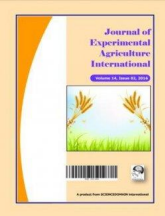

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Evaluation of Groundnut (*Arachis hypogaea* L.) Genotypes under Allahabad Agro-climatic Conditions in India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present investigation was carried out to elucidate the information on the performance of groundnut genotypes for quantitative and qualitative traits. The experimental design consisted of 11 groundnut genotypes (including one check) arranged in Randomized complete Block Design with three replications in the *Kharif* season 2014 at Field Experimentation Centre of the Department of Genetics and Plant Breeding, SHIATS Allahabad, Analysis of variance revealed the presence of considerable variation among the genotypes for all the characters studied. On the basis of mean performance among 11 genotypes ICG 163 was best genotype in growth like primary branches per

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plant (7.77), days to maturity(107.33), pod yield per plant (17.89 g), kernel yield (21.12 q ha^{-1}) and oil yield (997 kg ha^{-1}). ICG 434 and ICG 513 were the best in protein content (23.68%) and oil content (47.73%).

Keywords: Allahabad; groundnut; quantitative and qualitative traits.

1. INTRODUCTION

Groundnut (*Arachis hypogaea* L.), an important crop among oilseeds, is a self pollinated, grown in tropical and sub-tropical regions of the world. Groundnut (*Arachis hypogaea* L.) is believed to be the native of Brazil, where the greatest diversity is found [1,2]. 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. Groundnut has other anonymous each peanut, earthnut, monkey nut, goober and manila nut. Groundnut belongs to the family Fabaceae, tribe Aeschynomenae and sub tribe Stylosanthinae. It is an allotetraploid (2n=40) with two genomes, A and B. India is one of the largest producers of groundnut in the world. Total world production of groundnut in 2013-14 is approximately 45.2 million tonnes. China, India, Nigeria, United States, Burma, and Indonesia are the major producers of groundnut globally. In India, groundnut is cultivated on 5.25 million ha, production was 9.47 million tones and productivity was 1.80 tonnes ha^{-1}. The major producers of groundnut are Gujarat, Andhra Pradesh, Rajasthan, Tamil Nadu, Karnataka, Madhya Pradesh and Maharashtra. India is largest grower and second producer after china [3].

Groundnut contains on the average 12-15% carbohydrates, 25-30% protein and 45-50% 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 [4]. Groundnut is a photo-insensitive crop, which can be grown throughout the year. It is a well known fact that seed yield and seed quality depends upon the prevailing climatic conditions, agronomic and production practices followed and also post-harvest factors. Groundnut seed produced in summer gives better yield but the quality of seed is affected due to high temperature [5]. Hence, in this present study, 11 groundnut genotypes were undertaken for evaluation in Allahabad agro-climatic conditions based on quantitative and qualitative traits.

2. MATERIALS AND METHODS

The experimental materials for the present study consist of 11 genotypes of Groundnut (ICG 76, ICG 81, ICG 163, ICG 397, ICG 434, ICG 442, ICG 513, ICG 875, ICG 1142 and ICG 1711) received from ICRISAT, Hyderabad Andhra Pradesh, India. Kadiri-6 cultivar is the check. The present investigation was carried out at Field Experimentation Centre of the Department of Genetics and Plant Breeding, Faculty of Agriculture, Sam Higginbottom Institute of Agriculture, Technology & Sciences (Formerly Allahabad Agriculture Institute) Deemed to be University, Allahabad during *kharif* 2014. Allahabad is located in the South-East part of Uttar Pradesh, India. The site of experiment is located at 25.57º N latitude, 81.51º E longitude and 98 meter above the sea level. This region has subtropical climate with extreme of summer and winter. The 11 groundnut genotypes were grown in randomized block design with three replications, with row to row distance 35cm and plant to plant distance 10 cm. Observations were recorded on five randomly selected plants from each replication. Reading from five plants was average replication-wise and the mean data were used for statistical analysis for the 17 characters is field emergence (%), days to 50% flowering, plant height (cm), primary branches per plant, days to maturity, pods per plant, pod yield per plant (g), pod yield (q ha^{-1}.), seed yield per plant (g), hundred Kernel weight (g), sound matured kernel (%), kernel uniformity (%), shelling (%), kernel yield (q ha^{-1}), protein content (%), oil content (%) and oil yield (kg ha^{-1}) were recorded.

3. RESULTS AND DISCUSSION

The mean sum of squares due to genotypes showed significant difference for all 14 quantitative and 3 qualitative characters studied (Table 1) and (Table 2). The mean sums of squares were suggesting that the selected genotypes were genetically variable and considerable amount of variability existed among

Table 1. Mean performance of 14 quantitative characters of 11 genotypes of groundnut during *Kharif* -2014

SL. no	Genotypes	FE(%)	DT (50%)F	PH (cm)	PB /P	DTM	P/P	PY/P	PY (q/h)	SY/ P	KY	SP (%)	100 KW	SMK	KU
1	ICG 76	67.00	27.00	41.83	6.20	118.00	20.30	11.43	20.78	8.06	14.66	70.5	46.39	78.79	81.00
2	ICG 81	66.67	27.00	36.34	5.21	108.33	21.70	12.94	23.42	9.02	16.31	69.6	45.44	79.23	80.00
3	ICG 163	72.33	24.33	49.07	7.77	107.33	14.97	17.89	35.11	10.76	21.12	60.14	51.54	82.46	82.00
4	ICG 397	62.67	24.00	37.55	6.09	117.33	16.17	8.93	15.18	6.13	10.42	68.6	47.45	79.46	79.33
5	ICG 434	68.67	23.33	43.10	5.53	108.67	15.73	18.14	33.80	11.16	20.80	61.5	50.45	80.98	83.67
6	ICG 442	67.00	28.00	34.38	4.93	108.67	24.92	13.79	25.07	10.33	18.79	74.9	47.25	79.39	82.33
7	ICG 513	68.33	23.67	38.69	6.14	107.33	13.33	8.89	16.48	6.37	11.80	71.68	49.29	83.66	79.33
8	ICG 875	65.00	27.67	40.19	4.02	108.33	22.95	11.04	19.47	7.36	12.95	66.69	48.62	79.09	83.00
9	ICG 1142	69.00	33.00	34.48	6.47	118.33	19.53	13.09	24.52	8.25	15.44	63.00	45.39	81.25	81.33
10	ICG 1711	64.00	32.33	42.50	5.60	123.33	20.60	14.73	25.58	10.12	17.57	68.70	48.30	81.64	80.00
11	Kadiri-6	71.33	24.00	52.28	5.30	109.67	22.62	15.85	30.68	10.84	20.98	68.39	49.42	81.21	81.00
Mean		67.45	26.76	40.95	5.75	112.33	19.35	13.34	24.55	8.94	16.44	67.61	48.14	80.65	81.18
C. V.		2.69	3.02	0.86	2.25	1.09	3.647	2.186	1.59	1.92	2.26	0.851	0.59	1.52	1.59
S. E.		1.48	0.66	0.29	0.1	1.07	0.57	0.23	0.32	0.14	0.30	0.47	0.23	1.006	1.05
C. D. 5%		3.09	1.37	0.6	0.22	2.1	1.202	0.49	0.66	0.29	0.634	0.99	0.48	2.099	2.20

Legends: -

P/P= Pods per plant
PY/P=Pod yield per plant (g.)
PY (q/h) =Pod yield (q ha^{-1}.)
SMK= Sound matured kernel
DTM=Days to maturity
SP (%) =Shelling (%)
KY=Kernel yield (q ha^{-1})
KU=Kernel uniformity (%)
PB/P= Primary branches/plant
100KW= Hundred Kernel weight (g.)
FE (%) =Field Emergence (%)
DT (50%) F= Days to 50% flowering.
PH (cm) = Plant height (cm).
SY/P= Seed yield per plant

Table 2. Mean performance of 3 qualitative characters of 11 genotypes of groundnut during *Kharif* -2014

SL. no	Genotypes	PC	OC	OY
1	ICG 76	18.97	46.00	674.58
2	ICG 81	18.57	44.22	721.48
3	ICG 163	23.49	47.23	997.75
4	ICG 397	19.98	45.67	476.19
5	ICG 434	23.68	46.97	976.95
6	ICG 442	18.97	46.12	866.68
7	ICG 513	22.36	47.73	563.62
8	ICG 875	22.05	44.83	581.90
9	ICG 1142	20.34	44.48	687.03
10	ICG 1711	22.18	45.45	798.91
11	Kadiri-6	19.05	45.76	960.45
Mean		20.88	45.81	754.40
C. V.		2.93	1.14	0.14
S. E.		0.50	0.42	0.81
C. D. 5%		1.045	0.89	1.81

Legends: - OC=Oil content (%) PC=Protein content (%) OY= Oil yield (kg ha^{-1})

them. These findings are in accordance with the findings of Shukla and Rai [6], [7,8,9,10] and Upadhyaya et al. [11] also observed significant variability for yield and quality attributing traits in groundnut. On the basis of mean performance 11 groundnut genotypes, ICG 163 was identified as better performance in growth like primary branches/plant (7.77), field emergence (72.33%), days to maturity (107.33), pod yield per plant (17.89 g), kernel yield (21.12 q ha^{-1}) and oil yield (997 kg ha^{-1}), genotypes ICG 434 is high in days to 50% of flowering (23.33), pod yield per plant (18.14 g), seed yield per plant (11.16 g), kernel uniformity (%), protein content % (23.68), and ICG 513 is superior in sound mature kernel % (83.66) and days to maturity (107.33) are identified as highest performance for quantitative and Quality traits. The genotype ICG 163 was found to be highest mean value for field emergence, highest mean values for number of primary branches per plant and highest mean value for pod yield (q ha^{-1}) it leads to the highest kernel yield (q ha^{-1}) and its having highest oil yield (kg ha^{-1}), hence this genotype has better performance among 11 groundnut genotypes. Other genotype showing highest growth performance for plant height and days to maturity was observed in Kadiri-6. The genotype ICG 442 showed highest shelling percentage. The mean performance of qualitative characters of the genotypes grown properly is presented in Table 2, among the kernel quality characters the protein content of the groundnut was more ICG 434 (23.68%) and low in ICG 81 with a general mean value of 18.57 percent. Oil content is the important character in groundnut is an inherited trait, although environmental factors such has temperature and humidity during ripening and post harvest stages are known to influence oil content. The maximum mean value for oil content was observed in genotype ICG 163 (47.23 %) and low content was observed in ICG 81 (44.22%). Oil yield is directly proportional to kernel yield and oil content, the genotype ICG 163 was recorded highest oil yield (997.75 kg ha^{-1}).

4. CONCLUSION

On the basis of mean performance among 11 genotypes ICG 163 was best genotype in growth, days to maturity, pod yield per plant, kernel yield and oil yield. ICG 434 and ICG 513 were the best in protein content and oil content. The results from the present study were outcome of one year information. One year data is not sufficient to conclude concurrent results; further experimentation is required to further substantiate the results. Our results provide some useful information for genetic improvement of the cultivated groundnut.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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