

Residual Effect of Organic Manures and Fertilizer Levels to Preceding Maize on the Nutrient Uptakes of Succeeding Groundnut

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ABSTRACT

Integrated nutrient management (INM) approach for maize-groundnut cropping system studied in field experiment during 2014-15 and 2015-16. Residual INM treatments and fertilizer levels effected significant differences on the nutrient uptakes of groundnut over control. The plot receiving combination of residual 50% RDF+50% RDN through urban compost (M₅) and 100% RDF (S₁) exerted significant effect on most of the nutrient uptakes of succeeding groundnut. The highest NPK uptakes was obtained from the plots receiving residual 50% RDF+50% RDN through urban compost (M₅) through 100% RDF (S₁) and was closely followed by the treatments having residual 50% RDF+50% RDN through FYM (M₃) and 100% RDF (S₁) at 60,90 days after sowing and at harvest. With regard to interaction between residual treatments and fertilizer levels, combination of M₅S₁ recorded the highest NPK uptake, which was on par with M₃S₁ and M₁S₁ at 60days after sowing during both years of study.

Key words: Urban compost, FYM, INM, NPK uptakes

INTRODUCTION

One of the most important challenges faced by human beings today is to conserve/sustain natural resources, including soil and water, for increasing food production while protecting the environment. As the world population grows, stress on natural resources increases, making it difficult to maintain food security. Long term food security requires a balance between increasing crop production, maintaining soil health and environmental

sustainability. In India, effective nutrient management has played a major role in accomplishing the enormous increase in food production from 52 million tonnes in 1951-52 to 264 million tonnes during 2014-15. However, application of imbalanced and excessive nutrients led to declining nutrient-use efficiency making fertilizer consumption un economical and producing adverse effects on atmosphere¹ groundwater quality causing health hazards and climate change.

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Groundnut, the premier oilseed crop of India, occupies in an area of about 6.7 million ha and contributes 7.3 million tonnes towards the oilseed production. India stands first in area and second in production, and fifth in productivity (1,000 kg ha⁻¹) after USA, China, Indonesia and Nigeria. The productivity of groundnut is low in India when compared with other countries mainly due to rain dependency (85%), monoculture (60%) and cultivation on marginal soils of low fertility. Groundnut is an energy rich crop and needs sufficient amount of nutrients and moisture to meet their requirement for growth and development and high yields. Sustainable groundnut production can be achieved by diversifying the groundnut cropping system and nutrient management practices². Integration and incorporation of organic manure (FYM/urban compost) in the agricultural systems helps to improve soil structure, soil microbial activity and soil moisture conservation and which in turn helps to stabilize the production and productivity of the crops. INM is also important for marginal farmers who cannot afford to supply crop nutrients through costly chemical fertilizers.

MATERIALS AND METHODS

A field experiment entitled “Direct and residual effect of integrated nutrient management in Maize-Groundnut crop sequence in Southern Telangana region” was conducted during *kharif* and *rabi* 2014-15 and 2015-16 at College Farm, College of Agriculture, Rajendranagar, Hyderabad, Southern Telangana climatic Zone of Telangana. The soil of experimental site was sandy clay loam with pH of 7.6, Electrical conductivity 0.86 dSm⁻¹, low in organic carbon (0.73 dSm⁻¹), low in available nitrogen (217 kg ha⁻¹) and medium in phosphorus (64 kg ha⁻¹) and high in potassium (402 kg ha⁻¹). The experiment was laid out in a randomized block design for maize during *kharif* 2014 and 2015 with six treatments consisting of combinations of three fertilizer levels 100,75 and 50 per cent RDF through fertilizer and 25 and 50 per cent RDN through two manures (FYM, Urban compost) with four replications. In succeeding

rabi season, the experiment was laid out in split- plot design by taking five residual treatments from preceding maize as main plots and each at 50, 75 and 100 per cent RDF as three sub-treatments with 3 replications for groundnut during *rabi* 2014-15 and 2015-16. The data on nutrient uptakes included nitrogen, phosphorus and potassium were recorded after harvesting in groundnut during both years of study.

Succeeding *rabi* Groundnut (Kadire-6) was sown on 26th November during first year and 16th October during second year adopting a spacing of 30 x 10 cm.

RESULTS AND DISCUSSION

Nitrogen uptake at different stages

Nitrogen uptake at 60 and 90 days after sowing observed with 50% RDF+50% RDN through urban compost (M₅) to preceding maize was comparable with 50% RDN through farmyard manure (M₃) in the both years of investigations in succeeding groundnut. In both the years, application of 50% RDF+50% RDN through urban compost (M₅) to preceding maize resulted significantly higher N uptake than that of (M₂) and (M₄) it was comparable with uptake recorded in 50% RDF+50% RDN through farmyard manure (M₃) and 100% RDF (M₁) at harvest by succeeding groundnut. In both the years, N uptake by groundnut at 30 days after sowing was not significantly different among the treatments.

Whereas, extent of crop removal of these nutrients was comparatively low in treatments with organic manures alone than the chemical treatments which might be due to non-availability of adequate quantity of nutrients throughout the crop growth period as slow release of nutrients from the organic manures become available only in the later stages and making the crop suffer in the early growth period due to want of sufficient nutrients. On the contrary, treatments without nitrogen substitution neither with organics nor with chemical fertilizers (i.e. only organics) recorded lower uptake of these nutrients, because, these manures might not have

provided enough nutrients in the area of application, but they help in buildup of soil fertility through quick build up of micro flora and fauna¹, which might have helped in the supply of considerable amounts of native pool of nutrients from the soil. The variations in nitrogen, phosphorus and potassium uptake through different organic sources (*viz.*, urban compost, FYM) might be attributed to their inherent capacity to supply these nutrients during the crop growth period which in turn influenced the nutrients uptake by the crop.

During both the years of study, fertilizer levels exerted a significant influence on nitrogen uptake of groundnut and it was the highest with 100% RDF (S₁), which was however, comparable with 75% RDF (S₂) and significantly superior to 50% RDF (S₃) at 60, 90 days after sowing and at harvest. Application of FYM along with N and P fertilizers resulted in the highest total uptake of N, P and K by soybean which was due to higher availability of these nutrients in soil reservoir besides the additional quantity of nutrients supplied by FYM⁵. Similarly, Swetha⁴ reported soybean-wheat as efficient cropping system in terms of productivity and profitability.

With regard to interaction between residual treatments and fertilizer levels, combination of M₅S₁ recorded the highest nitrogen uptake, which was on par with M₃S₁ during both years of study at 60 days after sowing.

Phosphorus uptake at different stages

Phosphorus uptake at 60 and 90 days after sowing observed with 50% RDF+50% RDN through urban compost (M₅) to preceding maize was comparable with 50% RDN through farmyard manure (M₃) in the both years of investigations. In both the years, application of 50% RDF+50% RDN through urban compost (M₅) to preceding maize resulted significantly higher phosphorus uptake than that of (M₂) and (M₄) it was comparable with uptake recorded in 50% RDF+50% RDN through farmyard manure (M₃) and 100% RDF (M₁) at harvest by succeeding groundnut. In both the years,

phosphorus uptake by groundnut at 30 days after sowing was not significantly different between the treatments. The positive residual effect of INM and 100% RDF may be due to improvement in greater uptake of nutrients as result of higher nutrient availability with application of organic manure (FYM or urban compost). Other researchers Nathiya and Sanjivkumar³ reported improvement in soil nutrient status thereby growth of crop with integrated use of manures and fertilizers which improved yield attributes and yield.

During both the years of study, fertilizer levels exerted a significant influence on phosphorus uptake of groundnut and it was the highest with 100% RDF (S₁), which was however, comparable with 75% RDF (S₂) and significantly superior to 50% RDF (S₃) at 60, 90 DAS and at harvest.

With regard to interaction between residual treatments and fertilizer levels, combination of M₅S₁ recorded the highest phosphorus uptake, which was on par with M₃S₁ during both years of study at 60 days after sowing.

Potassium uptake at different stages

Potassium uptake by groundnut also showed similar trend as that of nitrogen and phosphorus uptake at 30, 60, 90 DAS and at harvest.

Similar results of residual effect with organic manures were also reported by others¹. The addition of FYM and urban compost in the present study might have helped the surface soil structure favorable for easy penetration of pegs and better development of pods through increased supply of essential nutrients. In general, the status of available N P K after harvest of groundnut was higher following the preceding seasons INM treatments than that of the non-INM treatment. The status of available N P K, however, decreased with decreasing rate of recommended N to maize substituted with organic sources, FYM or urban compost. Addition of FYM or urban compost in addition to N P K recommended or in conjunction with recommended N P K might have conserved N P K otherwise lost and made available in due

course by enhanced microbial activity. Applying of organic plant nutrients along with inorganic fertilizers in the soil, the complexing properties of organic materials which prevented the precipitation and fixation of nutrients and kept them in soluble form. The solubilization action of organic acids produced during the degradation of organic materials

resulted in better release of the essential nutrients in the soil ecosystem and effectively utilized by the plants for their growth and development and also sustaining the soil quality. Increased retention and availability of N P K with the use of organic manures in cropping systems have been reported by Nathiya and Sanjivkumar³.

Table 1: N uptake (kg ha⁻¹) at 30 DAS of rabi groundnut after kharif maize as influenced by different treatments

Treatments given to kharif maize(M)	Treatments given to rabi groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	15.26	14.09	12.44	13.93	17.77	16.33	14.95	16.35
M ₂ - 75% RDF of NPK +25% N-FYM	13.98	12.68	11.65	12.77	16.05	15.07	13.81	14.98
M ₃ - 50% RDF of NPK +50% N-FYM	17.36	16.11	15.04	16.17	19.45	17.95	16.68	18.03
M ₄ - 75% RDF of NPK +25% N-Urban Compost	15.13	13.60	12.40	13.71	17.28	15.55	14.48	15.77
M ₅ - 50% RDF of NPK +50% N-Urban Compost	19.90	18.64	17.81	18.79	21.65	19.76	18.56	19.99
Mean	16.33	15.02	13.87		18.44	16.93	15.69	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	1.85	NS			M	2.80	NS	
S	1.03	NS			S	1.35	NS	
M at S	2.10	NS			M at S	0.33	NS	
S at M	1.27	NS			S at M	0.85	NS	

Table 2: N uptake (kg ha⁻¹) at 60 DAS of rabi groundnut after kharif maize as influenced by different treatments

Treatments given to kharif maize(M)	Treatments given to rabi groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	47.69	42.79	38.42	42.97	49.78	45.84	41.53	45.71
M ₂ - 75% RDF of NPK +25% N-FYM	40.68	36.86	33.16	36.90	43.43	39.75	36.28	39.82
M ₃ - 50% RDF of NPK +50% N-FYM	54.65	49.89	44.59	49.71	57.77	52.81	47.62	52.73
M ₄ - 75% RDF of NPK +25% N-Urban Compost	43.97	41.09	36.96	40.68	46.88	43.98	39.85	43.57
M ₅ - 50% RDF of NPK +50% N-Urban Compost	61.54	56.89	51.76	56.73	64.66	59.75	55.41	59.94
Mean	47.69	42.79	38.42		49.78	45.84	41.53	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	3.41	7.55			M	4.36	9.44	
S	3.48	7.71			S	3.78	6.63	
M at S	4.08	8.79			M at S	4.75	10.87	
S at M	3.56	7.73			S at M	2.76	5.69	

Table 3: N uptake (kg ha⁻¹) at 90 DAS of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	77.03	71.54	64.22	71.19	78.98	73.39	66.48	77.03
M ₂ - 75% RDF of NPK +25% N-FYM	66.28	61.64	57.77	62.19	67.06	64.21	60.64	66.28
M ₃ - 50% RDF of NPK +50% N-FYM	85.93	84.12	79.61	83.08	84.31	80.81	82.99	85.93
M ₄ - 75% RDF of NPK +25% N-Urban Compost	69.78	67.54	63.88	66.83	71.07	67.93	63.79	69.78
M ₅ - 50% RDF of NPK +50% N-Urban Compost	85.46	84.63	79.21	82.77	90.70	86.36	86.35	85.46
Mean	76.90	73.89	68.94		78.42	74.54	72.05	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	1.57	2.45			M	0.91	1.78	
S	2.06	4.23			S	1.84	4.75	
M at S	2.39	NS			M at S	1.88	NS	
S at M	2.22	NS			S at M	1.94	NS	

Table 4: N uptake (kg ha⁻¹) of haulm at harvest of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	66.9	65.5	50.7	61.0	75.3	69.9	56.9	67.4
M ₂ - 75% RDF of NPK +25% N-FYM	50.8	47.0	38.6	45.5	53.5	49.5	46.0	49.7
M ₃ - 50% RDF of NPK +50% N-FYM	69.6	64.5	50.0	61.4	74.2	68.3	55.8	66.1
M ₄ - 75% RDF of NPK +25% N-Urban Compost	54.0	50.4	42.7	49.0	59.0	54.7	47.7	53.8
M ₅ - 50% RDF of NPK +50% N-Urban Compost	77.5	71.6	54.1	67.7	83.8	77.4	63.5	74.9
Mean	63.8	59.8	47.2		69.2	64.0	54.0	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	2.59	6.90			M	4.07	10.01	
S	2.51	5.52			S	2.71	5.53	
M at S	2.70	NS			M at S	4.71	NS	
S at M	3.02	NS			S at M	3.47	NS	

Table 5: N uptake (kg ha⁻¹) of pod at harvest of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	66.25	62.38	52.07	60.23	71.64	66.00	54.94	64.19
M ₂ - 75% RDF of NPK +25% N-FYM	50.77	46.95	38.66	45.46	50.72	46.00	38.01	44.91
M ₃ - 50% RDF of NPK +50% N-FYM	69.81	65.00	50.03	61.61	74.03	68.31	54.33	65.55
M ₄ - 75% RDF of NPK +25% N-Urban Compost	54.25	50.92	43.23	49.47	58.19	53.68	45.87	52.58
M ₅ - 50% RDF of NPK +50% N-Urban Compost	75.89	70.81	54.76	67.15	81.03	75.77	59.87	72.22
Mean	63.39	59.21	47.75		67.12	61.95	50.60	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	4.50	10.37			M	4.00	9.23	
S	2.80	5.67			S	3.76	7.58	
M at S	2.78	NS			M at S	1.70	NS	
S at M	4.73	NS			S at M	4.23	NS	

Table 6: P uptake (kg ha⁻¹) at 30 DAS of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	4.50	4.00	3.40	3.97	6.20	5.60	5.00	5.60
M ₂ - 75% RDF of NPK +25% N-FYM	4.23	3.76	3.44	3.81	5.86	5.37	4.90	5.38
M ₃ - 50% RDF of NPK +50% N-FYM	5.23	4.80	4.33	4.79	6.90	6.43	5.86	6.40
M ₄ - 75% RDF of NPK +25% N-Urban Compost	4.53	4.17	3.70	4.13	6.20	5.76	5.23	5.73
M ₅ - 50% RDF of NPK +50% N-Urban Compost	6.10	5.63	5.23	5.65	7.83	7.17	6.70	7.23
Mean	4.92	4.47	4.02		6.60	6.07	5.54	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	0.95	NS			M	1.23	NS	
S	0.28	NS			S	0.48	NS	
M at S	0.64	NS			M at S	0.51	NS	
S at M	0.16	NS			S at M	1.24	NS	

Table 7: P uptake (kg ha⁻¹) at 60 DAS of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	18.24	15.2	12.65	15.36	25.68	21.2	18.34	21.74
M ₂ - 75% RDF of NPK +25% N-FYM	13.37	11.3	8.86	11.18	19.06	16.5	13.6	16.39
M ₃ - 50% RDF of NPK +50% N-FYM	19.33	16.7	13.46	16.50	26.5	23.5	19.6	23.20
M ₄ - 75% RDF of NPK +25% N-Urban Compost	14.9	13.03	10.3	12.74	20.9	18.73	15.43	18.35
M ₅ - 50% RDF of NPK +50% N-Urban Compost	22.53	19.74	16.66	19.64	30.63	27.16	23.83	27.21
Mean	17.67	15.19	12.39		24.55	21.42	18.16	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	1.39	3.32			M	2.14	4.25	
S	1.24	2.49			S	1.58	3.17	
M at S	1.32	2.71			M at S	1.40	2.85	
S at M	1.51	3.02			S at M	1.64	3.43	

Table 8: P uptake (kg ha⁻¹) at 90 DAS of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	23.6	20.56	17.64	20.60	33.64	29.31	26.43	29.79
M ₂ - 75% RDF of NPK +25% N-FYM	18.73	16.23	13.4	16.12	26.23	23.76	20.4	23.46
M ₃ - 50% RDF of NPK +50% N-FYM	24.7	22.03	18.76	21.83	34.63	31.43	27.64	31.23
M ₄ - 75% RDF of NPK +25% N-Urban Compost	20.46	18.47	15.56	18.16	28.53	25.9	22.23	25.55
M ₅ - 50% RDF of NPK +50% N-Urban Compost	28.33	25.13	21.43	24.96	38.96	35.17	30.9	35.01
Mean	23.16	20.48	17.36		32.40	29.11	25.52	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	1.96	4.46			M	1.95	4.29	
S	1.34	3.76			S	1.51	3.03	
M at S	1.34	NS			M at S	1.46	NS	
S at M	1.54	NS			S at M	1.02	NS	

Table 9: P uptake (kg ha⁻¹) of haulm at harvest of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	13.25	11.69	8.2	11.05	15.32	13.46	10.67	13.15
M ₂ - 75% RDF of NPK +25% N-FYM	10.81	9.81	7.57	9.40	12.99	12.02	9.55	11.52
M ₃ - 50% RDF of NPK +50% N-FYM	14.9	13.72	9.83	12.82	17.15	15.85	11.93	14.98
M ₄ - 75% RDF of NPK +25% N-Urban Compost	11.08	10.04	7.93	9.68	13.7	12.68	10.48	12.29
M ₅ - 50% RDF of NPK +50% N-Urban Compost	16.57	14.86	10.58	14.00	18.67	17.13	13.09	16.30
Mean	13.32	12.02	8.82		15.57	14.23	11.14	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	1.65	3.82			M	2.79	3.07	
S	0.62	1.21			S	1.15	2.31	
M at S	1.23	NS			M at S	1.34	NS	
S at M	0.68	NS			S at M	0.84	NS	

Table 10: P uptake (kg ha⁻¹) of pod at harvest of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	12.34	11.02	8.76	10.71	18.65	17.96	12.86	16.49
M ₂ - 75% RDF of NPK +25% N-FYM	10.27	9.4	7.33	9.00	15.37	14.15	11.26	13.59
M ₃ - 50% RDF of NPK +50% N-FYM	13.73	12.6	9.27	11.87	20.65	19.22	14.27	18.05
M ₄ - 75% RDF of NPK +25% N-Urban Compost	10.87	9.93	8.06	9.62	15.83	14.62	11.91	14.12
M ₅ - 50% RDF of NPK +50% N-Urban Compost	15.1	13.67	10.3	13.02	22.61	20.67	15.3	19.53
Mean	12.46	11.32	8.74		18.62	17.32	13.12	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	1.81	3.72			M	1.68	3.14	
S	0.57	1.18			S	0.74	1.69	
M at S	0.78	NS			M at S	0.69	NS	
S at M	0.65	NS			S at M	0.92	NS	

Table 11: K uptake (kg ha⁻¹) at 30 DAS of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	16.99	15.62	13.84	15.48	19.44	18.00	16.52	17.99
M ₂ - 75% RDF of NPK +25% N-FYM	15.19	13.71	12.55	13.82	17.23	16.20	14.87	16.10
M ₃ - 50% RDF of NPK +50% N-FYM	19.21	17.96	16.70	17.96	21.69	19.87	18.31	19.96
M ₄ - 75% RDF of NPK +25% N-Urban Compost	16.42	15.05	13.74	15.07	18.82	17.47	16.04	17.44
M ₅ - 50% RDF of NPK +50% N-Urban Compost	22.22	20.75	19.54	20.84	24.24	22.30	20.78	22.44
Mean	18.00	16.62	15.28		20.28	18.77	17.30	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	1.06	NS			M	1.51	NS	
S	0.87	NS			S	0.98	NS	
M at S	1.23	NS			M at S	1.30	NS	
S at M	0.63	NS			S at M	0.56	NS	

Table 12: K uptake (kg ha⁻¹) at 60 DAS of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	64.40	56.17	48.98	56.39	72.40	64.94	57.26	65.09
M ₂ - 75% RDF of NPK +25% N-FYM	55.70	49.44	42.90	49.47	64.40	57.81	51.05	57.52
M ₃ - 50% RDF of NPK +50% N-FYM	76.38	68.32	59.80	68.05	86.21	78.31	68.81	77.64
M ₄ - 75% RDF of NPK +25% N-Urban Compost	60.63	55.50	47.82	54.54	69.51	63.97	56.08	63.36
M ₅ - 50% RDF of NPK +50% N-Urban Compost	87.19	79.51	70.89	79.28	98.32	89.73	82.16	89.98
Mean	68.86	61.79	54.08		78.17	70.95	63.07	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	5.98	12.56			M	4.07		
S	4.45	8.95			S	4.54		
M at S	5.31	11.34			M at S	4.21		
S at M	5.15	10.37			S at M	3.23		

Table 13: K uptake (Kg ha⁻¹) at 90 DAS of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut (S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	42.20	39.15	35.15	38.66	45.54	41.94	38.00	41.76
M ₂ - 75% RDF of NPK +25% N-FYM	36.61	34.28	31.83	34.31	35.18	36.97	34.82	52.55
M ₃ - 50% RDF of NPK +50% N-FYM	45.90	43.40	40.80	43.23	48.53	46.74	43.57	45.85
M ₄ - 75% RDF of NPK +25% N-Urban Compost	38.92	36.98	34.93	37.21	40.78	38.93	36.46	39.21
M ₅ - 50% RDF of NPK +50% N-Urban Compost	49.85	46.93	44.26	46.79	52.38	50.19	47.38	49.43
Mean	42.70	40.15	37.39		44.48	42.95	40.05	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	3.09	6.33			M	3.34		
S	1.42	3.68			S	0.72		
M at S	5.94	NS			M at S	6.95		
S at M	1.64	NS			S at M	5.54		

Table 14: K uptake (kg ha⁻¹) of haulm at harvest of *rabi* groundnut after *kharif* maize as influenced by different treatments

Treatments given to <i>kharif</i> maize(M)	Treatments given to <i>rabi</i> groundnut(S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	56.45	53.21	42.25	45.55	63.45	58.96	46.78	56.40
M ₂ - 75% RDF of NPK +25% N-FYM	42.13	37.96	31.16	42.98	46.63	42.13	34.73	41.16
M ₃ - 50% RDF of NPK +50% N-FYM	59.13	55.66	43.7	48.96	65.1	61.4	48.4	58.30
M ₄ - 75% RDF of NPK +25% N-Urban Compost	47.13	44.06	36.83	48.22	52.13	48.83	40.96	47.31
M ₅ - 50% RDF of NPK +50% N-Urban Compost	64.76	60.7	48.06	54.38	71.16	66.8	53.1	63.69
Mean	53.92	50.32	40.40		59.69	55.62	44.79	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	4.68	9.18			M	3.93		
S	2.49	4.03			S	2.53		
M at S	3.10	NS			M at S	3.19		
S at M	2.83	NS			S at M	3.08		

Table 15: K uptake (kg ha⁻¹) of pod at harvest of rabi groundnut after kharif maize as influenced by different treatments

Treatments given to kharif maize(M)	Treatments given to rabi groundnut(S)							
	2014-15				2015-16			
	Recommended Dose of Fertilizer (%)				Recommended Dose of Fertilizer (%)			
	100(S ₁)	75(S ₂)	50(S ₃)	Mean	100(S ₁)	75(S ₂)	50(S ₃)	Mean
M ₁ - 100% RDF of NPK	13.37	12.23	10.50	12.03	14.67	13.53	11.8	13.33
M ₂ - 75% RDF of NPK +25% N-FYM	14.38	12.13	11.57	12.69	15.74	13.49	12.9	14.05
M ₃ - 50% RDF of NPK +50% N-FYM	16.00	14.96	12.27	14.41	17.47	16.43	13.7	15.88
M ₄ - 75% RDF of NPK +25% N-Urban Compost	14.87	12.96	12.08	13.30	16.29	14.38	13.5	14.72
M ₅ - 50% RDF of NPK +50% N-Urban Compost	17.67	15.30	13.27	15.41	19.24	16.87	14.8	16.98
Mean	15.26	13.52	11.94		16.68	14.94	13.36	
	S.Em ±	CD(P=0.05)			S.Em ±	CD(P=0.05)		
M	1.47	3.27		M	1.69	3.69		
S	0.90	1.89		S	0.94	1.81		
M at S	1.20	NS		M at S	1.23	NS		
S at M	0.49	NS		S at M	0.63	NS		

CONCLUSION

Nitrogen, phosphorus and potassium uptake at initial stage was not significantly influenced by treatments where as at 60,90 days after sowing and at harvest interaction of residual 50% RDF+50% RDN through urban compost (M₅) and 100% RDF (S₁) on par with integration of residual 50% RDF+50% RDN through FYM (M₃) and 100% RDF(S₁) during both the years.

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