



Research Article

Phosphocompost influences nutrient use efficiency, yield and quality of rice (*Oryza sativa*)

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Summary

A field experiment was conducted consecutively for three years in rice crop with phosphocompost in the research farm of Sheila Dhar Institute of Soil Science, Allahabad University, Allahabad. The laboratory analysis for determination of threshold limit of N and P in the Gangetic alluvial soil was carried out partly at Indian Institute of Vegetable Research, and Institute of Agricultural Sciences, Varanasi. A significantly enrichment of per cent organic C and total N, Ca, Mg, K, Fe, Mn, Zn and Cu content was recorded in compost when prepared with application of Missouri rock phosphate @ 1% of total substrate biomass. The enriched compost alone or in combination with inorganic fertilizers was found effective in terms of supplementing readily available phosphate ion in soil pool for rice crop. The soil P content in different crop growth stages, protein per cent in grain, N and P content in grain and straw, plant population/m², number of panicle, panicle length (cm), number of grain/ panicle, 1000 seed weight and yield in rice crop was significantly different under the influence of phosphocompost. The level of available nutrients and nutrient balances in soil was also significantly higher when treated with phosphocompost in combination with inorganic fertilizer compared to alone application of either inorganic or organic forms of nutrients. The nutrient use efficiency, apparent recovery of nutrients, soil nutrient balance sheet and cost: benefit ratio were also found higher and in direct proportion to supplementation rate of inorganic fertilizers by phosphocompost. A significant correlation between protein content in grain, grain yield, N uptake and available P in soil pool was established.

Key words : Phosphocompost, NPK, Rice, Yield, Quality, Correlation

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Introduction

The decreasing factor productivity of rice-wheat system in the grain bowl of the Gangetic plains needs as urgent attention. The dynamics of N and P- solubility in a puddled rice soil will be significantly different compared to normal soil because of change of physico-chemical properties and reduction sequence (Poronamperuma, 1972). Composting of agricultural wastes with rock phosphate is known to increase the solubility of the phosphate ion and availability of other major and microelements (Tian and Kolawole, 2004; Rai *et al.*, 2010). An attempt was made in the present paper to quantify and compare the yield and yield attributes, protein content of grain, nutrient balance of soil, nutrient use efficiency, cost: benefit ratio of rice crop when subjected to application of phosphocompost @ 5 or and 10 t/ha in order to supplement

at 1/3, 1/2, 2/3 and full dose of recommended N and K fertilizer.

Resources and Research Methods

The field experiment was conducted at the agriculture farm of Sheila Dhar Institute of Soil Science, Allahabad University, Allahabad. The detailed chemical analysis of soil and plant sample was carried out at Indian Institute of Vegetable Research, and Institute of Agricultural Sciences, Varanasi during 2006-2009. Low cost easily available inputs like (decomposable farm waste+ urine and fresh cow dung): (green weeds + water hyacinth): (rice and wheat straw) at the ratio 80:10:10 was used as substrate and allowed for composting with Missouri rock phosphate (MPR) @1 kg per 100 kg substrate for 120 days. The phosphorus enriched compost and ordinary compost were analyzed for C: N ratio, total and different fraction of phosphorus,