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Growth and Yield of Groundnut Genotypes as Influenced by Nutrient levels

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ABSTRACT

A field experiment was conducted at S.V. Agricultural College, Tirupati (ANGRAU), during *rabi* season of 2012 -13 to study the response of groundnut genotypes to the nutrient levels. The findings of the experiment revealed that the growth, yield attributes and yield were higher with the genotype TCGS-1073 than Rohini, Greeshma and TCGS-1043. Application of 150 % RDF recorded the highest growth, yield attributes and pod yield of groundnut than application of 100 % RDF@ 30:40:50 kg N, P_2O_5 and K_2O ha^{-1}.

Key words : Groundnut genotypes, Nutrient levels, Yield.

Groundnut is an important oil seed crop in India and commonly called as poor man's nut. India is the one of the major producing country in the world with an area, production and productivity of 4.91m.ha, 5.62m.t and 1341kg ha^{-1} respectively. The present production level of groundnut needs to be increased in order to meet the ever growing population pressure on per capita consumption of oil to reach self sufficiency in oil seed production. Therefore, development of groundnut genotypes is a practically feasible and readily adoptable genetic option to increase the groundnut productivity. Adoption of an improved genotype alone can increase the yield by about 20 per cent. (http://www.ikisan.com).

Fertilizer recommendations from the past research do not hold promise in the present day scenario for new genotypes. The fertile soils in the past are gradually becoming sick due to intensive cultivation, inadequate replenishment of nutrients than their removal. One of the prime factor responsible for low yields in groundnut is the inadequate and imbalanced use of nutrients. New groundnut genotypes were recently developed at RARS, Tirupati, but very little of the agronomic requirement of these genotypes are known. Hence, the present study was conducted to study the growth and yield of groundnut genotypes as influenced by nutrient levels in Southern Agro climatic zone of Andhra Pradesh.

MATERIAL AND METHODS

A field experiment was conducted during *rabi*, 2012-13 at Dry land Farm of S.V. Agricultural College, Tirupati. The soil of the experimental site was sandy clay loam in texture, low in available nitrogen (210 kg ha^{-1}), and medium in available phosphorus (34.6 kg ha^{-1}) and low in available potassium (140.5 kg ha^{-1}) with a pH of 7.3. The field experiment was laid out in a split plot design with three replications. The treatments comprised of four genotypes *viz.,* Greeshma (G_1), Rohini (G_2), TCGS-1073 (G_3) and TCGS- 1043 (G_4) as main plots and three nutrient levels *viz.,* Control (N_1), 100% RDF @30- 40-50 kg N, P_2O_5 and K_2O kg ha^{-1}(N_2) and 150 % RDF (N_3) as sub plots. The crop was supplied with nutrients as per the treatments. Nitrogen was applied in the form of urea in two equal splits as basal and at 30 DAS. Phosphorus and Potassium were applied uniformly to all the treatments as basal in the form of single super phosphate and muriate of potash, respectively. Recommended agronomic practices and plant protection measures were followed. The data was subjected to statistical analysis as prescribed by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The leaf area index and dry matter production were significantly influenced by groundnut genotypes and nutrient levels. However, the interaction between genotypes and nutrients was not found to be significant (Table 1). At 45 and 60 DAS the highest leaf area index was recorded with TCGS- 1073 (G_3), which was distinctly superior to other genotypes. The genotype Rohini (G_2) was found to be the next best and produced leaf area index comparable with Greeshma (G_1). The lowest LAI was noticed with genotype TCGS- 1043 (G_4). The genotype TCGS- 1073 (G_3) showed excellent performance and produced highest LAI compared to rest of the genotypes. This might be due to higher plant height, more number of green leaves, varietal difference in leaf area and delayed senescence of leaves. The above results corroborate with that of Kaul (1999), Bharatha Lakshmi and Sambasiva Reddy (2001).

The highest leaf area index was recorded with application of 150 % RDF (N_3) followed by 100 % RDF (N_2) with significant disparity between them. The lowest LAI was noticed with control (N_1). Increase in LAI with levels of nutrients application was evidently due to their favourable effect on triggering of leaf primordia coupled with cell enlargement, resulting in production of more number of leaves with larger area plant^{-1} and obviously per unit area. The present findings are in conformity with those of Barik *et al.*(1994).

The highest dry matter was produced by TCGS- 1073 (G_3) which was significantly higher than other genotypes. The next best genotype was Rohini (G_2), however, it was comparable with Greeshma (G_1). The genotype TCGS- 1043 (G_4) recorded the lowest dry matter. Higher dry matter production by TCGS-1073 indicates its physiological advantage to out yield other three genotypes. This is in the accordance with results reported by Raghavaiah *et al.* (1995) and Bharatha Lakshmi and Sambasiva Reddy (2001).

Application of 150 % RDF (N_3) resulted in highest dry matter production, followed by 100 % RDF (N_2) with distinct disparity between them. The lowest dry matter production was recorded with control (N_1). The cumulative effect of better photosynthesis due to taller plants with more number of leaves and larger leaf area might have lead to increased dry matter production. Enhanced dry matter production with increasing levels of nutrients as evidenced in this investigation corroborates with the findings of Barik *et al.*(1994), Kausale *et al.*(2009) and Rezaul Kabir *et al.*(2013).

The highest number of filled pods plant^{-1} and hundred pod weight were obtained with TCGS-1073 (G_3), which was significantly higher than other genotypes (Table 2). The next best genotypes were Rohini (G_2) and Greeshma (G_1), which were comparable with each other. The lowest number of filled pods plant^{-1} and hundred pod weight were obtained with genotype TCGS- 1043 (G_4). Higher number of filled pods plant^{-1} and hundred pod weight with TCGS- 1073 (G_3), might be due to effective translocation of photosynthates from source to the pods (sink) and also genetic potential of genotype. This is in the accordance with the results reported by Subrahmaniyam and Kalaiselvam (2006) and Gopal *et al.* (2006)

Application of 150 % RDF (N_3) recorded highest number of filled pods plant^{-1} and hundred pod weight, followed by 100 % RDF (N_2). The lowest yield attributes were recorded with control (N_1). Improvement in the stature of yield attributes with higher level of nutrients applied might be due to combined effect of N, P and K in better assimilation and translocation of photosynthates for developing pods. These results are in conformity with the findings of Tirumala Reddy *et al.*(2011).

The highest pod and haulm yields were produced by the genotype TCGS- 1073 which was significantly superior to other genotypes (Table.2). This was followed by Rohini (G_2) and Greeshma (G_1). The genotype TCGS- 1043 (G_4) resulted in significantly least pod yield. The differences between genotypes in the yielding ability might be attributed to several factors like vegetative matter build up, development of yield attributes and sink capacity of the genotype. The yielding ability is also governed by the partitioning ability of genotype towards development of reproductive organs. The increase in pod and haulm yields was by 53.1% and 37% over least producing genotype,(TCGS 1043) The results are in full agreement with the findings of Bharatha Lakshmi and Sambasiva Reddy (2001) and Kamara *et al.* (2011).

Regarding nutrient levels, application of 150 % RDF (N_3) recorded highest pod and haulm yields, which was significantly superior to 100 % RDF (N_2). The lowest pod and haulm yields were observed with control (N_1). The increase in pod and haulm yields by 59% and 34.8% over control respectively, might be due to the enhanced

Table 1. Growth of the groundnut as influenced by genotypes and nutrients.

Treatments	Leaf area index		Dry matter production (kg ha^{-1})	
	45 DAS	60 DAS	45 DAS	60 DAS
Genotypes				
G_1 : Greeshma	1.96	3.23	2653	4696
G_2 : Rohini	1.96	3.24	2766	5018
G_3 : TCGS -1073	2.28	3.56	3886	5949
G_4 : TCGS -1043	1.61	2.89	2188	3456
SEm±	0.08	0.04	50.4	124
CD (P=0.05)	0.30	0.15	174	429
Nutrient levels				
N_1 : Control	1.45	2.73	2115	3431
N_2 : 100 %RDF	1.86	3.14	2860	5034
N_3 : 150 %RDF	2.55	3.83	3645	5872
SEm±	0.09	0.05	89.5	137
CD (P=0.05)	0.28	0.18	268	412
G × N	NS	NS	NS	NS

Table 2. Yield attributes and yield of groundnut as influenced by genotypes and nutrients.

Treatments	Filled pods $plant^{-1}$	100 pod weight (g)	Pod yield (kg/ha)	Haulm yield (kg/ha)
Genotypes				
G_1 : Greeshma	13.5	94.73	2961	4248
G_2 : Rohini	14.0	95.16	3098	4417
G_3 : TCGS -1073	16.4	110.90	3550	4929
G_4 : TCGS -1043	11.1	80.93	2318	3596
SEm±	0.19	2.06	68	147
CD (P=0.05)	0.67	7.14	237	509
Nutrient levels				
N_1 : Control	9.25	87.98	2245	3637
N_2 : 100 %RDF	14.5	96.69	3124	4351
N_3 : 150 %RDF	17.5	101.67	3576	4904
SEm±	0.39	1.36	107	109
CD (P=0.05)	1.2	4.09	321	329
G × N	NS	NS	NS	NS

morphological characters *i.e.,* highest plant height, LAI and dry matter accumulation, with the highest level of nutrients applied. The above results are in conformity with the findings of Barik *et al.*(1994) and Tirumala Reddy *et al.*(2011).

From the present investigation, it can be concluded that among the different genotypes TCGS-1073 performed better with the application 150 % RDF (45:60:75 N, P_2O_5 and K_2O kg ha^{-1}) for realising higher pod and haulm yields of groundnut in Southern Agro climatic zone of Andhra Pradesh.

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