Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-7: 201-204

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7692 **Special Issue-7 pp. 201-204**
Journal homepage: http://www.ijcmas.com

Original Research Article

Role of Different Organic Manures for Sustaining Productivity in Groundnut- Rice Cropping System in Konkan Region

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A B S T R A C T

The soil nutrient reserves depleted by heavy crop removal if not adequately replenished by way of fertilization and manuring, then it would slowly lead to decline deterioration of soils productive capacity (Reddy, 2004). Unbalanced and continuous use of fertilizer in the intensive cropping system is leading to decrease in crop yields, imbalance of nutrient in soil adversely affect on soil physical properties. While integrated plant nutrient supply system relates to combined application of organic and inorganic sources of plant nutrient, aiming the maintenance of the soil fertility and plant nutrient supply to an optimum level for sustaining the crop productivity. Increasing cropping intensity and enhanced productivity levels step up the nutrient removal by crop harvest. Groundnut – Rice is a very popular cropping sequence adopted by the farmers in Konkan region due to favorable climatic condition. The nutrient management play a dominant role for increasing the productivity, as well as to maintain the soil health. There is no controversy about the importance of organic manures regarding their role. Organic manures not only regularly supply macro, micro and secondary nutrients, but also improve soil physical properties and soil biological health (Singh, 2001). Hence, it was considered necessary to evaluate the effect of different organic manures in groundnut-rice cropping system.

Keywords

Groundnut, rice cropping, organic manures, soil nutrient

Introduction

Amongst the different organic manures swastik, phosphocompost, poultry manure and FYM each @ 5 t/ha were found efficient for groundnut. Application of poultry manure, swastik, bhoomilabh, FYM and vermicompost showed marked residue benefiting the succeeding rice crop in groundnut-rice cropping system. Continuous application of organic manures over a period of three years in groundnut-rice cropping system did not show any improvement in the available nutrients. On the contrary, it resulted in to the net negative balance of available N from 22.8 kg (lowest due to poultry manure) to 91.8 kg N/ha (highest in unfertilized plot) over initial soil fertility. Phosphocompost enhanced the available phosphorus in soil after groundnut to the extent of 14.4 kg/ha.

Materials and Methods

A field experiments were conducted at Agronomy Farm, College of Agriculture, Dapoli during 2005-2008. The soil was clay loam with slightly in reaction (pH 6.33), very high in organic carbon (1.43 %), medium in available N (300.9 Kg ha^{-1}) and

low in available P_2O_5 (16.9 Kg ha^{-1}) and available K_2O (158.3 Kg ha^{-1}).Groundnut crop was grown in *rabi* season in randomized block design consisting of nine treatments with three replications. All organic manures were applied @ 5 t ha^{-1}. A low density white transparent polythene film of 7 micron thickness with 90 cm width was spread on flat beds. The edges of sheet were burried on both the sides of bed. The treated seeds of (Thiram @ 3 gm Kg^{-1}) TG-26 groundnut variety was used for sowing. Holes of 3 cm depth were made on polythene film with machine and the seeds were dibbled at 30 x 10 cm spacing @ 2 seeds per hole covering with moist soil.

While split plot design was used for rice grown during *kharif* season to test the residue of organic manures with two levels of 100 % RDF (100:50:50 Kg NPK ha^{-1}) and 50 % RDF (50:25:25 Kg NPK ha^{-1}). Nitrogen was applied in three splits, while phosphorus and potash was given as basal dose. Rice cv. Palghar 1 was transplanted using 25 days old seedlings at a spacing 20 x 15 cm.A soil samples were taken from each plot in the beginning and the end of each cropping season. The samples were analyzed by using standard procedures. Need based plant protection measures were followed. Standard statistical procedure was used given by Panse and Sukhatme (1967).

Results and Discussion

Data indicated that application of swastik, RDF and phosphocompost recorded significantly higher pod yield compared to FYM, bhoomilabh, celrich, vermicompost and control. These treatments recorded 46.73, 45.93 and 44.54 q/ha which were 59.2%, 56.4% and 51.7% higher over control, respectively, while the differences between former three treatments were of the similar magnitude. Similarly, poultry manure and FYM also showed their superiority over, bhoomilabh, celrich, vermicompost and control. Later three treatments showed their superiority over control, but the differences between them were of the similar order. Similar trend was also noticed in case of haulm yield. The differences between swastik, RDF, phosphocompost, poultry manure were not up to the mark, though these treatments were superior than bhoomilabh, celrich, vermicompost and control.

The direct effect of 100 % RDF (43.77 q/ha) was significant in increasing the grain yield of rice as compared to 50 %, RDF (37.09 q/ha). It was observed that the residual effects of all the organic manures showed beneficial effects in increasing the rice grain yield over control. In general, poultry manure showed marked residue and increased the grain yield of rice significantly compared to all the remaining treatments. Similarly, swastik, bhoomilabh, FYM and vermicompost were superior than celrich, phosphocompost and control, but the differences due to residue between former four treatments and were not up to the mark.

Data on available nitrogen after groundnut indicated negative balance due to all the organic manures. The extent of loss of available N was the highest in control/unfertilized plot (41.2 kg N/ha) followed by phosphocompost (22.2 kg N/ha), celrich (21.0 kg N/ha) and FYM (18.2 kg N/ha), while the lowest loss was observed due to poultry manure (5.7 kg N/ha) and swastik (6.3 kg N/ha) over the initial soil fertility. The trend was continued even after the harvest of rice. The loss was aggravated in control (50.6 kg N/ha) followed by phosphocompost (29.2 kg N/ha), vermicompost (28.5 kg N/ha), RDF (26.5 kg N/ha) and bhoomilabh (26.4 kg/N ha) and FYM (22.1 kg N/ ha).

Table.1 Groundnut pod and haulm/ grain yield of rice and fertility dynamics in groundnut - rice cropping system as affected by different treatments. (Average of three years)

Treatment	Groundnut Yield (q/ha)		Grain yield Rice (q/ha)			Available N (kg/ha) after		Available P (kg/ha) after		Available K (kg/ha) after	
	Pod	Haulm	100% RDF	50% RDF	Mean	AHG	AHR	AHG	AHR	AHG	AHR
FYM	41.65	47.91	43.40	42.16	42.78	282.7 (-18.2)	278.8 (-22.1)	11.5 (-5.4)	10.6 (-6.3)	152.5 (-5.8)	144.1 (-14.2)
Poultry manure	43.68	49.32	50.26	42.99	46.62	295.2 (-5.7)	283.8 (-17.1)	19.3 (2.4)	14.9 (-2.0)	163.8 (5.5)	150.4 (-7.9)
Vermicompost	37.27	44.24	44.30	39.70	42.00	283.2 (-17.7)	272.4 (-28.5)	13.8 (-3.1)	10.8 (-6.1)	154.7 (-3.6)	143.5 (-14.8)
Celrich	38.78	44.86	40.51	38.37	39.44	279.9 (-21.0)	269.2 (-31.7)	11.7 (-5.2)	9.6 (-7.3)	152.2 (-6.1)	139.9 (-18.4)
Swastik	46.73	53.21	48.64	39.82	44.23	294.6 (-6.3)	283.3 (-17.6)	21.7 (4.8)	12.1 (-4.8)	162.4 (4.1)	147.4 (-10.9)
Bhoomilabh	39.25	45.51	47.42	38.76	43.09	289.8 (-11.1)	274.5 (-26.4)	20.8 (3.9)	13.5 (-3.4)	161.3 (3.0)	147.2 (-11.1)
RDF	45.93	52.94	45.84	36.01	40.92	286.3 (-14.6)	274.4 (-26.5)	21.3 (4.4)	11.1 (-5.8)	155.8 (-2.5)	142.2 (-16.1)
Control	29.36	36.03	33.48	27.49	30.48	259.7 (-41.2)	250.3 (-50.6)	8.5 (-8.4)	7.0 (-9.9)	138.6 (-19.7)	128.9 (-29.4)
Phospho compost	44.54	51.13	40.10	34.68	37.39	278.7 (-22.2)	271.7 (-29.2)	31.3 (14.4)	24.4 (7.5)	147.9 (-10.4)	140.3 (-18.0)
C D. 5%	2.85	4.29	2.40	4.38							
Initial Value (Kg ha^{-1})						300.9		16.9		158.3	

Fig in parenthesis indicate gain or loss of nutrient AHG = After Harvest of groundnut AHG = After Harvest of rice

The continuous application of organic manures did not show any build up in available nutrients. The net negative balance of available N in groundnut-rice cropping system was the highest due to unfertilized treatment (91.8 kg N/ha) followed by celrich (52.7 kg N/ha), phosphocompost (51.4 kg N/ha), vermicompost (46.2 kg N/ha), RDF (41.6 kg N/ha) and FYM (40.3 kg N/ha), while the extent of loss of N was less due to poultry manure (22.8 kg N/ha) and swastik (23.9 kg N/ha) application.

Application of phosphocompost resulted in buildup of available phosphorus (14.4 kg P_2O_5/ha) followed by swastik (4.8 kg P_2O_5/ha), RDF (4.4 kg P_2O_5/ha), bhoomilabh (3.9 kg P_2O_5/ha) and poultry manure (2.4 kg P_2O_5/ha), while remaining manures did not show positive balance for available phosphorus after groundnut. On the other hand phosphocompost resulted into buildup of available phosphorus by 7.5 kg P_2O_5/ha after rice. Data clearly indicated that continuous application of organic manures alone did not maintain soil health in groundnut-rice cropping system resulting in negative balance of available soil phosphorus.

The available potassium balance was not improved due to different organic manures, except poultry manure (5.5 kg K_2O/ha), swastik (4.1 K_2O/ha) and bhoomilabh (3.0 K_2O/ha) after harvest of groundnut. On the contrary, the different organic manures showed negative balance of potassium after harvest of rice except phosphocompost.

Amongst the different organic manures swastik, phosphocompost, poultry manure and FYM each @ 5 t/ha were found efficient for groundnut. Application of poultry manure, swastik, bhoomilabh, FYM and vermicompost showed marked residue benefiting the succeeding rice crop in groundnut-rice cropping system. Continuous application of organic manures over a period of three years in groundnut-rice cropping system did not show any improvement in the available nutrients. On the contrary, it resulted in to the net negative balance of available N from 22.8 kg (lowest due to poultry manure) to 91.8 kg N/ha (highest in unfertilized plot) over initial soil fertility. Phosphocompost enhanced the available phosphorus in soil after groundnut to the extent of 14.4 kg/ha. While other remaining manures showed negative balance of phosphorus. Continuous application of organic manures did not improve the fertility status in groundnut-rice cropping system except phosphocompost. Similar results were also observed in available potash, except poultry manure, swastik and bhoomilabh. In general all the organic manures resulted in negative balance of available potassium in groundnut-rice cropping system.

References

Panse, V.G. and Sukhatme, P.V. 1967. Statistical method for Agricultural workers. ICAR Publication, New Delhi.pp.199-200.

Reddy, D. 2004. Soil fertility and fertilizer use situation in India. Paper presented in short training course on "Assessment of compost quality for Agriculture crop production "held at Bhopal pp.9.

Singh, P. 2001. Sustainable crop production – limitations and strategies. *Indian Fmg.* January, pp.7-10.