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STUDY ON THE PERFORMANCE OF GROUNDNUT (*Arachis hypogea* L.) GENOTYPES FOR QUANTITATIVE TRAITS IN ALLAHABAD REGION

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Abstract

Fifteen groundnut genotypes (including check) obtained from ICRISAT, Hyderabad evaluated for qualitative parameters. The crop was sown during *kharif* 2013 at field experimentation center of the Department of Genetics and Plant Breeding, Faculty of Agriculture, SHIATS, Allahabad Uttar Pradesh. The experiment was laid out in Randomized Block Design with three replications, 14 quantitative parameters was studied. The components of variance revealed that the phenotypic coefficient of variation (PCV) were higher than genotypic coefficient of variation (GCV) for all parameters. The analysis of variance revealed the prevalence of significant different among the genotypes for all studied parameters. Based on *per se* performance genotypes ICG 4389 were found best for pod yield q/ha and Kernel yield q/ha and genotype ICG 4538 were found best for Pod yield per plant, Seed yield per plant, Seed index. Moderate estimates of GCV were exhibited by kernel yield, days to 50% flowering, seed yield per plant and Moderate estimates of PCV were exhibited by field emergence, kernel yield, seed yield per plant, pod yield, no of primary branches per plant, days to 50 % flowering, pod yield per plant. Plant height, Seed index, Days to 50% flowering, shelling percentage, pod yield per plant, kernel yield, seed yield per plant, pod yield q/ha, exhibited high values for heritability (broad sense). Kernel yield exhibited high values for genetic advance as percent of mean.

Introduction

Groundnut **(*Arachis hypogea* L.),** family, Leguminosae an important crop among oilseeds, is a self pollinated, chromosome no. **(2n=40)** grown in tropical anda sub-tropical regions of the world. Groundnut (*Arachis hypogaea* L.) is believed to be the native of **Brazil**. It was introduced into India during the first half of the sixteenth century from one of the Pacific islands of China, where it was introduced earlier from either Central America or South America. India is the second largest producer of groundnut after China. Groundnut is the largest oilseed in India in terms of production. Groundnut is one of the most important cash crops of our country. Groundnut has other anonymous each peanut, earthnut, monkey nut, goober, pinda and manila nut. Groundnut is the also known as "**The king of oilseeds**".

Groundnut contains on the average 12 to 15% carbohydrates, 25 to 30% protein and 45 to 50% oil. The nuts may be chewed uncooked, but are usually eaten boiled or roasted. The nuts can also be boiled, fried, ground into groundnut butter, or crushed for oil. Groundnut butter is extensively used in the preparation of soup and as bread spread (**Tsigbey, *et al.* 2004)**.

India is largest grower and second producer after china, the average productivity of groundnut is about 0.98 tones/ ha, which is very much lower than the world average of 1.62 tones/ha. In India its cultivation mostly confined to the southern states viz, Gujarat, Karnataka, Andhra Pradesh, Tamil Nadu and Maharashtra. The other important states growing groundnut area were Madhya Pradesh, Rajasthan, Uttar Pradesh and Punjab. The area under groundnut cultivation in Uttar Pradesh during 2011-2012 was 0.17 million hectare and production was 0.39 million tons (**Anonymous, 2012)**.
Genetic variability is essential for initiating an effective and successful breeding programmed and it became imperative to study the level of genetic variability available in the existing genotype. The study of genetic advance with heritability estimates further clarify the nature of character which can be improved through selection. Therefore, the present investigation was undertaken to study variability, heritability and genetic advance in groundnut genotypes.

MATERIALS AND METHODS

Fifteen groundnut genotypes were received from International Crop Research Institute for the Semi Arid Tropics (ICRISAT), Patancheru, Hyderabad, Andhra Pradesh, India were evaluated at field experimentation center, Department of Genetics and Plant Breeding, SHIATS, Allahabad, during kharif 2013. The experiment was laid out in randomized block design (RBD) having three replications with 35 cm inter and 10 cm intra row spacing. The observations were recorded on five randomly selected plants from each replication for various characters *viz.* field emergence percentage, days to 50% flowering, plant height, primary branches/plant, days to maturity, pods/plant, pod yield/plant, pod yield, seed yield/plant, hundred kernel weight, sound mature kernels, kernel uniformity, shelling percentage, kernel yield. Analysis of variance to test the significance difference among accessions for each character was carried out as per methodology suggested by Panse and Sukhatme (1967). Phenotypic Coefficient of Variance (PCV) and Genotypic Coefficient of Variance (GCV) were calculated by the formula given by Burton (1952), heritability in broad sense (h^2) was worked out by using formula suggested by Lush (1949) and Burton and Devane (1953) and genetic advance *i.e*. the expected genetic advance were calculated by using the procedure given by Lush (1949) and Johnson *et al.*, (1955).

RESULTS AND DISCUSSION

The analysis of variance for different characters is presented in Table 1. Mean sum of squares due to genotypes showed significant difference for all 14 quantitative characters studied. The mean sums of squares were suggesting that the selected genotypes were genetically variable and considerable amount of variability existed among them. Similar results were also reported by Korat *et al.,* (2009) and Savaliya *et al.,* (2009).

Table No. 1 Analysis of variance for 14 quantitative Characters in 15 Groundnut Genotypes (including check) during *Kharif* 2013.

S. No.	Characters	Mean sum of squares		
		Replications (d.f. =02)	Treatment (d.f=14)	Error =28
1.	Field emergence	0.067	1.419*	0.686
2.	Days to 50% flowering	3.622	28.698**	1.670
3.	Plant height	0.596	47.625**	0.837
4.	Number of primary branches per plant	0.038	0.647*	0.307
5.	Days to maturity	1.089	4.422**	1.208
6.	Pods per plant	1.745	7.696**	1.773
7.	Pod yield per plant	2.305	11.943**	1.028
8.	Pod yield	1.935	10.871**	1.408
9.	Seed yield per plant	2.400	6.840**	0.829
10.	Seed index	3.557	43.332**	1.224
11.	Sound matured Kernels	0.528	29.583**	5.494
12.	Kernel Uniformity	8.622	13.175*	5.598
13.	Shelling percentage	3.267	23.799**	1.838
14.	Kernel yield	0.691	6.508**	0.597

* and ** significant at 5% and 1% Level of significant respectively

The genotypic coefficient of variation provides a measure to compare of genetic variability present in 14 quantitative parameters. Moderate estimates of genotypic coefficient of variation was recorded for kernel yield (11.21), days to 50% flowering (10.43), seed yield per plant (10.12) and low genotypic coefficient of variation value was observed for pod yield q/ha (9.99), pod yield per plant (9.91), seed index (9.96), plant height (8.86), field emergence (8.09), no of primary branches per plant (5.60), pods per plant (5.55), sound matured kernel(4.14), shelling percentage (3.85), kernel uniformity (2.31), days to maturity (0.87). (Table no. 4.3). Similar finding were reported by **Venkataramana *et al.* (2001). Nath and Alam (2002)** also resulted low genotypic co-efficient of variation for days to maturity. **Injeti (2008)** reported for days to maturity for low genotypic coefficient of variation. Phenotypic coefficient variation which measures total relative variation was moderate for field emergence (16.77), kernel yield q/ha (12.79), seed yield per plant (12.03), pod yield q/ha (12.01), no of primary branches per plant (11.69), days to 50 % flowering (11.36), pod yield per plant (11.22), and low estimate of phenotypic coefficient of variation value was observed in seed index (9.96), plant height (9.09), pods per plant (7.65), sound matured kernels (5.37), shelling percentage (4.30), kernel uniformity (4.14), days to maturity (1.27). (Table no. 4.3) Similar finding were observed for days to maturity by John et *al.* (2008) and Sangram *et al.* (2013) and Shukla and Rai (2014).

Heritability is a measure of extent of phenotypic caused by the action of gene. For making effective improvement in the character for which selection is practiced, heritability has been adopted by genetic variability, which is transmitted from parent to offspring is reflected heritability. The estimates of heritability in broad sense for 14 quantitative traits ranged from Number of primary branches per plant (22.98%) to Plant height (94.91%). Higher estimates of heritability were observed for characters like Plant height (94.91%), Seed index (91.98%), Days to 50% flowering (84.36%), shelling percentage (79.93%), pod yield per plant (77.96%), kernel yield (76.75%), seed yield per plant (70.74%), pod yield (69.14%). Moderate estimates of heritability were

observed for characters like sound matured kernels (59.38%), pods per plant (52.68%), days to maturity (47.01%), kernel uniformity (31.09%). The low estimate of heritability was observed for character like field emergence (26.27%) no of primary branches per plant (22.98%). (Table no. 2). Similar observations were made by Khote *et al.* (2009), Sumathi *et al.* (2009). The results are in according with findings of Venkataramana *et al.* (2001), Mahalakshmi *et al.*, (2005) and John et *al.* (2008) for hundred kernel weight.

Table no. 2 Genetic Parameters of 14 Quantitative Characters in 15 Groundnuts Genotypes (including check) during Kharif 2013

Characters	Mean	Range		VG	VP	GCV	PCV	h^2	GA	GG=GA %
		Min.	Max.							
Field emergence	56.67	46.67	73.33	**24.44**	**93.02**	8.09	**16.77**	26.28	5.22	8.90
Days to 50% flowering	28.78	25.33	35.67	9.01	10.68	10.43	11.36	84.36	5.68	19.74
Plant height	44.59	40.84	51.59	15.60	16.43	8.86	9.09	**94.91**	7.93	17.78
primary branches	5.70	4.73	6.40	**0.10**	**0.44**	5.60	11.69	**22.98**	0.36	6.33
Days to maturity	118.85	117.00	121.67	1.07	2.28	**0.87**	**1.27**	47.01	1.46	1.23
Pods per plant	25.30	22.07	27.60	1.97	3.75	5.55	7.65	52.68	2.10	8.30
Pod yield per plant	19.25	15.57	22.75	3.64	4.67	9.91	11.22	77.96	3.47	18.03
Pod yield	17.78	15.68	23.41	3.15	4.56	9.99	12.01	69.14	3.04	17.11
Seed yield per plant	13.99	11.36	16.77	2.00	2.83	10.12	12.03	70.74	2.45	17.53
Seed index	39.33	33.25	46.04	14.04	15.26	9.55	9.96	91.98	7.40	18.87
Sound matured Kernels	68.48	62.33	72.00	8.03	13.52	4.14	5.37	59.38	4.50	6.57
Kernel Uniformity	68.89	66.00	72.33	2.53	8.12	2.31	4.14	31.09	1.83	2.65
Shelling percentage	70.34	62.24	72.99	7.32	9.16	3.85	4.30	79.93	4.98	7.08
Kernel Yield	12.52	10.88	16.87	1.97	2.57	**11.21**	12.79	76.75	2.54	20.24

Where, VG = Genotypic variance, VP = Phenotypic variance, GCV = Genotypic coefficient of variation, PCV = Phenotypic coefficient of variation, h^2 = Heritability, GA = Genetic advance.

A perusal of genetic advance for different traits revealed that it varied from 0.36 (Number of primary branches per plant) to 7.93 (Plant height). Low genetic advance was observed for all the traits like Plant height (7.93), seed index (7.40), days to 50 % flowering (5.68), field emergence (5.22), shelling percentage (4.98), sound matured kernel (4.50), pod yield per plant (3.47), pod yield (3.04), kernel yield (2.54), seed yield per plant (2.45), pods per plant (2.10), kernel uniformity (1.83), days to maturity (1.46), no of primary branches per plant (0.36). (Table no. 2). Similar findings were observed by Rani et *al*. (2005) for pod yield and shelling percentage.

Genetic advance as percent of mean for various characters are presented in table and noticed that high genetic advance as percent of mean was recorded for kernel yield (20.24). Moderate estimates of genetic advance as percent of mean was observed for days to 50% flowering (19.74), seed index (18.87), pod yield per plant (18.03), plant height (17.78), Seed yield per plant (17.53), pod yield (17.11). The low estimate of genetic advance as percent of mean was observed for character like field emergence (8.90), pods per plant (8.30), shelling percentage (7.08), sound matured kernels (6.57), no of primary branches per plant (6.33), kernel uniformity (2.65), days to maturity (1.23). (Table no.2). Similar findings were reported by Saraswathi *et al.* (2010). High

heritability coupled with high genetic advance as per cent of mean in the present set of groundnut genotypes was recorded for kernel yield indicating predominance of additive gene effect and the possibilities of effective selection for the improvement of these characters.

CONCLUSION

Groundnut genotype ICG 4389 identified as best genotype for pod yield (23.41 q/ha), Kernel yield (16.87 q/ha) and genotype ICG 4538 identified as best genotype for Pod yield per plant (22.75 g.), seed yield per plant (16.77 g.), seed index (46.04 g.). Kernel yield recorded maximum estimates of genotypic coefficient of variation (11.21) and field emergence recorded maximum estimates of phenotypic coefficient of variation (16.77) whereas high heritability coupled with high genetic advance as per cent of mean in the present set of groundnut genotypes was recorded for kernel yield. The results from the present study were outcome of one year evaluation. It is generally believed that evaluation carried out across year (at least two year) derived reliable conclusions on the range of quality traits measured from each entry. Our results provide some useful information for genetic improvement of the cultivated groundnut

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