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RESEARCH PAPER

Effect of integrated nutrient management on yield, quality, nutrient content and uptake of groundnut in shrink-swell soil

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Abstract : Pod and haulm yield of groundnut was significantly affected by different treatments over control maximum pod and haulm yield (20.95 and 37.87 q ha^{-1}) was recorded by the 150 % RDF (37.5:75:37.5 NPK Kg ha^{-1}) followed by integrated use of 5t FYM ha^{-1} + 50% RDF + neem cake 500 kg ha^{-1}+ biofertilizers (18.79 and 37.03 Kg ha^{-1}) and lowest being control (10.98 and 27.46 Kg ha^{-1}) regarding quality parameter such as crude protein content in groundnut kernels influenced significantly among various nutrient sources in comparison to control. Among the different combination treatments the highest oil content was recorded by the 150 % RDF (37.5:75:37.5 NPK Kg ha^{-1}) and 5t FYM ha^{-1} + 50% RDF + neem cake (NC) 500 Kg ha^{-1} + biofertilizer (BF). The highest nutrient content and uptake was recorded in 150% RDF and found at par with 5t FYM ha^{-1}+ 50% RDF+NC+BF (3.89, 0.39, 0.89% and 1.81, 0.18, 1.37% nutrient contents) and uptake (72.93, 7.35, 16.70 and 62.08, 6.65, 50.73 kg ha^{-1}) in pod and haulm, respectively.

Key Words : Groundnut, Nutrient content, Uptake, Yield, Quality

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INTRODUCTION

Groundnut is an exhaustive crop and removes large amount of macro and micronutrient. No single source of nutrient is capable at supplying plant nutrients in adequate amount and balanced proportion. Therefore, to maintain soil fertility and to supply plant nutrients in balanced proportion for optimum growth, yield and quality of crop in an integrated manner in a specific agro ecological situation is to practice integrated nutrient supply through the combined use of biological and organic sources of plant nutrients (Kachot *et al*., 2001). The decline in the soil fertility and production are the matter of nutrient in balance, which recognized as one of the most important factors that limits the crop yield (Nambiar and Ghosh, 1984).

Confectionary groundnut is gaining more important in recent years in view of its export potential to earn the foreign exchange and also to pattern at groundnut utilization for oil purpose is gradually changed during the past decades. The food and confectionary use is on the rise. The present experiment was therefore undertaken in order to increase the productivity of confectionary groundnut and efficient use of resources like FYM, neem cake, biofertilizer and fertility through nutrient management.

MATERIAL AND METHODS

A field experiment was conducted with groundnut variety AK - 303 at Oil Seed Research Unit. Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during *Kharif* 2007. The experiment was laid out in Randomized Blocks design with three replications and eleven treatments. The following treatments were imposed *viz.*, T_1 = 100 % RDF (25:50:25) NPK Kg ha^{-1} university recommended dose, T_2 = 150 % RDF (37.5:75:37.5) NPK Kg ha^{-1} national recommended dose of HPS, T_3 = 10t FYM ha^{-1}, T_4 = 5t FYM ha^{-1} + BF (*Rhizobium* + PSB), T_5 = 5t FYM ha^{-1} + BF, T_6 =5t FYM ha^{-1} + NC +BF, T_7 = 5t FYM ha^{-1} + 50 % RDF + BF, T_8 = 5t FYM ha^{-1} + 50 %

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RDF + NC, T_9 = 5t FYM ha^{-1} + 50% RDF + NC + BF, T_{10} = 5t FYM ha^{-1} + 50 % RDF, T_{11} = absolute control. The annual rainfall at the region is 779.8 mm. The initial soil at the experimental site was Inceptisol consisting of 0.47 (%) organic carbon, 183.50, 14.10 and 328.25 available N, P_2O_5, and K_2O Kg ha^{-1} with pH 7.92 and EC 0.24 ds m^{-1}. The initial and at harvest soil samples at 0-15 cm depth and organic manures were analyzed for different parameters by following standard methods (Jackson, 1967). Pod and haulm plant samples after harvest were analyzed for total N, P and K as described by Jackson (1967). The quality parameters such as oil and protein content of groundnut seed after harvest was determined by A.O.A.C (1990).

RESULTS AND DISCUSSION

The results on pod and haulm yield of groundnut was significantly affected by different treatments over control (Table.1) maximum pod and haulm yield (20.95 and 37.87 q $ha^{-1)}$ was recorded by the (T_2) 150 % RDF (37.5:75:37.5 NPK Kg ha^{-1}) followed by (T_1) 100 % RDF (25:50:25 NPK Kg ha^{-1}) and 5t FYM ha^{-1} + 50 % RDF + Neem cake + Bio fertilizers (19.56 and 35.33 q ha^{-1}, 18.79 and 37.03 q ha^{-1} T_1 and T_9, respectively) and lowest values at these yield were recorded in absolute control (T_{11}). Balasubramanian (1997) reported that though 150 per cent NPK application increased pod yield it did not differ with recommended dose. It may be due to low efficiency of applied nutrients at higher rate.

At par values of pod and haulm yields observed in treatments receiving 50 % RDF along with various sources of organics might be due to the combined effect of FYM chemical and biofertilizers which played very important role due to their synergistic effect biofertilizers was perform

Table 1 : Pod and haulm yield of groundnut as influenced by different nutrient management practices

Sr. No.	Treatments	Yield (q ha^{-1})		Quality parameters	
		Pod	Haulm	Protein content (%)	Oil content (%)
T_1	100 % RDF	19.56	35.33	29.68	47.05
T_2	150 % RDF	20.95	37.87	29.93	47.92
T_3	10t FYM ha^{-1}	16.26	33.79	29.62	46.32
T_4	5t FYM ha^{-1} + BF	13.29	29.01	29.37	46.11
T_5	5t FYM ha^{-1}+ NC	14.74	29.16	29.49	47.22
T_6	5t FYM ha^{-1} + NC +BF	15.64	29.78	29.62	47.25
T_7	5t FYM ha^{-1} + 50 % RDF + BF	16.87	33.17	29.62	47.23
T_8	5t FYM ha^{-1} + 50 % RDF + NC	17.74	35.49	29.68	47.52
T_9	5t FYM ha^{-1} + 50% RDF + NC + BF	18.79	37.03	29.81	47.89
T_{10}	5t FYM ha^{-1} + 50 % RDF	15.70	31.79	29.50	46.25
T_{11}	Absolute control	10.98	27.46	24.13	46.20
	S.E. (m)±	1.06	1.61	1.35	0.11
	C.D. (P = 0.05)	3.53	5.38	NS	0.36

NS=Non-significant

Table 2 : Nutrient content and uptake at groundnut as influenced by different nutrient management practices

Sr. No.	Treatments	Nutrient content (%)						Uptake (kg ha^{-1})					
		Pod			Haulm			Pod yield			Haulm yield		
		N	P	K	N	P	K	N	P	K	N	P	K
T_1	100 % RDF	3.88	0.37	0.87	1.80	0.178	1.35	75.99	7.21	17.08	63.59	6.28	47.65
T_2	150 % RDF	3.90	0.40	0.90	1.83	0.184	1.39	81.66	8.35	18.89	69.29	6.95	52.56
T_3	10t FYM ha^{-1}	3.86	0.35	0.85	1.79	0.175	1.28	62.73	5.67	13.84	60.51	5.66	43.22
T_4	5t FYM ha^{-1} + BF	3.80	0.31	0.80	1.69	0.170	1.34	50.53	4.13	10.62	49.06	4.93	38.86
T_5	5t FYM ha^{-1}+ NC	3.82	0.33	0.82	1.70	0.173	1.33	56.26	4.82	12.12	49.54	5.04	38.72
T_6	5t FYM ha^{-1} + NC +BF	3.83	0.33	0.84	1.71	0.175	1.33	59.96	5.17	13.10	50.90	5.20	39.16
T_7	5t FYM ha^{-1} + 50 % RDF + BF	3.84	0.35	0.85	1.75	0.175	1.34	64.88	5.91	14.32	58.07	5.80	46.50
T_8	5t FYM ha^{-1} +50 % RDF+NC	3.85	0.36	0.84	1.75	0.176	1.35	68.30	6.38	14.91	62.07	6.24	47.92
T_9	5t FYM ha^{-1}+ 50% RDF+NC+BF	3.89	0.39	0.89	1.81	0.180	1.37	72.93	7.35	16.70	62.08	6.65	50.73
T_{10}	5t FYM ha^{-1} + 50 % RDF	3.84	0.34	0.83	1.73	0.169	1.32	60.30	5.37	13.01	55.01	5.37	41.93
T_{11}	Absolute control	3.77	0.29	0.78	1.65	0.162	1.24	41.40	3.17	8.55	45.25	4.44	33.95
	S.E.(m)±	0.015	0.007	0.010	0.017	0.002	0.011	4.11	0.39	0.96	3.04	0.28	2.12
	C.D. (P = 0.05)	0.050	0.026	0.034	0.057	0.006	0.036	13.68	1.32	3.21	10.10	0.94	7.04

better when soil is well supplied with nutrients particularly nitrogen and phosphorus and application of FYM increase the supply of easily assimilated major as well as micro nutrients to plants besides mobilizing unavailable nutrients into available form. Kachot *et al.*, 2001 Badole *et al.*, 2003 and Panwar and Singh, 2003).

Quality parameters:

Regarding quality parameters such as oil and protein content in groundnut kenels influenced by various treatments among different combination treatments the highest protein content (29.93 %) was observed recorded in (T_2)150 per cent RDF while lowest value (24.18) of protein was recorded in control (T_{11}). In case oil content highest (47.92 %) was recorded in (T_2) 150 per cent RDF at par with (T_9) 5t FYM ha^{-1} + 50 % RDF + neem cake + biofertilizer and lower value (46.20 %) was recorded in control (T_{11}). This may be due to residual effect of organic and inorganic sources applied (Thimmegowda, 1993).

Nutrient content and uptake :

Macronutrient content and uptake in pod and haulm was significantly affected by the judicious use of inorganic fertilizer with organic manure ie. FYM Neemcake and biofertilizers *i.e.* PSB, *Rhizobium* (Table 2). Among different treatments integration of 5t FYM ha^{-1} + 50 % RDF + NC + BF was found to be the best nutrient management practices which resulted significantly higher N, P, K content in pod and haulm (3.89, 0.39, 0.89 and 1.81, 0.180, 1.37 %) and uptake (72.93, 7.35, 16.70 and 62.08, 6.65, 50.73 Kg ha^{-1}), respectively in companion with 150 % RDF. The higher content and uptake of nutrients by groundnut in both pod and haulm by 5t FYM ha^{-1} + 50 % RDF + NC + BF than alone 150 % RDF may be due to outcome of increased availability of nutrients to the plant by decomposition of applied FYM. Application of N fixing biofertilizers enhances the soil N and PSM produces organic acids which may partly be responsible for quick release of nutrients resulting in more content of nutrients Kachot *et al.* (2001), Badole *et al.* (2003) Dhawale and Charjan (2005).

REFERENCES

A.O.A.C. (1990). Official methods of analysis. Association of official analytical chemist Washington, D.C.U.S.A.

Badole, S.B., More, S.N., Adsul, P.B., Shaikh, A.K. and Dhamak, A.L. (2003). Residual effect of integrated nutrient management system of cotton on yield and nutrient uptake of summer groundnut. *J. Soil & Crops*, **13**(1):77-80.

Balasubramanian, P. (1997). Effect of integrated nutrient management on yield, quality and economic returns in irrigated groundnut. *Madras Agric J.*, **84**(9):536-538.

Dhawale, M.B. and Charjan, Y.D. (2005). Response of groundnut (TAG. 24) grown after *Rabi* Sorghum to levels of fertilizers and plant densities. *J. Soils & Crops*, **15**(1): 199-200.

Jackson, M.L. (1967). *Soil chemical analysis*. Prentice Hall of India.Pvt Ltd., New Delhi (INDIA).

Kachot, N.A., Malavia, D.D. Solanki, R.M. and Sagarka, B.K.(2001). Integrated nutrient management in rainy season groundnut (*Arachis hypogea*). *Indian J. Agron.*, **46** (3) : 516-522.

Nambiar, K.M. and Ghosh, A.B. (1984). Highlights at research of long-term fertilizer experiment in India. LTFE Research Bulletin 1. New Delhi, pp. 101.

Panwar, A.S. and Singh, N.P. (2003). Effect of conjunctive use of phosphorus and bio-organics on growth and yield of groundnut (*Arachis hypogaea). Indian J. Agron.*, **48** (3) : 214-216.

Thimmegowda, S. (1993). Effect of fertilizer levels on growth and yield of groundnut after *Kharif* rice. *J. Res. APAU*, **21** (1) : 36-38.