

Evaluation of Groundnut (*Arachis hypogea* L.) Genotypes for Yield and Yield Contributing Traits

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Abstract An experiment was conducted to assess the 11 groundnut genotypes including one check (Kadiri-6) to study on quantitative and seed quality traits. The experiment was conducted during *kharif* of 2015 in randomized block design with three replications. Analysis of variance showed highly significant differences among 11 groundnut genotypes for 12 quantitative and 4 quality characters studied. Genotype ICG 13942 identified as best genotype for pod yield and kernel yield. Genotypes ICG 3037 identified as best genotype for pod length and kernel length.

Keywords Groundnut (*Arachis hypogea* L.), Quantitative, Yield contributing characters.

Introduction

Groundnut (*Arachis hypogea* L.) family, Leguminosae an important crop among oilseeds, is a self pollinated, grown in tropical and sub-tropical regions of the world. Groundnut is believed to be the native of Brazil. Peanut seeds are a good source of protein (25–30%), lipid and fatty acids for human nutrition. Oil content is of primary importance in groundnut and in Indian cultivated groundnut varieties it ranges from 47 to 54.6%. Likewise, the protein content in groundnut kernels varies from 22–36% depending on cultivar, location, season, seed maturity and agronomic practices. Average protein content is higher than that of eggs, dairy products, meat and fish and the digestibility of groundnut protein is very high. So it plays an important role in decreasing protein mal nutrition in the developing countries. The soluble sugars content in groundnut varies from 9.2 to 13.3% [1].

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 nutritive value of food is high as the groundnut is affordable and serves as good source of oil and protein [2].

Groundnut is herbaceous annual plant, basically interlineate in growth habit. The habits are bunch (erect), semi spreading (ovate) and spreading (prostrate). In spreading forms the axis is very short and

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Table 1. Mean performance of 11 groundnut genotypes for 5 quantitative characters.

Sl. No.	Genotype	Field emergence	Plant height (cm)	Days to 50% flowering	Primary branches/plant	Days to maturity
1	ICG 81	84.33	36.06	19.66	6.73	123.00
2	ICG 513	77.00	48.73	27.66	6.40	120.00
3	ICG 3037	63.00	42.86	26.66	5.86	121.00
4	ICG 4670	76.33	43.83	24.66	5.86	123.33
5	ICG 5221	74.00	44.36	26.00	5.66	120.00
6	OCG 5236	72.00	44.70	30.00	5.73	124.33
7	ICG 5827	74.33	43.80	28.33	5.66	120.00
8	ICG 9666	77.33	49.10	26.00	5.26	122.00
9	ICG 13723	74.33	48.46	28.00	5.53	124.00
10	ICG 13942	73.33	52.20	26.33	4.13	121.00
11	Kadiri 6	72.00	46.10	26.66	4.80	120.33
	Mean	74.36	45.48	26.36	5.60	121.72
	CV	7.58	8.11	8.11	7.95	1.43
	SEm±	1.87	1.23	0.71	0.15	0.58
	CD 5%	9.57	6.28	3.64	0.76	2.96
Range	Min	63.00	36.06	19.66	4.13	120.00
	Max	84.33	52.20	30.00	6.73	124.33

erect and primary branches spread horizontally along with the ground. In bunchy type main axis is long erect and primary branches are oblique to the main axis. The intermediate forms between these two are classified as semi spreading, the plants have tap root system consisting of numerous lateral roots. Being leguminous crop root nodules are developed on roots that help fix atmospheric nitrogen. Normally the flowering period last from 3 to 6 weeks in case of bunch and 6 to 8 weeks in case of spreading types. Hence, in this present study, 11 groundnut genotypes were undertaken for evaluation based on yield and quality traits.

Materials and Methods

The field experiment for the present investigation entitled Evaluation of groundnut (*Arachis hypogaea* L.) genotypes for yield and yield contributing traits was conducted during *kharif* of 2015 at field experimentation center of Department of Genetics and Plant Breeding, Faculty of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad, (UP). The field experimental setup was laid out in randomized block design (RBD) with 3 replica-

tions during the 2015 growing season. Standard agronomic practices and plant protection measures were adopted as per schedule. Observations were recorded on five randomly selected plants per replication for field emergence, plant height, primary branches/plant, pod yield/plant, pod yield, sound mature kernel, hundred kernel weight, shelling, kernel yield, kernel uniformity and observations on days to 50% flowering and days to maturity were recorded on plot basis and 4 quality characters pod length, pod width, kernel length, kernel width. The field data were analyzed statistically as per randomized block design (RBD) as suggested by Panse and Sukhatme [3].

Results and Discussion

The mean sum of squares due to genotypes showed significant difference for all 12 quantitative and 4 qualitative characters studied. Genotype ICG 81 had highest field emergence % 60 DAS (84.33) and lowest field emergence % is for ICG 3037 (63.00) (Table 1). Genotype ICG 81 (19.66) had earliest days to 50% flowering and highest for ICG 5236 (30.00). Genotype ICG 13942 (52.20) had highest for plant height and lowest for ICG 81 (36.06). Genotype ICG (6.73) had highest primary branches per plant and lowest primary branches/plant observed in ICG 13942 (4.13). Genotype ICG 513 (117.0), ICG 5221 and ICG 5827 had earliest days to maturity and late days to maturity in genotype ICG 5236 (124.33). Genotype ICG 513 (18.30) had highest Pods/plant and lowest pods/plant observed in ICG 81 (9.73) (Table 2). Genotype ICG 13942 (66.40) had highest pod yield/plant (g) and lowest pod yield/plant (g) observed in ICG 5827 (44.93). Genotype ICG 13942 (36.67) had highest seed yield/plant (g) followed by ICG 13723 (35.00) and lowest seed yield/plant (g) observed in ICG 4670 (28.67). Genotype ICG 5221 (43.86) had highest hundred kernel weight (g) and lowest hundred kernel weight observed in ICG 3037 (36.66). Genotype ICG 81 (74.26) had highest sound mature kernel % and lowest sound mature kernel % observed in ICG 5236 (64.28). Genotype ICG 81 (91.06) had highest kernel uniformity % and lowest kernel uniformity % observed in ICG 5221 (68.84). Genotype K6 (72.60) had max shelling % and min shelling % in ICG 13942 (69.46). Genotypes that had maximum pod length like ICG 3037 (32.86 mm) and lowest pod length observed in ICG 81 (28.20 mm)

Table 2. Mean performance of 11 groundnut genotypes for 7 quantitative characters.

Sl. No.	Genotype	Pod/plant	PYP	Kernel yield/plant	Shelling (%)	100 KW	SMK	KU %
1	ICG 81	9.73	52.60	32.77	71.20	40.36	74.26	91.06
2	ICG 513	18.30	55.60	34.00	70.46	42.26	68.35	78.55
3	ICG 3037	11.80	53.00	32.33	70.16	36.66	66.86	90.88
4	ICG 4670	15.86	53.56	28.67	72.60	41.33	71.58	76.66
5	ICG 5221	13.80	48.03	32.67	71.60	43.86	67.29	68.84
6	ICG 5236	11.43	49.00	33.33	70.00	41.03	64.28	89.36
7	ICG 5827	16.50	44.93	35.00	69.53	41.76	70.64	84.01
8	ICG 9666	13.23	53.76	32.67	70.40	38.60	68.47	79.77
9	ICG 13723	14.00	54.00	35.00	72.20	42.66	68.99	83.81
10	ICG 13942	15.16	66.40	36.67	69.46	42.50	72.41	80.13
11	Kadiri 6	14.13	56.00	32.33	70.60	43.23	68.32	79.69
Mean		13.99	53.35	33.22	70.74	41.30	69.23	82.07
CV		8.14	7.99	6.05	1.53	5.53	3.88	7.88
SEm $\pm$		0.38	1.42	0.67	0.36	0.76	0.89	2.16
CD 5%		1.94	7.26	3.43	1.84	3.89	4.57	11.02
Range	Min	9.73	44.93	28.67	69.46	36.66	64.28	68.84
	Max	18.30	66.40	36.67	72.60	43.86	74.26	91.06

(Table 3). Genotypes that had maximum pod width like ICG 3037 (15.06 mm) and lowest pod width observed in ICG 9666 (10.86 mm). Genotypes that had maximum seed length like ICG 3037 (17.70 mm) and lowest seed length observed in ICG 4670 (14.49 mm). Genotypes that had maximum seed width like ICG 9666 (10.26 mm) and lowest seed width observed in ICG 5236 (7.03 mm).

The growth, yield and quality of seed were governed by soil and weather condition besides management practices. Crop performance under given environmental conditions is also depends on methods of cultivation and genotypes used in vogue. Therefore there is a need for study the variations for growth, yield and quality traits [4]. The results were obtained from the experiment conducted during *kharif* of 2015 to study the yield performance and quality parameters among the groundnut genotypes. The variation in growth parameters among the genotypes can be attributed due to the response of different genotypes to environment and genetic makeup of the genotype. Among the studied genotypes early days to 50% flowering was found in ICG 81 (19.66 days). The highest plant was recorded in ICG 13942 (52.20 cm). The highest number of primary branches was recorded in ICG 81 (6.73) and the genotype required minimum number of days for physiological maturity in ICG 513, ICG

5221 and ICG 5827 (120.00). Such variation with respect to field performance of different genotype is reported by Mallikarjuna et al. [5]. Among the yield components, the pod yield per plant was significantly higher in ICG 13942 (66.40 g). The genotype with more number of pods per plant was observed in ICG 513 (18.30). Similar findings were reported by Borkar and

Table 3. Mean performance of 11 groundnut genotypes for 4 quality characters.

Sl. No.	Genotype	Pod width (mm)	Pod length (mm)	Kernel length (mm)	Kernel width (mm)
1	ICG 81	11.90	28.20	15.63	8.00
2	ICG 513	12.10	32.63	16.73	7.13
3	ICG 3037	15.06	32.86	17.70	10.26
4	ICG 4670	13.70	28.60	14.49	7.56
5	ICG 5221	12.13	28.70	15.26	9.20
6	ICG 5236	11.73	29.43	16.46	7.03
7	ICG 5827	13.66	29.23	16.80	7.50
8	ICG 9666	10.86	30.63	15.00	7.43
9	ICG 13723	13.43	32.70	16.06	8.16
10	ICG 13942	13.76	31.93	16.60	9.83
11	Kadiri 6	14.46	32.60	16.06	6.73
Mean		12.98	30.73	16.12	8.07
CV		8.03	6.26	5.68	8.43
SEm $\pm$		0.35	1.57	0.75	0.23
CD 5%		1.78	3.28	1.56	1.16
Range	Min	10.86	28.20	14.49	6.73
	Max	15.06	32.86	17.70	10.26

Dharanguttikar [6], and Kumar et al. [7]. Higher kernel yield was mainly attributed to greater shelling percent, kernel yield per plant, seeds per pod, 100 kernel weight, sound matured kernel and kernel uniformity in different genotypes. The highest kernel yield/plant was recorded in ICG 13942 (36.67). The shelling percent is significantly highest in ICG 4670 (72.60%). The sound matured kernel was significantly higher in ICG 81 (74.26). The kernel uniformity was significantly higher in ICG 81 (91.06). The similar findings were reported by Shukla and Rai [8], and Saxena et al. [9].

Conclusion

Present study concluded that the genotype ICG 13942 identified as best genotype for pod yield per plant and kernel yield per plant. ICG 81 best for days to 50% flowering, sound matured kernel (74.26), kernel uniformity (91.06) and primary branches per plant (6.73). The genotype ICG 1427 recorded highest 100 kernel weight (44.33 g) and ICG 3037 identified as best genotype for pod length and kernel length. Significant differences were observed for almost all the different quantitative and seed quality characters studied.

References

1. Asibuo JY, Akromah R, Dapaah HKA, Kantanka OS (2008) Evaluation of nutritional quality of groundnut (*Arachis hypogaea* L.) from Ghana. *Afr J Food Agric Nutri and Develop* 8 : 133—150.
2. Atasie VN, Akinhanmi TF, Ojiodu CC (2009) Proximate analysis and physico-chemical properties of groundnut (*Arachis hypogaea* L.). *Pak J Nutri* 82 : 194—197.
3. Panse VG, Sukhatme PV (1967) Statistical methods for agricultural workers. ICAR New Delhi. 2nd edn, pp 381.
4. Annals of West University of Timisoara (2015) *Ser biology* Vol 18, pp 139—144.
5. Mallikarjuna SBP, Upadhyaya HD, Kenchana GPV, Kulliswamy, Singh BY (2003) Phenotypic variation for agronomic characteristics in a groundnut core collection for Asia. *Field Crop Res* 84 : 359—371.
6. Borkar VH, Dharanguttikar VM (2014) Evaluation of groundnut (*Arachis hypogaea* L.) genotypes for physiological traits. *Int J Sci and Res Publ* 4 : 2250—3153.
7. Kumar K, Rai PK, Kumar A, Singh BA (2014) Study on the performance of groundnut (*Arachis hypogaea* L.) genotypes for quantitative traits in Allahabad region. *Carib J Sci and Technol* 2—564—569.
8. Shukla AK, Rai PK (2014) Evaluation of groundnut genotypes for yield and quality traits. *Ann Pl and Soil Res* 16 : 41—44.
9. Saxena P, Rai PK, Singh BA, Thomas N (2014) Evaluation of groundnut (*Arachis hypogota* L.) genotypes for yield and quality characters. *J Kalash Sci* 2 : 17—21.