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Genetic Variability, Heritability and Genetic Advance of Yield and Related Traits of Spanish Bunch Groundnut (*Arachis hypogaea* L.)

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ABSTRACT

Forty eight diverse genotypes of Spanish bunch groundnut were evaluated during kharif in 2018 to assess the variability, heritability and genetic advance as per cent of mean for nine characters viz., Initial plant stand per plot, Final plant stand per plot, days to maturity, shelling percentage, 100 kernel weight (g), kernel yield per plot (g), biological yield per plot (g), pod yield per plot (g) and Sound mature kernel percent The results revealed that high PCV and GCV was observed for pod yield per plot (g), kernel yield per plot (g) and biological yield per plot (g). High heritability accompanied with high genetic advance as per cent of mean was recorded for kernel yield per plot (g), biological yield per plot (g), pod yield per plot (g) and 10 kernel weight indicated the preponderance of additive gene action which may be exploited through simple selection methods.

Keywords: *Genetic advance, Groundnut, Heritability, Pod yield, Variability.*

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is a predominant oilseed crop in India ranking first among the edible oilseed groups. Groundnut kernels are the rich source of edible oil (40-55%) and proteins (22-28%). Its cake is used as feed or for making other food products and haulms provide quality fodder. Genetic variability is the prerequisite for crop improvement, as this provides wider scope for selection. The success of any breeding programme depends upon the quantum of genetic variability present in the population. Wider range of genetic variability helps in selecting desired genotypes Heritability estimates are used to determine the amount of variation present in the population. Heritability combined with genetic advance will bring out the genetic gain expected from selection. Therefore, it is necessary to have knowledge of genetic variability, heritability and genetic advance as per cent of mean present in the available genotypes. Hence, in present investigation an attempt was made to determine the performance of 48 Spanish bunch genotypes to assess the variability of important traits.

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MATERIALS AND METHODS

The experimental material comprised of forty eight Spanish bunch groundnut genotypes. The experiment was laid out in randomized block design with four replications at Agricultural Research Station, Kadiri during *Kharif* 2018. Each entry was accommodated in eight rows of 5.0 m length with a spacing of 30 × 10 cm. Observations were recorded on nine characters like Initial plant stand per plot, Final plant stand per plot, days to maturity, shelling percentage, 100 kernel weight (g), kernel yield per plot (g), biological yield per plot (g), pod yield per plot (g) and Sound Mature kernel percent, The data were subjected to statistical analysis and genetic parameters such as phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability and genetic advance as per cent of mean were worked out as per Johnson et al. (1955) and Hanson (1963).

RESULTS AND DISCUSSION

The analysis of variance revealed significant differences among all the 48 genotypes for all the characters studied, indicating a high degree of variability in the material (Table 1). Perusal of the components of variance revealed that the phenotypic coefficient of variation (PCV) were higher than genotypic coefficient of variation (GCV) for all the characters studied indicating the role of environmental variance in the total variance (Table 2). High PCV and GCV was exhibited by pod yield per plot (g), kernel yield per plot (g) and biological yield per plot (g) indicating the greater variability and scope for improvement of high yielding genotypes with desirable character. These results were in accordance with the findings of Thirumala Rao (2016). Moderate PCV and GCV was recorded 100 kernel weight indicated the greater role of environment interaction with genotype in the expression of variability. These results were in accordance with the findings of Zaman et al. (2011) for number. of mature pods per plant and 100 kernel weight, while days to maturity, shelling percentage, initial plant stand per plot, final plant stand per plot and SMK percent exhibited low PCV and GCV indicated the presence of low variability among the tested genotypes.

Heritability estimates were high for; Initial plant stand per plot, Final plant stand per plot, days to maturity, shelling percentage, 100 kernel weights (g), kernel yield per plot (g), biological yield per plot (g), pod yield per plot (g) and Sound Mature kernel percent indicated little influence of environment on the inheritance of these characters. Similar result was obtained by Pradan and Patra, (2011). The maximum value for heritability was recorded for initial plant stand per plot (98 %) and minimum for Sound mature kernel percent (54%). Heritability estimates along with genetic advance as per cent of mean are more helpful in predicting the gain under selection than heritability estimates alone. The estimates of heritability and genetic advance as per cent of mean were high for, kernel yield per plot (g), biological yield per plot (g), pod yield per plot (g) and 10 kernel weight indicated that these characters were less influenced by environment and governed by additive gene action which may be exploited through simple selection methods. These findings were in agreement with Thirumala Rao, (2016) and Zaman et al. (2011). High heritability coupled with moderate genetic advance as per cent of mean was observed for days to maturity. Shelling percent and final plant stand per plot indicated the role of both additive and non-additive gene actions in the inheritance of these traits and improvement can be brought about using breeding methods like diallel selective mating or bi-parental mating followed by selection in advanced generation, whereas, initial plant stand per plot and Sound mature kernel percent expressed moderate heritability accompanied with low genetic advance as per cent of mean indicating these traits are governed by non-additive gene action with little influence of environment in its inheritance. The traits controlled by non-additive gene action can be improved by hybrids and inter-mating among selected ones in early generation followed by selection.

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 maturity	0.019	35.69	0.016
2	Initial plant stand per net plot	145.96	381.77	-
3	final plant stand per net plot	156.09	415.50	-
4	Shelling %	11.85	85.85	4.81
5	Kernel Yield	16018.6	109848.86	7458.13
6	Dry Pod yield	13645.48	277195.47	5143.6
7	100 Kernel Wt	14.13	94.21	2.3
8	SMK%	16.312	32.340	50554
9	Dry Haulms yield	10778.47	1180258.46	9505.42

Table2. Estimation of mean, range, genotypic and phenotypic coefficients of variation, heritability, genetic advance and geneticadvance as per cent of mean in 48 Spanish bunch groundnut genotypes in *Kharif* 2018

Character	Mean	Range		GCV	PCV	Heritability (%)	Genetic advance	GA as % of mean
		Min.	Max.					
Initial plant stand per plot	116	110	122	2.56	2.58	98	6.15	5.28
Final plant stand per plot	134	101	142	6.27	7.57	70	14.48	10.78
Days to maturity	131	91	140	7.44	7.95	88	18.91	14.36
Biological yield per plot (g)	1859	992	3152	29.09	29.56	96	1096	58.99
Pod yield per plot (g)	1040	735	1731	25.03	25.94	93	5517	49.75
Shelling (%)	66	57	77	6.78	7.54	80	8.34	12.55
Kernel yield per plot (g)	690	445	2012	23.16	26.32	77	290	41.99
100 kernel weight (g)	27	17	36	17.22	18.06	90	9.34	33.83
SMK (%)	92	82	97	2.80	3.80	54	3.94	4.27

GCV= Genotypic coefficient of variation, PCV= Phenotypic coefficient of variation
GA= Genetic advance

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