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Studies on neem based organic nutrient management practices in Rice -pulse cropping system in Cauvery delta region

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Abstract

Field Investigations were conducted at the Kodukkanpalayam,Cuddalore for three years from 2019-22 to study the neem based organic nutrient management practices such as farmyard manure, vermicompost, daincha, with and without neem cake on rice cv. ADT 36. The treatments consist of eleven treatments adopting randomized block design (RDF) with three replications. It was observed that the growth components of rice *viz.*, Plant height, number of tillers per plant, number of panicle m^{-2} were significantly increased by vermicompost @ 2.5t ha^{-1}, with neem cake.

Introduction

Rice (*Oryza sativa*) is one of the most predominant food crops that are being extensively cultivated in India More than 90 per cent of the world's rice is grown and consumed in Asia. To fulfil the increased rice demand with shrinking resources, it is necessary to increase yield per unit area with sustainable and nutrient balance technology packages which would increase the rice production substantially without harming the precious environment. Nutrients supplied exclusively through chemical sources, though enhance yield initially lead to unsustainable productivity over the years (Mahajan *et al*., 2008) In view of escalating cost of fertilizers and their hazardous polluting effects on environment, there is awareness among the research workers about the alternate agricultural systems known as Biological farming or organic farming. Farmyard manure (FYM) is a mixture of cattle dung, urine, litter or bedding material, portion of fodder not consumed by cattle and domestic wastes are collected and dumped into a pit or heaped in the corner of the backyard, it is allowed to remain there and rot until it is taken out and applied to the fields. A small portion of nitrogen is directly available to the plants while a larger portion is made available to the crops when the FYM decomposes. The organic source of humus and plant nutrients to increase the soil fertility of tropical soil is recognized. Biofertilizers or microbial fertilizers or microbial inoculants are preparations containing live or latent cells of efficient strain of nitrogen fixing microorganisms used for seed or soil application with the objective of increasing the numbers of microorganisms in soil for better plant growth bio fertilizers are eco-friendly, cost effective and renewable sources of plant nutrients that help to maintain long term soil fertility and sustainability. The bio fertilizers act as a supplement of plant nutrient is gaining worldwide value in finger millet farming (Antench Argaw, 2017). The effect of added biofertilizers could be enhanced along with chemical fertilizers and different organic sources (Srinivasa Rao *et al.*, 2017Considering all these facts in view, a field experiment was conducted to study the effect of organic practices for sustainable yield in Rice using neem.

Methodology

The Experimental Farm is situated at 11°24' N latitude and 79°44' E longitude at an altitude of +5.79 m above mean sea level. The weather is moderately warm with hot summer months. The maximum temperature ranged from 34.4ºC to 39.1ºC with mean of 35.8ºC. The minimum temperature ranged from 21.1ºC to 24.1ºC with mean of 28.1ºC. The relative humidity ranged from 76 to 89 percent with mean of 81 percent. The soil is deep clay, low in available N (196 kgha^{-1}), medium in P (22.8 kgha^{-1}) and high in available K (274 kgha^{-1}) . The experiments were laid out in RBD with three replications. T_1 – Control , T_2 – FYM @ 10 t ha^{-1} , T_3 – Vermicompost @ 5 t ha^{-1} , T_4 – Daincha @ 5 t ha^{-1} , T_5 – Pressmud @10 t ha^{-1} T_6 – Neem Cake @5 t ha^{-1} , T_7 – FYM @ 5 t ha^{-1}+ Neem Cake @ 2.5 t ha^{-1}, T_8 - Vermicompost @ 2.5 t ha^{-1} + Neem Cake @ 2.5 t ha^{-1}, T_9 - Daincha @ 2.5 t ha^{-1}, T_{10} – Pressmud @5 t ha^{-1} + Neem Cake @ 2.5 t ha^{-1} and T_{11} – Farmers practice(FYM @ 12.5 t ha^{-1} +RDF.The plots were laid out with required specification. Buffer channels were made around each plot so as to serve as irrigation cum drainage channel. Twenty four days old paddy seedlings were planted @ 2 seedlings hill^{-1} with a depth of 3 cm. A spacing of 12.5 × 10 cm was adopted. Care was taken to fill the gap within 10 days after transplanting in order to maintain optimum population in both the seasons..The well decomposed matured farmyard manure was collected from dairy farm, Division of Animal Husbandry, Annamalai University and applied to experimental plots as per the treatment schedule .Pressmud was collected from the sethiathopu M.R.K. Co-operative sugar Mills Ltd. It was dark brown to black in colour. The pressmud was applied @ 12.5 t ha^{-1} and incorporated thoroughly two weeks before sowing. Five hills of rice plants were chosen at random from each net plot area and tagged for recording biometric observations at various crop growth stages. The data on observations and characters studied were statistically analyzed by adopting the procedure of Panse and Sukhatme (1978) and for the results that were significant, the critical differences were calculated at 5 per cent probability level to draw statistical conclusion.

Result

Rice:

Significant differences were noticed among various organic sources and their combination for growth and yield attributing characters. Highest plant height, DMP, LAI and the number of productive tillers clump^{-1} were obtained with the application of vermicompost @ 2.5 ha^{-1} + neem cake @2.5 t ha^{-1} and such increases were significant over FYM @ 5 t ha^{-1}, Neem cake @ 2.5 t ha^{-1}.

Different sources of organic and the combination this is favorable effect on plant height and dry matter production might due to higher leaf area / hill and more number of productive tillers hill^{-1} associated with high photosynthetic efficiency of rice plant leading to enhance photosynthetic accumulation on and their translocation which together accounted for higher DMP. Also when different organic sources were combined, (vermicompost + neem cake) , the releasing nitrogen probably at faster rate and enrich the soil owing to providing sufficient amount of nitrogen that is especially required to various metabolic processes. This resulted in better mobilization of synthesized which in term stimulated rapid cell division and cell elongation and facilitate the faster vegetative growth and leads to higher intermodal elongation and finally enhanced the plant height and DMP.

Slow available of nitrogen due to higher rate of neem cake is known to enhance the formation of new cells, promotes root and shoot growth. It is also associated with vital oxidation reduction reactions of various physiological processes determining the supply of photosynthesis to proliferating shoots and other parts. Thus readily available N in organic and inorganic sources of nutrients might have helped in the production of large number of shoots and finally their conversion into dry matter accumulation and straw yield per unit area.(FAO, 1999)

Yield attributes and the yield of rice exhibited the significant differences due to combined application of organic sources recorded significantly more number of panicles m-2. Panicle length, Number of filled grains panicle-1, test weight(g), grain yield(kg ha^{-1}) , straw yield(kg ha^{-1}) and harvest index. Marked noticed

and FYM @ 2.5 t ha^{-1} + neem cake @ 2.5 t ha^{-1} which followed daincha/ pressmud @ 2.5 t ha^{-1} + neem cake @ 2.5 t ha^{-1} were numerically differed. Application of N through combined application of metabolic and auxin activities in the plant, humic acid in vermicompost enhances the availability of both native and added micronutrients in soil, and neem also excretes vitamins and auxins which may improve the growth and yield attributes and finally yield of rice crop. This positive inference was also supported by Yadav and Meena, 2014.

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References

Kumarimanimuthu Veeral, D. and P. Kalaimathi. 2017. Utilization of diluted distillery spentwash as liquid fertilizer for enhancing soil fertility. ***Int. J. Environ. and Polln. Res.*****, 5(4):** 1-3.

Saha, R., V. K. Mishra, B. Majumdar, K. Laxminarayanana and P. K. Ghosh. 2010. Effect of integrated Groundnut management on soil physical properties and crop productivity under a Maize (*Zea mays* L.)-Mustard (*Brassica campestris* L.) cropping sequence in acidic soils of Northeast India. ***Commun. Soil Sci. and Pl. Analy.*****, 41(18):** 2187-2200.

Tandon, H.L.S. 1972. Fertilizers, organic manures, recyclable wastes and biofertilizers. ***Fertilizer Develop. and Consult. Org.,*** pp. 36-51. Tejavath Bharath. 2017. Direct and residual effect of integrated nutrient management in Maize-Groundnut crop sequence in Southern Telangana Region. ***Ph.D Thesis, Telangana State Agricultural University, Hyderabad.***

Vidyavathi, G.S., H. Dasog, B. Babalad, N.S. Hebsur, S.K. Gali, S.G. Patil and A.R. Alagawadi. 2011. Influence of nutrient management practices on crop response and economics in different cropping systems in a vertisol of Karnataka. ***J. Agric. Sci.*****, 24(4):** 455-460.

Table ;1 Effects of neem based organic nutrient management practices on growth and yield traits of Rice

Treatments	Growth traits			Yield traits		
	Plant Height	**DMP**	**No. of Tillers**	**No. of filled grains /panicle**	**Panicle Length (cm)**	**Grain Yield (kg ha^{-1})**
T_1 – Control	62.6	3.41	6.1	130.4	18.5	3500
T_2 – FYM @ 10 t ha^{-1}	80.6	5.83	8.4	150.3	22.5	3720
T_3 – Vermicompost @ 5 t ha^{-1}	87.6	7.02	11.5	196.0	22.8	5650
T_4 – Daincha @ 5 t ha^{-1}	84.5	6.87	10.0	174.6	22.4	5070

T_5 – Pressmud @10 t ha^{-1}	85.4	6.58	9.2	160.9	22.2	5010
T_6 – Neem Cake @5 t ha^{-1}	81.3	6.43	9.0	155.3	21.5	4945
T_7 – FYM @ 5 t ha^{-1}+ Neem Cake @ 2.5 t ha^{-1}	95.7	8.58	13.3	210.2	23.9	6240
T_8 - Vermicompost @ 2.5 t ha^{-1} + Neem Cake @ 2.5 t ha^{-1}	**104.2**	**9.36**	**15.8**	**266.1**	**25.1**	**6930**
T_9 - Daincha @ 2.5 t ha^{-1}	93.4	7.30	11.1	224.0	23.8	6150
T_{10} – Pressmud @5 t ha^{-1} + Neem Cake @ 2.5 t ha^{-1}	91.4	7.23	10.9	205.1	23.0	5910
T_{11} – Farmers practice(FYM @ 12.5 t ha^{-1} +RDF)	83.9	6.72	7.0	171.5	19.4	5370
SEd	3.9	0.6	2.05	15.02	0.63	276.09
CD (P = 0.05)	7.9	1.2	4.5	30.04	1.26	552.18