

Long-Term Impact Of Organic And Inorganic Fertilization On Grain Yield And Quality Of Rice (*Oryza Sativa* L) In Mollisol Of Tarai

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ABSTRACT

A field experiment was conducted to study the effect of organic and inorganic sources of nutrients applied to rice on, yield, quality and nutrient uptake by rice in a long term fertilizer experiment in Mollisol. The selected treatments were : 50% NPK + Zn, 100% NPK, 150% NPK, 100% NP + Zn, 100% N + Zn, 100% NPK+FYM and control. The results indicated that maximum yield and uptake of rice were found in 100% NPK + FYM followed by 150% NPK. 100% N with zinc gave lower yield and nutrient uptake as 50% NPK+Zn compared to 100% NP and zinc application. The continuous cropping without fertilization leads to depletion of organic matter leading to decrease in yield and nutrient uptake as compared to balanced fertilization along with organic manure which had beneficial effect on organic matter and ultimately increase yield of rice.

Key Words : Long term experiment, rice, FYM

INTRODUCTION

Fertilizer is one of the inputs which will continue to play a dominant role in food grain production. Crop removal of plant nutrients far exceeds the addition through fertilizers. The result is a net gap of about 10 million tonnes which has to come from soil and organic manures. This implies that the natural nutrient content of soil is being continuously depleted. Due to ever increasing population pressure the land resources are gradually shrinking and food grain demand is increasing. Thus, the vertical increase in production is the only through higher and better use of both organic and inorganic sources so that with the increase in production, the soil physical health may also be sustained. The supplementary and complementary use of organic manures and chemical fertilizers will increase the efficiency of both the substances to maintain a high level of soil productivity. Long-term studies usually offer unique opportunities to study the influence of the long-term nutrient management practices on soil health and crop production. Present paper reports the influence of continuous application of organic manures and inorganic fertilizers on yield and quality of rice.

MATERIALS AND METHODS

All India Coordinated Research Project on long term fertilizer experiment is in progress since 1971 started with rice-wheat cropping system at Crop Research Centre, G.B. Pant University of Agriculture and Technology, Pantnagar, soil being silty clay loam with 7.3 pH, 1.48% organic carbon, 392 kg ha⁻¹ available N, 18 kg ha⁻¹ available P, 125

kg ha⁻¹ available K and 20 c mol P⁺ Kg⁻¹, CEC at the time of experiment initiation. Among the 12 treatments of long term fertilizer experiments, seven namely T₁- control (no fertilizer and manure), T₂- 50% NPK, T₃-100% NPK, T₄- 150% NPK, T₅- 100% NP + Zn, T₆- 100% N + Zn, T₇- 100% NPK + FYM were selected. One month old seedlings of rice (var. Pant Dhan 4) were transplanted at the spacing of 15 × 20 cm after puddling of field. The amount of fertilizer were calculated as per treatments on the bases of recommended dose of NPK @ 120 : 60 : 30. Half N and full dose of P and K fertilizer through urea, single super phosphate and muriate of potash respectively were applied as basal before transplanting of rice. Remaining half of N was applied into two equal splits just at tillering and some at flowering stage. Zinc was applied @ 20 Kg ZnSO₄ ha⁻¹ in alternate years and farmyard manure (FYM) is being applied @ 15 t ha⁻¹ to every kharif crops. Yield data were recorded after crop harvest and grain and straw samples were collected from the selected treatments. The plant samples were analysed for their nutrient composition using standard procedure.

RESULTS AND DISCUSSION

Grain yield increased significantly with increasing nutrient level. Significant effect of zinc addition with same level of nutrient was also noticed. Maximum (46.7q/ha) grain yield was found in 100% NPK + FYM treatment followed by 100%, NP + Zn application (Table - 1). This can be assumed due to improved physical as well as

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