Research Note

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GENETIC VARIABILITY STUDIES FOR YIELD AND YIELD ATTRIBUTES IN LARGE SEEDED GENOTYPES OF GROUNDNUT (*Arachis hypogaea* L.)

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ABSTRACT

The genetic parameters namely, variability, heritability and genetic advance as per cent of mean, were estimated for 32 groundnut genotypes during *Kharif*, 2025. Among the 15 characters studied, the number of mature pods plant^{-1} and pod yield plant^{-1} exhibited high phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV), indicating the presence of substantial genetic variability for these traits. High heritability coupled with high genetic advance as percent of mean was observed for dry haulm yield plant^{-1}, number of mature pods plant^{-1}, pod yield plant^{-1}, kernel yield plant^{-1}, number of primary branches plant^{-1} and harvest index. This suggests the predominance of additive gene action in the inheritance of these traits. Therefore, direct selection for these characters would be effective in improving pod yield plant^{-1} in groundnut.

KEYWORDS: Genetic variability, groundnut, heritability, large-seeded and oilseed.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is one of the most important oilseed-cum-food legume crops cultivated in tropical and subtropical regions of the world. It is valued for its high nutritional content, with kernels containing approximately 45-50 per cent oil and 25-30 per cent protein, making it an important source of edible oil, food and livestock feed. In India, groundnut crop occupies about an area of 53.51 lakh hectares and a production of about 120.91 lakh tonnes, productivity of about 2260 kg hectare^{-1} (Indiastat 2026). Large seeded groundnut genotypes have gained considerable importance due to their superior market preference, higher kernel recovery and suitability for confectionery purposes. These genotypes generally possess greater 100-kernel weight and attractive pod characteristics, which fetch premium prices in domestic and international markets. Large-seeded varieties are particularly preferred by the food processing industry because of their better roasting quality, uniform kernel size, and enhanced consumer acceptability. Furthermore, the incorporation of large seed size into high-yielding cultivars has become an important objective in groundnut breeding programmes aimed at improving both productivity and market value.

The present investigation was carried out with the objective to estimate the genetic variability, heritability coupled with genetic advance as percent of mean for yield and yield component traits which can support the ongoing and future groundnut breeding programs.

MATERIAL AND METHODS

The material used for the present investigation comprised of 32 groundnut genotypes. This was evaluated in randomized block design with two replications at dryland farm of S.V. Agricultural college, Tirupati during rainy season (*Kharif* 2025). Each genotype was grown in three rows of 5 m length, with a spacing of 30 cm between rows and 10 cm between plants. Standard agronomic and plant protection practices were uniformly followed throughout the crop season to ensure a healthy crop. The five plants were randomly selected from each genotype in both replications. The randomly selected plants were used for recording the plant height, number of primary branches plant^{-1}, number of mature pods plant^{-1}, hundred pod weight, hundred kernel weight, shelling percentage, sound mature kernel per cent, dry haulms yield plant^{-1}, harvest index, kernel yield plant^{-1}, pod yield plant^{-1}. Oil and protein content were estimated using the Near Infrared Spectroscopy. The analysis of variance (Panse and Sukhatme, 1967) was estimated using R software. The mean, range, genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV) were calculated by the formula given by Burton (1952); heritability (%) in broad sense was worked out by using the formula of Lush (1940) and genetic advance as per cent of mean was estimated by the procedure given by Johnson *et al.* (1955).

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Table 1. Estimation of genetic parameters for yield and yield attributes in large seeded genotypes of groundnut

S. No.	Characters	Mean	Range		Variance		Coefficient of variation		Heritability (Braod sense) (%)	Genetic advance (GA)	Genetic advance as percent of mean (%)
			Min.	Max.	Genotypic	Phenotypic	Genotypic	Phenotypic			
1.	DFF	32.03	27.00	36.00	4.29	7.00	6.47	8.26	61.31	3.34	10.43
2.	DM	111.97	104.00	117.00	15.25	16.57	3.49	3.64	92.04	7.72	6.89
3.	PH	45.48	31.62	50.00	13.03	17.74	7.94	9.26	73.48	6.37	14.01
4.	NPB	5.93	4.20	8.25	0.90	1.27	16.05	19.03	71.07	1.65	27.89
5.	NMP	14.69	9.90	25.23	11.75	14.11	23.34	25.58	83.21	6.44	43.88
6.	HPW	132.39	164.39	113.50	96.63	166.66	7.42	9.75	57.98	15.41	11.64
7.	HKW	47.48	39.41	55.59	8.47	25.00	6.19	10.54	33.86	3.48	7.37
8.	SP	60.51	51.45	76.68	15.15	36.35	6.43	9.96	41.68	5.17	8.55
9.	SMK	88.88	78.25	95.16	12.72	17.50	4.01	4.70	72.67	6.23	7.04
10.	DHY	29.01	28.77	44.59	28.77	33.68	18.49	20.00	85.42	10.21	35.20
11.	HI	39.32	29.04	55.52	31.00	44.60	14.16	16.98	69.52	9.56	24.33
12.	KYP	11.32	7.05	17.41	5.09	6.95	19.94	23.30	73.27	3.98	35.17
13.	OIL	48.27	46.48	50.65	1.06	1.14	2.13	2.21	92.62	2.04	4.22
14.	PRO	25.24	23.00	27.28	0.88	1.86	3.72	5.40	47.37	1.33	5.27
15.	PYP	18.82	12.54	30.70	15.80	20.65	21.12	24.14	76.53	7.16	38.07

DFF : Days to 50 % flowering
DM : Days to maturity
PH : Plant height
NPB : Number of primary branches plant^{-1}
NMP : Number of mature pods plant^{-1}

HPW : Hundred pod weight
HKW : Hundred kernel weight
SP : Shelling percentage
SMK% : Sound mature kernel percent
DHY : Dry haulms yield plant^{-1}

HI : Harvest index
KYP : Kernel yield plant^{-1}
OIL : Oil content
PRO : Protein content
PYP : Pod yield plant^{-1}

RESULTS AND DISCUSSION

Analysis of variance revealed highly significant differences among genotypes for all the traits, indicating the presence of sufficient variability in the genotypes studied.

The phenotypic coefficient of variation (PCV) exceeded the genotypic coefficient of variation (GCV) for all the characters studied, suggesting that environmental factors contributed to the observed variation in the expression of these traits. High GCV and PCV estuimates were observed for the traits number of mature pods plant^{-1} and pod yield plant^{-1}. These results were similar with the findings of Mane *et al*. (2024), Ragiri *et al*. (2023) and Bindu Sree *et al*. (2026). It indicates a good scope for yield improvement through phenotypic selection. Low GCV and PCV were recorded for days to 50 per cent flowering, days to maturity, hundred pod weight, shelling percentage, plant height, sound mature kernel percent, oil and protein content indicating the larger influence of environment on these traits.

High heritability coupled with genetic advance as percent of mean gives a very good indication of nature of inheritance and effectiveness of selection for a particular trait (Johnson *et al.* 1955). In present study, high heritability (>60%) and high genetic advance as percent of mean (>20%) were recorded for dry haulms yield plant^{-1}, number of mature pods plant-1, pod yield plant^{-1}, kernel yield plant^{-1}, number of primary branches plant^{-1}and harvest index. These results were in accordance with the findings of Chavadhari *et al*. (2017), Mahesh *et al.* (2018), Bugati *et al.* (2020), Mane *et al.* (2024), Yami *et al.* (2025). The high heritability and genetic advance indicated the dominance of additive gene action, indicating that selection would be effective for these traits.

High heritability with moderate genetic advance as per cent of mean was exhibited by the characters *viz.,* plant height, days to 50 per cent flowering. Moderate heritability coupled with moderate genetic advance as per cent of mean were recorded for hundred pod weight. Similar results for hundred pod weight were reported by Shinde *et al.* (2019). Hundred kernel weight, shelling percentage and protein content exhibited moderate heritability with low genetic advance as per cent of mean. Hampannavar *et al.* (2018) reported the same results for shelling percentage. Moderate heritability with low genetic advance for protein content and hundred kernel weight are in accordance with the findings of Patidar and Nadaf (2017) and Aruna kumari *et al*. (2019).

The study revealed the presence of considerable genetic variability among the 32 groundnut genotypes for yield and yield related traits. High GCV and PCV were observed for number of mature pods plant^{-1} and pod yield plant^{-1}, indicating ample scope for improvement through selection. High heritability coupled with high genetic advance as per cent of mean was recorded for number of mature pods plant^{-1}, dry haulm yield plant^{-1}, kernel yield plant^{-1}, pod yield plant^{-1}, number of primary branches plant^{-1}and harvest index, suggesting the predominance of additive gene action and the effectiveness of direct selection for these traits. Therefore, these characters can be considered as an important selection criterion for enhancing pod yield in groundnut breeding programmes.

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