters. High GCV accompanied by high heritability and high GAM were obtained for dry pod yield and kernel yield indicating predominant role of additive gene action and amenability for phenotypic selection. High heritability accompanied by low GCV and moderate GAM were obtained for Shelling % indicating major role of non additive gene action and it was not responsive for phenotypic selection. Moderate heritability and low GCV, GAM were registered for Days to maturity and sound mature kernel % indicating that additive and non-additive gene actions have a role in their inheritance and phenotypic selection would be effective to some extent. low heritability and low GAM were registered for days to 50% flowering, 100 kernel weight and dry haulm yield indicating that role of environment on the expression of above characters which cannot be effective for selection.

Keywords: *Genetic variability, Heritability, Genetic advance as percentage of mean and Groundnut.*

INTRODUCTION

Groundnut is the second most important edible oil seed crop after rice in Andhra Pradesh in terms of acreage and economy. It is being cultivated in 8.74 lakh ha with a production of 4.93 lakh tonnes. More than 80% of the area is under rainfed situation in *kharif* season. Average *kharif* productivity is 564 kg/ha which is much lower than national average productivity of 1712 kg/ha. This is mainly due to cultivation of groundnut in rainfed situation in marginal soils of poor fertility and improper management. The main constraint in this situation is moisture stress at different stages of crop growth with no fixed pattern due to erratic distribution of rainfall. In some years, excess moisture at later stages especially at pod filling phase affects filling and quality of the produce.

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Genetic variability is the basic requirement for crop improvement as this provides wider scope for selection. Thus, effectiveness of selection is dependent upon the nature, extent and magnitude of genetic variability present in material and the extent to which it is heritable. However, the assessment of variation made on truly diverse germplasm provides the correct picture of the extent of variation which would help in assessing the variability and factors for limited progress made in groundnut. The pre-requisite for bringing yield improvement is to identify the genotypes with high variability. Genetic variability among traits is important in selecting desirable types. Genetic parameters such as genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) are useful in detecting the amount of variability present in the germplasm. Heritability coupled with high genetic advance would be more useful tool in predicting the resultant effect in selection of the best genotypes for yield and its attributing traits. Keeping this in view, the present investigation was undertaken involving 19 genotypes of groundnut to assess the genetic variability and heritability for seed yield and yield components.

MATERIALS AND METHODS

The field experiment was carried out at Agricultural Research Station, Kadiri, Anantapuramu district of Andhra Pradesh during *kharif* 2018. The experimental material comprised of nineteen advanced breeding lines and the plot size consisted of 7 rows of 5m length with a spacing of 30 × 10cm. The observations were recorded for days to 50% flowering, days to maturity, shelling %, kernel yield, dry pod yield, 100 kernel weight, Sound mature kernel %, dry haulm yield. Analysis of variance was carried out as per the method suggested by Panse and Sukhatme (1979). Phenotypic and genotypic coefficients of variation were computed as per Burton (1952), heritability (broad sense) and genetic advance as followed as per Allard (1960).

RESULTS AND DISCUSSION

The analysis of variance for eight characters in nineteen genotypes during *kharif* 2018 showed significant differences for all the traits studied viz., days to 50% flowering, days to maturity, shelling %, kernel yield, dry pod yield, 100 kernel weight, Sound mature kernel %, dry haulm yield. (Table1). In the present investigation the genetic parameters, genotypic co-efficient of variation (GCV), phenotypic co-efficient of variation (PCV), heritability [h2 (b)] and genetic advance as percentage of mean (GAM) were estimated for yield, yield attributes among nineteen advance breeding lines of groundnut. High GCV accompanied by high heritability and high GAM were obtained for dry pod yield and kernel yield indicating predominant role of additive gene action and amenability for phenotypic selection.

High heritability recorded for dry pod yield followed by kernel yield and shelling % indicated that there is least influence of environment on the expression of the traits. Therefore for improving these traits simple selection will be more effective in early generations on the basis of per se performance. High heritability for dry pod yield suggests that straight selection based on pod yield alone would be effective for bringing improvement. Similar results were obtained for dry pod yield by john et al. (2013) and saritha et al. (2018) and for kernel yield and shelling % by anamika roy et al. (2018).

Moderate estimates of heritability along with low GCV and GAM were recorded for days to maturity and SMK% suggested that greater influence of genetic causes in the inheritance of the traits. Simple selection would help to fix these traits. Anamika roy et al. (2018) found the similar results for days to maturity. The low GCV accompanied by low Heritability and genetic advance as per cent mean observed for days to 50% flowering, 100 kernel weight and dry haulm yield. Hence, simple selection may not be effective and hence these characters could be improved by intermating of selected superior genotypes through recombination breeding.

Table 1: Analysis of variance for the characters studied

Sl. No.	Character(s)	Mean sum of squares		
		Replications (df: 2)	**Treatments (df: 18)**	**Error (df: 36)**
1	**Days to 50% flowering**	15.84	13.35	8.28
2	**Days to maturity**	49.7	74.6	27.83
3	**Shelling %**	30.33	105.87	15.2
4	**Kernel Yield**	43436.01	397657.4	71158.14
5	**Dry Pod yield**	21537.38	942356.34	143770.64
6	**100 Kernel Wt**	15.28	37.91	19.02
7	**SMK%**	15.07	38.69	16.66
8	**Dry Haulm yield**	8037222.6	4249355.7	3908675.23

Table 2: Mean, coefficient of variability, heritability (broad sense), genetic advance as per cent of mean for eight characters of groundnut

Sl. No.	Character(s)	Mean	Range		Variance		Coefficient of Variation		Heritability (Broad sense) (%)	Genetic advance (GA)	Genetic Advance as percent of mean (%)
			Min.	Max.	Genotypic	Phenotypic	Genotypic	Phenotypic			
1	**Days to 50% flowering**	30.31	22	35	1.69	9.97	4.29	10.42	16.95	1.10	3.63
2	**Days to maturity**	123.82	106	134	15.59	43.42	3.19	5.32	35.91	4.87	3.93
3	**Shelling %**	64.92	1120	3654	30.22	45.42	8.47	10.38	66.54	9.24	14.22
4	**Kernel Yield**	1594.08	51	78	108833.09	179991.23	20.70	26.61	60.47	528.45	33.15
5	**Dry Pod yield**	2475.87	787	2745	266195.23	409965.87	20.84	25.86	64.93	856.43	34.59
6	**100 Kernel Wt**	29.92	20	43	6.30	25.32	8.39	16.82	24.87	2.58	8.61
7	**SMK%**	87.24	76	95	7.34	24.00	3.11	5.62	30.59	3.09	3.53
8	**Dry Haulm yield**	5595.42	1460	9658	113560.16	4022235.39	6.02	35.84	2.82	116.64	2.08

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