



## **Performance of Nutrient Management Practices on Yield and quality of *kharif* Groundnut**

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### **ABSTRACT**

*Agronomic investigation was carried out to study the influence of nutrient management on growth, yield and quality of kharif groundnut. The results revealed that, the balanced nutrition through STCR equation proved its superiority by recording significantly maximum growth and yield attributes during both years. Application of fertilizer as per STCR (25 q/ha) equation was recorded maximum and significantly higher dry pod yield (23.08 and 24.49 q/ha) than recommended dose of fertilizer during both years. This indicates that, the application of fertilizer dose as per soil test crop response (STCR) equation was achieved the yield target of 25 q ha<sup>-1</sup> in kharif groundnut with 5 per cent variation. The maximum oil content (50.04 and 50.22%) was recorded under application of fertilizer dose as per soil test and maximum protein content (25.61 and 25.67%) was observed in fertilizer dose as per STCR equation and at par with fertilizer dose as per soil test during both the years. Application of fertilizer as per STCR equation to kharif groundnut registered significantly higher total uptake of nitrogen (124.48, 126.58 kg/ha), phosphorus, (25.93 and 25.97 kg/ha) and potassium (77.53 and 78.92 kg/ ha) than rest of treatments. Whereas, significantly yield and yield attributing characters were recorded in treatment control.*

**Keywords:** *Kharif groundnut, nutrient managements, dry pod yield, nutrient uptake.*

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### **INTRODUCTION**

Groundnut (*Arachis hypogaea* L.) is the premier oilseed crop of India, occupies an area of 4.19 million ha and contributes 6.68 million tonnes production average productivity of 1.59 t/ha in India [2]. It is leguminous oilseed crop with high nutritive value of its kernels, containing 43.6 % edible oil and 25.3 % protein. Groundnut is energy rich crop and need sufficient amount of nutrients and moisture to meet their requirement for growth and development and high yields. Continuous cropping of cereal-cereal crop sequence over a long period of time reduces productivity and soil fertility. Sustainable groundnut production can be achieved by diversifying the groundnut cropping system and nutrient management. The approach of general fertilizer recommendations related to soil test ratings was in common use though it has its shortcoming. Because of the changing trend in agriculture, yield target concept and fertilizer recommendations for maximum profit per hectare became more promising. Yield target concept has the added advantage that targets can be varied by taking into consideration the resources available. The targeted yield concept has proved to be superior to others whose theoretical basis and proof was demonstrated by [7]. Targeted yield approach has been an unique one in the sense that this method not only indicates soil test based fertilizer dose, but also the levels of yield, the farmers can hope to achieve if good agronomy is followed in raising the crop. The present investigation was conducted with an objective to study the effect of nutrient management on growth, yield and quality potential of *kharif* groundnut.

### **MATERIAL AND METHODS**

A field experiment was conducted during 2011-12 and 2012-13 at Department of Agronomy, MPKV, Rahuri (M.S.). The soil of the experimental site was sandy clay loam in texture with low in available

nitrogen (168.41 kg ha<sup>-1</sup>), medium in phosphorus (15.69 kg/ ha) and high in potassium (427.00 kg/ ha) and moderate in Fe (6.89 µg/ gof soil), Mn (9.51 µg/gof soil), Zn (0.62 µg/ gof soil ) and Cu (3.41 µg/ gof soil). The soil was slightly alkaline in reaction (pH 8.20) with 0.29 dS/melectrical conductivity and 0.54 percent organic carbon content. The treatment consists of four nutrient management practices *viz.*, T<sub>1</sub>-recommended dose of fertilizer; T<sub>2</sub>-fertilizer dose as per soil test; T<sub>3</sub>- fertilizer dose as per STCR equation (25 q ha<sup>-1</sup>) and T<sub>4</sub>-control treatment. The experiment was laid out in randomized block design with nine replications. The fertilizer dose was applied as per treatment through Urea, DAP, Single Super Phosphate and Murate of Potash. Groundnut seed (CV. JL-501) was inoculated with *Rhizobium* and Phosphate Solubilizing Bacteria culture for all treatments except control. The crop was sown at a spacing of 30 cm X10 cm. All the recommended package of practices was followed during the period of investigation.

## RESULT AND DISCUSSION

### Growth attributes

The data presented in Table 1. revealed that the nutrient management through STCR equation proved its superiority by recording significantly maximum growth attributes *viz.* plant height (29.14 and 31.14 cm), number of branches/ plant(6.82 and 6.96), plant spread (28.46 and 28.96 cm), number of leaflets/ plant(55.19 and 57.78) and leaf area/ plant(10.18 and 10.74 dm<sup>2</sup>) than rest of treatments at harvest during both the years. The control treatment registered significantly minimum values of all growth attributes during both the years of experimentation. This might be because of balanced nutrition in yield target approach increase the uptake of essential nutrients and which accelerates the activities of cell elongation and cell multiplication as well as metabolic activities resulted in increasing all the growth attributes. Similar results were recorded by [3] and [6].

### Yield attributes and yield

Data presented in Table 2 indicated that, application of fertilizer dose as per STCR equation (25 q/ ha) registered significantly higher number of total pods/ plant (23.76 and 30.64), number of developed pods/ plant(20.95 and 25.79), weight of pods / plant(19.11 and 24.37 g), weight of karnels / plant(13.41 and 17.48 g) and weight of 100 karnels (37.31 and 37.49 g) than rest of treatments during both the years. However, the total number of pods / plant and 100 karnels weight was at par with fertilizer dose as per soil test during second year and weight of kernel during first year.

Application of fertilizer as per STCR (25 q/ ha) equation was recorded maximum and significantly higher dry pod yield (23.08 and 24.49 q/ ha) and it was 40.47 and 39.06 per cent higher than recommended dose of fertilized during both years. The yield target of 25 q/ ha was achieved by STCR equation (23.08 and 24.49 q/ ha) with less than 10 per cent variation (-5.8 %). While fertilizer dose as per soil test was found second best treatment (18.91 and 19.59 q ha<sup>-1</sup>) during both years. The control treatment registered significantly minimum dry pod yield (7.96 and 6.63 q ha<sup>-1</sup>) of groundnut than rest of treatments during both years. The balanced nutrition increases the chlorophyll content in leaves, which accelerate the photosynthetic rate and translocation of photosynthates towards reproductive parts (pods). Similar results were recorded by [4] and [12].

### Quality studies

The maximum oil content (50.04 and 50.22%) was recorded under application of fertilizer dose as per soil test and at par with fertilizer dose as per STCR equation and recommended dose of fertilizer during both the years. Whereas, the maximum protein content (25.61 and 25.67%) was observed in fertilizer dose as per STCR equation and at par with fertilizer dose as per soil test and recommended dose of fertilizer during both the years. This might be because of groundnut karnels were accumulated higher concentration of nitrogen which increases the protein and oil synthesis (Table 3). Similar results recorded by [1] and [9].

### Total nutrient uptake

The total nutrient uptake by groundnut was influenced significantly due to different nutrient management treatments during both the years. Application of fertilizer as per STCR equation to *kharif* groundnut registered significantly higher total uptake of nitrogen (124.48, 126.58 kg/ ha), phosphorus, (25.93 and 25.97 kg/ ha) and potassium (77.53 and 78.92 kg/ ha) than fertilizer dose as per soil test, recommended dose of fertilizer and control treatments during both the years. This might be because of STCR yield target approach of fertilizer application provides balanced nutrition to groundnut which produced more yield and nutrient uptake hence, there was lesser content of residual soil available nitrogen, phosphorus and potassium. Similar findings were reported by [12] and [13].

**CONCLUSION**

From the above study it could be concluded that, Application of fertilizer dose as per soil test crop response (STCR) equation was achieved the yield target of 25 q/ ha with increased oil and protein content in *kharif* groundnut.

**Table1: Growth attributes of groundnut as influenced by different treatments at harvest**

Nutrient management Treatment	Plant height (cm)		Number of branches/ plant		Number of leaflets/ plant		Plant spread (cm)		Leaf area plant/(dm <sup>2</sup> )	
	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
T <sub>1</sub> - Recommended dose of fertilizer	27.81	28.47	6.35	6.36	47.83	50.57	26.64	26.89	8.72	9.21
T <sub>2</sub> -Fertilizer dose as per soil test	28.10	30.16	6.76	6.75	51.50	52.71	27.17	27.87	9.43	9.87
T <sub>3</sub> - Fertilizer dose as per STCR eq <sup>n</sup> (25 q ha <sup>-1</sup> )	29.14	31.14	6.82	6.96	55.19	57.78	28.46	28.96	10.18	10.74
T <sub>4</sub> -Control (No fertilizer )	23.12	22.91	4.78	4.41	37.60	35.66	16.23	15.73	4.06	3.99
SEM±	1.06	0.77	0.35	0.34	1.33	1.46	0.67	0.63	0.19	0.20
C.D. at 5%	3.09	2.23	1.02	0.97	3.87	4.26	1.94	1.85	0.56	0.58
<b>General mean</b>	27.04	28.17	6.18	6.12	48.03	49.18	24.62	24.86	8.10	8.45

**Table 2. Yield attributes and dry pod yield of groundnut as influenced by different treatments**

Treatment Nutrient management	No. of pods/plant		Weight of pods/plant (g)		Weight of karnels plant(g)		Weight of 100 karnels (g)		Dry pod yield (q /ha)	
	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
T <sub>1</sub> - Recommended dose of fertilizer	19.56	25.54	16.26	19.35	11.16	13.63	35.22	35.64	16.43	17.61
T <sub>2</sub> -Fertilizer dose as per soil test	20.17	28.42	17.01	21.76	11.76	15.46	36.53	36.47	18.91	19.59
T <sub>3</sub> - Fertilizer dose as per STCR eq <sup>n</sup> (25q ha <sup>-1</sup> )	23.76	30.64	19.11	24.37	13.41	17.48	37.31	37.49	23.08	24.49
T <sub>4</sub> -Control (No fertilizer )	13.05	12.57	8.45	8.38	5.74	5.67	34.36	32.53	7.96	6.63
SEM±	0.91	0.92	0.59	0.75	0.53	0.46	0.54	0.47	0.59	0.52
C.D. at 5%	2.66	2.67	1.72	2.20	1.54	1.35	1.57	1.36	1.71	1.54
<b>General mean</b>	19.13	24.29	15.21	18.46	10.52	13.06	35.85	35.53	16.59	17.08

**Table 3. Theoil, protein content and nutrient uptake of *kharif*groundnut as influenced by different treatments.**

Treatment Nutrient management	Oil content (%)		Protein content (%)		Total nutrient uptake (kg/ ha)					
	2011	2012	2011	2012	2011			2012		
					N	P	K	N	P	K
T <sub>1</sub> - Recommended dose of fertilizer	49.14	49.53	25.03	25.42	90.30	16.83	57.90	94.68	17.94	61.45
T <sub>2</sub> -Fertilizer dose as per soil test	50.04	50.22	25.48	25.58	103.19	19.67	64.15	106.31	20.57	66.37
T <sub>3</sub> - Fertilizer dose as per STCR eq <sup>n</sup> (25q ha <sup>-1</sup> )	49.78	49.84	25.61	25.67	124.48	25.93	77.53	126.58	25.97	78.92
T <sub>4</sub> -Control (No fertilizer )	47.25	47.09	24.26	24.13	41.52	7.54	28.71	33.78	6.01	25.40
SEM±	0.49	0.29	0.34	0.34	2.15	0.45	1.30	2.23	0.52	0.99
C.D. at 5%	1.42	0.84	0.99	0.98	6.27	1.32	3.79	6.51	1.50	2.89
<b>General mean</b>	49.05	49.17	25.09	25.20	89.87	17.50	57.07	90.34	17.62	58.04

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