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Effect of substitution of inorganic nitrogen through livestock wastes on yield, nutrient uptake and post harvest soil fertility status of lowland rice

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SUMMARY

Field experiments were conducted at Agricultural College and Research Institute, Killikulam to find out the feasibility of substitution of inorganic fertilizer N through poultry manure and livestock wastes and their effect on yield, Nutrient uptake and soil fertility status of lowland rice during *Kar* season (June - September). Difference sources of organic manures and fertilizer levels caused significant influence on grain yield varying from 3060 to 5825 kg^{-1}. The highest grain and straw yield of 5825 kg ha^{-1} and 7456 kg ha^{-1} was obtained with the treatment combination of 25 per cent N through pigmanure and remaining 75 per cent N through fertilizer. At all stages of crop growth *viz.*, tillering, flowering and harvest maximum N and K uptake was recorded with the combination of 25 per cent N as pig manure and 75 per cent N through fertilizer. Analysis of post harvest soil fertility status revealed that organic carbon content, available N, P, K were significantly higher in the treatment with 100 per cent N application through pig manure and was comparable with 75 per cent N as pig manure plus 25 per cent N as fertilizer.

Key words: Nutrient uptake, Grain yield, Post harvest soil fertility.

Rice (*Oryza sativa* L.) is one of the most staple food crop in India contributing 40 per cent of the total food grain production from 23 per cent of gross cropped area. The total production of rice in India during 1995-96 was 81 M.T. (Venkatramani, 1996). However, the requirement may increase to 25 to 30 M.T. of milled rice every decade (Siddiq, 1993). The productivity should therefore be increased from the present level of 1420 to 2500 kg ha^{-1} (Tewatia *et al.*, 1992). The growth rate of rice production has reduced to 1.79 per cent from 3.70 per cent and to sustain the present level of sufficiency the minimum growth rate for rice has to be 2.25 per cent. To meet this demand the high yielding rice varieties was introduced which require high amount of inorganic nitrogenous fertilizer, which is costly input and hence needs an alternate source of substitution. Majority of the Indian farmers use only supoptimal levels of nitrogenous fertilizers, which reflected wide difference between the potential and actual yield. Moreover, the sole application of inorganic fertilizers over a long period leads to decline in soil productivity. Under these situations, conjunctive use of organic manures, poultry and livestock wastes with inorganic fertilizers besides cultural practices are of paramount importance. Hence the present investigation was carried out to find out the feasibility of substitution of inorganic fertilizer N through livestock wastes and their effect on yield. Nutrient uptake and post harvest soil fertility status of lowland rice.

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MATERIALS AND METHODS

A study was undertaken at Agricultural College and Research Institute, Killikulam to find out the feasibility of substitution of inorganic fertilizer N through poultry manure and other livestock wastes and their effect on yield, Nutrient uptake and post harvest soil fertility status of lowland rice (*Oryza sativa*) during *Kar* season under Thambirabarani command area. The soil of the experimental field is moderately drained, deep, sandy clay (44.9% clay, 8.4% silt, 31.3% coarse sand and 14.2% fine sand) with pH of 6.9, electrical conductivity of 0.42 dsm^{-1}, available N of 250 kg ha^{-1}, available P_2O_5 of 16 kg ha^{-1}, available K_2O of 139 kg ha^{-1} and organic carbon of 0.69 g kg^{-1}.

The experiment was conducted in randomised block design (RBD) with 18 treatments and replicated thrice with various level of substitution of the inorganic N with the organic manure as per the treatment (Table.1) Recommended level of fertilizer 120:60:60 kg NPK ha^{-1} was followed and applied as per the treatments. Based on the nitrogen content of the different manures, the quantity required for different level of N substitution was calculated on dry weight basis and applied to the respective plots, one week before transplanting and incorporated well into the field. The nitrogenous fertilizer was applied in three splits and applied at basal, tillering and panicle initiation stages. The phosphatic fertilizer was applied fully as basal and potassium fertilizer and applied in two split dose as at basal and at panicle