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Evaluation of Groundnut (*Arachis hypogaea* L.) Genotypes for Physiological Traits

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Abstract- Twenty two groundnut genotypes were evaluated in randomized block design (RBD) with two replications at AICRP on Groundnut, MPKV, Rahuri, Dist. Ahmednagar (M.S.) during summer,2011 to study the physiological analysis of growth and yield variation in groundnut genotypes. The observations on plant height, number of branches, leaves, leaf area, LAI, dry matter production and it's distribution in component parts of plant, photosynthetic rate, transpiration rate, stomatal conductance, water use efficiency, stomatal frequency, chlorophyll content, protein and oil content and yield and yield contributing characters were recorded. The genotypes were significantly differed for seed yield. The highest dry pod yield was recorded by the genotypes ICG-8420, ICG-8473 and ICG-8506 due to significant favourable yield contributing characters like number of pods per plant, pod yield (g) and kernel yield (g) per plant, shelling percentage and harvest index. On the basis of morpho-physiological traits and bio-chemical parameters, ICG-8420, ICG-8473, ICG-8506, ICG-0845, ICG-8316 and ICG-8525 were considered as promising genotypes for future breeding programme for yield improvement and protein and oil content.

***Index Terms*-** Morpho-physiological traits, physiological parameters, Bio-chemical characteristics, yield and yield contributing characters.

I. INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is the fore most important oil seed crop of India. In terms of area and production, it occupies an important position among the oil seed crops in the world. It has been aptly described as natures masters piece of food values containing 36 to 54 per cent oil with 21.36 per cent protein and have an energy value of 2,363 KJ/100 g. The oil is rich in unsaturated fatty acid (80 %), oleic acid and linoleic acid accounting for 38 to 58 per cent and 16 to 38 per cent, respectively. Among the saturated fatty acids, palmitic acid is the major one with the proportion of about 10 to 16 per cent, higher iodine value (82 to 106) and refractive index values (1.4697 to 1.4719 ND20) indicating its susceptibility to oxidation. Raw groundnut oil has very good stability (Nagraj, 1995). Yield is a complex trait, governed by many traits and there are ample evidences to show that selections directly for grain yield in plants are not easy. Thus, any morphological character that is associated with higher seed yield or which makes a significant contribution to yielding ability would be useful in the improvement of grain yield. The basic studies on the basis of morpho-physiological traits are needed to overcome the yield barriers within the genotypes. There are two physiological approaches to achieve the target of yield potential. One is Physio-genetic, which consists the genotypic differences in physiological traits and another one is the Physio-agronomic relates with the management practices. It is ultimately the morpho-physiological variations, which is important for realizing higher productivity as evident from very high and positive association within traits (Mathur, 1995). Therefore the present study was undertaken with the objectives to evaluate groundnut (*Arachis hypogaea* L.) genotypes for physiological traits**.**

II. OBJECTIVES

1. To study the physiological efficiency of summer groundnut genotypes.
2. To study the dry matter accumulation and its partitioning in summer groundnut.
3. To find out correlation of physiological parameters with pod yield.

III. MATERIAL AND METHODS

Twenty two groundnut genotypes were evaluated in RBD with two replications during summer, 2011 at AICRP on Groundnut, MPKV, Rahuri. Dist. Ahmednagar (M.S.) in single row of 5 m length with the spacing of 30 x 10 cm under irrigated condition. FYM @ 10 cartloads hectare^{-1} was uniformly spread in the field and mixed well by harrowing. The basal dose of N: P: K @ of 25:50:0 kgha^{-1} was given at the time of sowing. One weeding and one hoeing were carried out as and when required and field was kept free from weeds. Randomly five plants were selected for recording the observations on morpho-physiological traits. The observations on morphological traits, dry matter production and it's distribution and physiological parameters were recorded. The photosynthetic rate (Pn), transpiration rate (E; mmol m^{-2} s^{-1}) and stomatal conductance (g_s; µmol H_2O m^{-2} s^{-1}) were measured using Infra-red Gas Analyser (IRGA; Model Portable Photosynthesis System LI 6400, LI-COR® Inc, Lincoln, Nebraska, USA). The E and Gs were measured continuously monitoring H_2O of the air entering and existing in the IRGA headspace chamber. Measurements were made at mid day, between 11:30 and 12:00 eastern day time (1400–1800 mmolm^{-2} s $^{-1}$ PPFD), on top fully expanded third leaf blades. The flow rate of air in the sample line was adjusted to 500 µmol s^{-1}. The water use efficiency (WUE) was calculated as the ratio of Pn to E. The protein and fat content from seed samples were estimated on NIR spectrometer (ZEUTEC, Germany Make), is a dual-beam near infrared spectrometer. In the NIR spectrometer, the sample is exposed near infrared light of specific wavelengths, selected from up to 19 high precision interference filters. The light penetrated the sample, interacted with sample molecules and is partly absorbed and partly diffusely reflected. The reflected light is measured by a lead sulfide (PbS) detector mounted in a gold coated integrating sphere located above the sample. The mean data analyzed for analysis of variance by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The vegetative phase governs the overall phenotypic expression of the plant and prepares the plant for next important reproductive phase. The root, stem, branches and leaves, all these parts constitute vegetative phase and perform specific functions.In the present investigation, the genotypes, ICG-8417 (27.800) and ICG-8521 (28.900) required minimum number of days for initiation of first flower, whereas, the genotype ICG-8525 (31.300) required highest number of days for appearance of flowering. The genotype ICG-8474 (124.70), ICG-8417 (124.80) and SB-XI (124.90) required minimum number of days for physiological maturity. The genotypes, ICG-8525 (130.00), ICG-8420 (129.30) and ICG-8518 (129.20) required maximum days to attend physiological maturity (Table 1). ICG-0845 (40.88 cm) and ICG-8075 (40.55 cm) were found to be taller, whereas ICG-8473 (27.40 cm) and ICG-8417 (27.43 cm) were dwarf genotypes. Mensah and Okpere (2000) showed the significant differences for plant height throughout the growth period. The genotypes, ICG-8473 (16.25), ICG-8417 (14.10), ICG-8472 (13.75), ICG-8328 (13.70) and ICG-8326 (13.45) had profuse branching, whereas TAG-24 (7.30) had less number of branches per plant. Deshmukh and Dev (1993) recorded the significant positive correlation between number of branches per plant with pod yield. ICG-8417 (925.60), ICG-8426 (7936.20) and ICG-8539 (755.40) recorded maximum number of leaves per plant. The genotype, ICG-8525 maintained higher leaf area (24.83 dm^2) and LAI (8.28) followed by ICG-8462 (23.78 & 7.93 dm^2) and ICG-8048 (23.44 & 7.81 dm^2).

The pattern of dry matter production and it's distribution into component plant parts has been of phenomenal interest to the research workers engaged in yield analysis. In view of this, in the present investigation, it envisaged to know the pattern of dry matter accumulation, it's distribution in component parts of plant (Table 2). In the present investigation, the dry matter accumulation is less than that of other plant parts (Ghosh *et al.*, 1997). The genotype, ICG-8462 (54.07 g) maintained the higher dry matter production as an account of higher magnitude of dry matter in leaves (23.47 g), stem (15.96 g) and roots (1.92 g). In addition, ICG-8521 (51.37 g), ICG 8075 (50.75 g) and ICG-8048 (50.60 g) were also recorded the higher dry matter production per plant. The genotypes, ICG-8539 (2.05 g), ICG-8326 (2.04 g) and ICG-8316 (1.98 g) for roots; ICG-8048 (17.83 g), ICG-8539 (17.10 g) and ICG-8075 (16.26 g) for stem; ICG-8075 (23.47 g), SB-XI (22.19 g) and ICG-8521 (20.96 g) for leaves; ICG-8416 (17.00 g), ICG-8417 (15.52 (15.52 g) and ICG-8420 (15.36 g) for pod were promising for higher dry matter accumulation in component parts of plant.

The physiological parameters influenced by groundnut genotypes are presented in Table 3. The genotypes, ICG-0845 (29.29µ mol m^{-2} s^{-1}), ICG-8472 (28.12 µmol m^{-2} s^{-1}) and ICG-8439 (28.05 µmol m^{-2} s^{-1}) recorded the higher rate of photosynthesis, while, ICG-8525 (4.76 mmol m^{-2} s^{-1}), ICG-8518 (4.36 mmol m^{-2} s^{-1}) and ICG-0845 (4.02 mmol m^{-2} s^{-1}) had higher rate of transpiration. The genotypes, ICG-8439 (0.36), ICG-8417 (0.35 µmol m^{-2} s^{-1}), ICG-8525 (0.34 µmol m^{-2} s^{-1}) and ICG-8473 (0.21 µmol m^{-2} s^{-1}) showed maximum stomatal conductance. The results are conformity with the results of Kalpana *et al.* (2003). As a result of higher rate of photosynthesis as compared with least amount of transpiration rate, the genotypes ICG-8316 (15.23), ICG-8328(11.86) and TAG-24 (11.54) had higher water use efficiency. The stomatal frequency is an important parameter which correlates with the water uptake, it's losses and use efficiencies. In the present investigation, the genotypes, ICG-8539 (22.40 mm^2), ICG-8506 (21.40 mm^2) and ICG-8521 (20.60 mm^2) for recorded maximum adaxial, whereas, ICG-8473 (10.50 mm^2), ICG-8518 (10.50 mm^2) and ICG-8316 (10.40 mm^2) maximum abaxial stomatal frequency, respectively.

As Bently Glass (1961) has to aptly stated, "Life is a photochemical phenomenon." The chemical compounds most important in this conversion of light energy to chemical energy are the pigments that exist within the chloroplast/ chromatophores of plants. The chlorophylls, the green pigment of the chloroplast, are the most important photosynthetic plant pigment, and today at least seven types may be distinguished. Amongst these, chl 'a' and 'b' covers majority of the portion of chloroplast. In the present investigation, the genotype, ICG-0845 recorded higher chlorophyll 'a' (0.73 mg/g), chlorophyll 'b' (0.55 mg/g) and total chlorophyll (1.43 mg/g). In addition to this, ICG-8316 also found rich in chlorophyll 'a' (0.65 mg/g), chlorophyll 'b' (0.49 mg/g) and total chlorophyll (1.27 mg/g).

Groundnut kernel considered as a rich source of oil and proteins. It has been aptly described as natures master piece of food values containing 36 to 54 per cent oil with 21-26 per cent protein and have a energy value of 2,363 KJ/100 g (Adsule *et al.*, 1980). In the present investigation, the genotype ICG-0845 maintained higher protein (25.73%) and oil content (52.46%) in addition to higher chlorophyll content. The genotypes, SB-XI (50.00%) and ICG-8326 (49.64%) also found rich for oil content (Table 4). It may be concluded that the genotypes having higher chlorophyll content might be a higher concentration of carbon compounds.

The data on yield and yield contributing characters are presented in Table 5. The genotypes, ICG-8075 (43.90), ICG-8539 (42.00) and ICG-8506 (41.40) recorded highest number of pods per plant. The highest number of kernels per pod was recorded by ICG-8525 (3.30), ICG-8539 (3.10) and TAG-24 (3.00). The 100 kernels weight (g) was higher in ICG-8328 (58.54 g) followed by ICG-8521 (53.49), ICG-8439 (50.73) and ICG-8473 (49.60). The genotypes, ICG-8416 (24.35 g), ICG-8417 (23.83 g) and ICG-8420 (23.55 g) the highest dry pod yield per plant. The Genotypes, ICG-8420 (69.94 q/ha), ICG-8473 (68.23 q/ha) and ICG-8506 (68.08 q/ha) were significantly superior for dry pod yield. The pod yield of the genotype was mainly due to favorable yield contributing character like number of pods per plant, number of kernels and harvest index. These findings are on the similar lines to those reported by Mishra *et al.* (1991), Jadhav and Sengupta (1991) and Jayalakshmi *et al.* (2000). The genotypes, TAG-24 (66.17 %), ICG-8473 (61.03%) and ICG-8420 (60.57%) maintained higher harvest index. The higher shelling percentage was recorded by the genotypes ICG-8462 (73.32 %), ICG-8525 (73.20 %) and TAG-24 (72.98 %).

From the result obtained in the present investigation, it was concluded that, the genotype ICG-8416 with highest pod dry matter partitioning percentage and lowest total dry matter at harvest is high yielding. The genotypes, ICG-8420, ICG-8473 and ICG-8506 showed highest dry pod yield per plot and dry pod yield per ha. The genotypes SB-XI, ICG-8326 and ICG-8462 with lowest harvest index indicated poor translocation of assimilate from source to sink. Therefore, these genotypes could be utilized in breeding programme for the high biological yield (dry matter) point of view. The physiological processes like photosynthesis, stomatal conductance, transpiration rate etc. were found at highest rate in some genotypes like ICG-8525 which resulted in highest yielding. The genotype ICG-0845, ICG-8316 and ICG-8525 recorded highest protein content, oil content, chlorophyll-a, chlorophyll-b and total chlorophyll which may be further useful for population improvement.

On the basis of relative ranking, the genotypes, ICG-8420 (69.94 q/ha), ICG-8473 (68.23 q/ha) and ICG-8506 (68.08 q/ha) were found superior in terms of morpho-physiological traits, whereas, ICG-0845, ICG-8316 and ICG-8525 were promising for maintaining chlorophyll content and protein and oil content. Therefore, these genotypes can be considered in future breeding programme for boosting up the yield heterosis and improvement in oil and protein content.

IV. CONCLUSION

1. From the result obtained in the present investigation, it was concluded that, the genotype ICG-8416 with highest pod dry matter partitioning percentage and lowest total dry matter at harvest is high yielding.

2. The genotype TAG-24 showed highest harvest index.

3. The genotypes like ICG-8420, ICG-8473 and ICG-8506 showed highest dry pod yield per plot and dry pod yield per ha.

4.The genotypes SB-XI, ICG-8326 and ICG-8462 with lowest harvest index indicated poor translocation of assimilates from source to sink. Therefore, these genotypes could be utilized in breeding programme for the high biological yield (dry matter) point of view.

5. The physiological processes like photosynthesis, transpiration rate etc. were found at highest rate in some genotypes which resulted in highest yielding.

6. The genotype ICG-0845, ICG-8316 and ICG-8525 recorded highest protein content, oil content, chlorophyll-a, chlorophyll-b and total chlorophyll which may be further useful for crop improvement.

7. Number of kernels/pod, photosynthetic rate and leaf area at harvest showed positive correlation association with dry pod yield per plant. Therefore, these traits could be considered for further breeding programme from the high dry pod yield per plant point of views.

8. Number of kernels/pod, photosynthetic rate and total dry matter at harvest exhibited direct positive effect on dry pod yield per plant. Suggesting direct selection based on these characters would be considered for further breeding programme and help in selecting high yielding genotypes in groundnut.

REFERENCES

[1] Adsule, R.N., Kadam, S.S. and Salunke, D.K.. Peanut in handbook of world food legumes CRC Press, 1 FL, USA pp. 193-215(1980).

[2] Deshmukh, D.D. and Dev, D.V.. Association of physiological traits with productivity and regression analysis in groundnut (Arachis hypogaea L.). Ann. Pl. Physiol. 7 (1) : 123-125 (1993).

[3] Ghosh, P.K., Mathur, R.K., Ravindra, V. and Gor, H.K.. Dry matter accumulation, nitrogen uptake and their partitioning pattern in virginia groundnut (Arachis hypogaea L.). Indian J. Pl. Physiol. 2 (3) : 234-236 (1997).

[4] Glass, B. (1961). Summary. In W. McElroy and B. Glass (eds), Light and life. Johns Hofkins Press, Baltimore, Md.Gregory, F. G.. The effect of climatic conditions on the growth of barley. Ann. Bot. 40: 1-26 (1926).

[5] Jadhav, B.B. and Sengupta, V.K.. Effect of light stress on peanut productivity. Ann. Pl. Physiol. 5 (2) : 194-201 (1991).

[6] Jayalakshmi, V., Reddy, C.R., Reddy, P.V. and Reddy, G.L.. Character association among morpho-physiological attributes in parental genotypes and groundnut hybrids. Legume Res. 23 (2) : 102-105 (2000).

[7] Kalpana, M., Chetti, M.B. and Ratnam, B.P.. Phenological changes in photosynthetic rate, transpiration rate and stomatal conductance and their relationship with seed yield in cowpea (Vigna unguiculata L.). Indian J. Plant Physio. 8 (2): 160-164 (2003).

[8] Mathur, R.. Genetic variability and correlation studies in segregating generations of cowpea. Madras Agric. J. 82: 150-152 (1995).

[9] Mensah, J.K. and Okpere, V.E.. Screening of four groundnut cultivars from Nigeria for drought resistant. Legume Res. 23 (1): 37-41 (2000).

[10] Mishra, R.K., Tripathi, A.K., Chaudhary, S.K. and Sharma, R.B.. Evaluation of characters responsible for high yield in groundnut. Indian J. Pl. Physiol. 24 (2): 300-303 (1991).

[11] Nagraj, G.. Paper presented on soil and oil quality of Indian groundnut in ICRISAT Seminar, Hyderabad. pp. 1-2 (1995).

[12] Panse, V. G. and Sukhatme, P. V.. Statistical Methods for Agricultural Workers. ICAR Rev. Ed. By Sukhatme, P. V. and Amble, V. N., pp. 145-156 (1985).

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Table 1 Phenological and morphological characters influenced by groundnut genotypes

Sr. No	Genotypes	Days for appearance of flowering	Days of physiological maturity	Plant height (cm)	Number of branches plant^{-1}	Number of leaves plant^{-1}	Leaf area plant^{-1} (dm^2)	LAI
1.	TAG-24	29.80	125.10	27.63	7.30	262.50	22.50	7.50
2.	ICG-8474	28.70	124.70	36.18	10.20	364.90	23.28	7.76
3.	ICG-8326	29.70	125.60	36.49	13.45	395.50	23.28	7.76
4.	ICG-8328	29.50	126.90	36.17	13.70	358.00	21.77	7.25
5.	ICG-8472	29.20	127.00	28.67	13.75	406.60	22.86	7.62
6.	ICG-8462	29.20	127.30	29.59	7.40	364.20	23.78	7.93
7.	ICG-8439	29.70	125.70	32.97	10.65	362.00	22.48	7.49
8.	ICG-8426	29.70	127.80	32.67	9.80	793.20	22.72	7.57
9.	ICG-8518	29.30	129.20	37.05	11.95	443.40	21.57	7.19
10.	ICG-8525	31.30	130.00	33.60	8.00	390.50	24.83	8.28
11.	ICG-0845	29.50	128.90	40.88	8.60	291.30	22.88	7.63
12.	ICG-8416	29.60	128.30	34.52	11.10	425.20	23.40	7.80
13.	ICG-8420	29.20	129.30	32.36	11.45	591.10	22.70	7.57
14.	ICG-8417	27.80	124.80	27.43	14.10	925.60	22.88	7.63
15.	ICG-8473	29.70	127.00	27.40	16.25	611.20	21.65	7.22
16.	ICG-8506	29.10	126.40	34.44	12.65	560.80	22.10	7.36
17.	ICG-8539	30.10	126.80	38.84	8.70	755.40	22.16	7.39
18.	ICG-8075	29.60	127.90	40.50	8.15	365.20	22.83	7.61
19.	ICG-8521	28.90	128.00	32.70	8.60	303.70	22.20	7.40
20.	ICG-8316	29.50	127.70	34.21	7.40	269.20	23.20	7.73
21.	ICG-8048	29.20	128.50	35.96	9.75	360.20	23.44	7.81
22.	SB-XI	29.70	124.90	38.14	8.80	482.20	22.52	7.50
Mean		29.46	127.17	34.02	10.53	458.27	22.77	7.59
S.E. $\pm$		0.30	0.76	0.63	0.92	1.13	0.51	0.17
C.D. at 5 %		0.88	2.23	1.86	2.70	3.33	1.49	0.50

Table 2 Dry matter production and it's distribution in component parts of plant influenced by groundnut genotypes.

Sr. No.	Genotypes	Dry matter accumulation per plant (g)				
		Roots	Stem	Leaves	Pods	Total
1.	TAG-24	1.63	12.18	16.14	12.34	42.29
2.	ICG-8474	1.70	13.85	19.04	11.80	46.39
3.	ICG-8326	2.04	15.82	17.81	11.40	47.07
4.	ICG-8328	1.74	15.14	18.19	12.34	47.41
5.	ICG-8472	1.54	12.79	13.71	12.71	40.75
6.	ICG-8462	1.92	15.96	23.47	12.72	54.07
7.	ICG-8439	1.82	15.65	17.11	11.71	46.29
8.	ICG-8426	1.73	12.99	14.61	12.24	41.57
9.	ICG-8518	1.54	13.39	16.85	13.81	45.59
10.	ICG-8525	1.78	11.65	16.05	14.12	43.60
11.	ICG-0845	1.70	13.91	17.37	12.95	45.93
12.	ICG-8416	1.73	12.51	13.70	17.00	44.94
13.	ICG-8420	1.63	13.78	17.12	15.36	47.89
14.	ICG-8417	1.72	11.86	14.80	15.52	43.90
15.	ICG-8473	1.74	14.81	16.41	13.41	46.37
16.	ICG-8506	1.56	13.57	13.18	13.87	42.18
17.	ICG-8539	2.05	17.10	19.12	11.96	50.23
18.	ICG-8075	1.94	16.26	20.32	12.23	50.75
19.	ICG-8521	1.80	15.98	20.96	12.63	51.37
20.	ICG-8316	1.98	14.58	16.08	13.70	46.34
21.	ICG-8048	1.65	17.83	18.41	12.71	50.60
22.	SB-XI	1.78	14.26	22.19	10.90	49.13
Mean		1.76	14.36	17.39	13.06	46.57
S.E. ±		0.08	0.73	0.78	0.87	1.65
C.D. at 5 %		0.24	2.15	2.28	2.56	4.85

Table 3 Physiological parameters influenced by groundnut genotypes at 50 % flowering.

Sr. No.	Genotypes	Photosynthesis rate (μ mol m^{-2} s^{-1})	Transpiration rate (mmol m^{-2} s^{-1})	Stomatal conductance (μmol m^{-2} s^{-1})	Water use efficiency	Stomatal frequency (mm^2 leaf area)	
						Adaxial	**Abaxial**
1.	TAG-24	26.55	2.30	0.27	11.54	15.10	10.10
2.	ICG-8474	27.13	2.41	0.26	11.26	20.30	10.20
3.	ICG-8326	25.95	2.64	0.26	9.83	18.50	8.40
4.	ICG-8328	26.10	2.20	0.21	11.86	17.30	9.40
5.	ICG-8472	28.12	3.09	0.31	9.10	15.10	8.80
6.	ICG-8462	27.91	2.92	0.28	9.56	18.10	9.30
7.	ICG-8439	28.05	3.34	0.36	8.40	17.10	9.00
8.	ICG-8426	30.39	2.81	0.30	10.81	16.70	10.00
9.	ICG-8518	30.69	4.36	0.33	7.04	17.50	10.40
10.	ICG-8525	31.47	4.76	0.34	6.61	19.20	8.50
11.	ICG-0845	29.19	4.02	0.30	7.26	18.70	9.30
12.	ICG-8416	26.04	3.22	0.24	8.09	20.40	9.50
13.	ICG-8420	25.26	2.95	0.30	8.56	17.90	8.70
14.	ICG-8417	26.53	3.02	0.35	8.78	19.80	10.30
15.	ICG-8473	26.43	3.68	0.21	7.18	20.40	10.50
16.	ICG-8506	25.61	2.82	0.26	9.08	21.40	9.80
17.	ICG-8539	25.74	3.92	0.24	6.57	22.40	9.50
18.	ICG-8075	27.98	3.26	0.26	8.58	20.00	7.30
19.	ICG-8521	27.58	3.87	0.25	7.13	20.60	9.20
20.	ICG-8316	27.41	1.80	0.25	15.23	18.50	10.40
21.	ICG-8048	27.10	2.31	0.27	11.73	17.40	9.60
22.	SB-XI	27.25	1.81	0.23	15.06	19.30	8.60
Mean		**27.48**	**3.07**	**0.28**	9.51	**18.71**	**9.40**
S.E. ±		0.59	0.24	0.02	2.46	0.78	0.39
C.D. at 5 %		1.74	0.71	0.07	2.45	2.29	1.15

Table 4 Bio-chemical parameters as influenced by groundnut genotype.

Sr. No.	Genotypes	Chlorophyll content (mg/g)			Protein content (%)	Oil content (%)
		Chlorophyll-a	**Chlorophyll-b**	**Total Chlorophyll**		
1.	TAG-24	0.37	0.25	0.74	25.01	50.00
2.	ICG-8474	0.57	0.41	1.17	25.28	49.40
3.	ICG-8326	0.46	0.38	1.06	24.84	49.64
4.	ICG-8328	0.37	0.24	0.72	24.44	45.08
5.	ICG-8472	0.49	0.36	1.08	24.77	49.50
6.	ICG-8462	0.41	0.29	0.83	25.20	47.53
7.	ICG-8439	0.53	0.46	1.25	25.36	47.89
8.	ICG-8426	0.45	0.34	0.82	24.56	47.53
9.	ICG-8518	0.32	0.26	0.64	25.52	48.03
10.	ICG-8525	0.56	0.44	1.23	25.60	45.66
11.	ICG-0845	0.73	0.55	1.43	25.73	52.46
12.	ICG-8416	0.52	0.43	1.05	24.79	45.40
13.	ICG-8420	0.45	0.37	0.86	24.61	46.19
14.	ICG-8417	0.48	0.35	0.83	24.48	48.42
15.	ICG-8473	0.52	0.35	1.03	24.87	48.95
16.	ICG-8506	0.47	0.37	0.94	24.42	45.82
17.	ICG-8539	0.63	0.43	1.16	24.41	49.31
18.	ICG-8075	0.41	0.33	0.84	24.74	44.85
19.	ICG-8521	0.49	0.34	0.98	24.85	47.67
20.	ICG-8316	0.65	0.49	1.27	24.84	47.49
21.	ICG-8048	0.48	0.40	1.06	24.97	47.56
22.	SB-XI	0.54	0.44	1.18	24.72	44.35
Mean		**0.50**	**0.37**	**1.01**	**24.91**	**47.67**
S.E. ±		0.02	0.02	0.02	0.27	0.20
C.D. at 5 %		0.06	0.06	0.06	0.79	0.58

Table 5. Yield and yield contributing characters as influenced by groundnut genotypes

Sr. No.	Genotypes	Number of pods per plant	Number of kernels per pod	100 kernel weight (g)	Dry pod yield (g) per plant	Dry pod yield (q/ha)	Harvest index (%)	Shelling %
1.	TAG-24	20.10	3.00	42.92	16.74	58.54	66.17	72.98
2.	ICG-8474	21.30	2.90	46.71	14.25	41.57	35.72	72.62
3.	ICG-8326	19.50	2.70	40.94	13.42	47.19	33.14	72.09
4.	ICG-8328	23.00	2.40	58.54	17.21	50.92	39.62	72.06
5.	ICG-8472	20.90	2.60	38.77	19.76	54.90	40.63	72.81
6.	ICG-8462	28.10	1.80	37.10	20.12	58.67	34.57	73.33
7.	ICG-8439	21.30	2.00	50.73	14.16	34.43	40.27	69.51
8.	ICG-8426	32.80	2.20	43.80	16.69	42.89	42.23	70.81
9.	ICG-8518	24.30	2.60	46.15	20.75	61.42	40.09	71.24
10.	ICG-8525	28.60	3.30	45.30	22.35	51.18	42.90	73.20
11.	ICG-0845	20.60	2.90	39.06	20.07	61.90	37.28	70.84
12.	ICG-8416	22.80	2.50	48.60	24.35	48.20	42.76	72.30
13.	ICG-8420	21.00	2.30	41.52	23.54	69.94	60.57	69.53
14.	ICG-8417	24.20	2.80	38.81	23.83	61.12	41.33	70.99
15.	ICG-8473	29.90	2.90	49.69	20.08	68.23	61.03	72.56
16.	ICG-8506	41.40	2.20	43.79	21.30	68.08	57.66	71.21
17.	ICG-8539	42.00	3.10	40.91	16.38	55.61	40.53	71.54
18.	ICG-8075	43.90	1.60	38.65	16.68	61.20	35.58	72.92
19.	ICG-8521	34.30	2.60	53.49	18.16	40.06	39.57	70.27
20.	ICG-8316	36.10	2.10	40.61	20.50	54.34	38.90	71.72
21.	ICG-8048	29.70	1.40	35.50	19.57	60.59	35.44	72.09
22.	SB-XI	34.40	2.20	45.47	12.98	48.57	32.94	70.84
Mean		28.19	2.46	43.96	18.77	54.52	42.68	71.70
S.E. ±		1.29	0.14	3.25	0.68	5.14	1.08	0.74
C.D. at 5 %		3.79	0.42	9.55	1.99	15.12	3.17	2.17