

Effect of pressmud and inorganic fertilizers on yield and nutrient uptake by rice and its residual effect on succeeding wheat and soil fertility in rainfed lowlands

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ABSTRACT

Field experiment conducted during 2000 -2002 on rice-wheat system revealed that the values of all yield attributes were improved significantly due to integrated use of pressmud alongwith recommended doses of fertilizer (RDF) over RDF alone. Rice received 10 t PM ha⁻¹ alongwith RDF produced significantly higher grain yield over RDF alone, RDF + 25 Kg ZnSO₄ ha⁻¹ and farmer's practice. Addition of 25 Kg ZnSO₄ ha⁻¹ alongwith RDF gave significantly higher grain and straw yield as compared to RDF alone, and farmer's practice. Application of 20 t PM ha⁻¹ alongwith RDF to preceding rice and 100% RDF to succeeding wheat gave significantly highest yield of 32.6 q/ha⁻¹ over rest of the treatment except 15 t PM ha⁻¹ alongwith RDF applied to preceding rice. The highest rice equivalent yield (37.62 q/ha⁻¹) was recorded with 20 t PM ha⁻¹ to preceding rice alongwith 100% RDF to both rice and wheat followed by 15 t PM ha⁻¹ (36.70 q/ha⁻¹) to preceding rice, and 100% RDF to both rice and wheat. The uptake of nutrients by rice was highest with 20 t PM ha⁻¹ + RDF, however, significant response was recorded only up to 15 t PM ha⁻¹ + RDF. The value of pH and bulk density of soil was reduced but content of organic carbon, available N₁, P₂O₅ and K₂O was improved with all integrated nutrient management practices as compared to its initial values.

Key words : Wheat, Rice, ZnSO₄.

INTRODUCTION

The productivity of rice-wheat system is declining day by day owing to continuous use of inorganic fertilizers resulting in deteriorating the soil physical, chemical and biological properties besides, application of inorganic fertilizer in large quantities over a long period create imbalance in soil supply of nutrients. On the other hand, escalation of price of inorganic fertilizers is beyond to the reach of the farmers. Application of organic manures like pressmud / FYM alongwith inorganic fertilizer is beneficial for improving the productivity of rice-wheat system as well as soil properties (Dwivedi and Thakur, 2000). Hence an attempt was made to study the effect of pressmud and inorganic fertilizers on yield and nutrient uptake by rice and its residual effect on succeeding wheat and soil fertility in rainfed lowlands

MATERIALS AND METHODS

Field experiment was conducted at the Crop Research Station Ghagharaghat during 2000- 2002 to find out the effect of integrated use of pressmud in different doses alongwith inorganic fertilizers with and without zinc sulphate on productivity of rice – wheat system and soil fertility in rainfed lowland. The experimental soil was sandy loam in texture with pH 8.1, organic carbon 4.0g Kg⁻¹, available N, 218, P, 20.10 and K, 174 kg ha⁻¹. Seven treatments consisted of farmer's practice (T1), RDF alone (T2), 5 t PM ha⁻¹ + RDF (T3), 10 t PM ha⁻¹ + RDF (T4), 15 t PM ha⁻¹ + RDF (T5), 20 t PM ha⁻¹ + RDF (T6), and 25 Kg ZnSO₄ ha⁻¹ + RDF (T7) were tested in randomized block design with four replications. Rice variety "Jalpriya" was transplanted on 17th July with 20 x 10 cm hill spacing in all years. The recommended dose of fertilizer was 100 Kg N

+ 50 Kg P₂O₅ + 40 Kg K₂O ha⁻¹. A dose of 40 Kg N + 20Kg P₂O₅ ha⁻¹ alongwith FYM (5 t ha⁻¹) was used in farmer's practice, The entire quantity of P₂O₅, K₂O and half of the nitrogen was applied as basal and remaining N was applied in two splits i.e. at tillering, and panicle initiation stage (PIS) of crop. Sulphitation pressmud used in the experiment had pH 7.5, organic matter 260 g Kg⁻¹, N 1.07, P₂O₅ 2.63, K₂O 1.75%. Pressmud was applied 20 days before transplanting of rice crop., The soil samples collected before and after harvest of rice and grain samples at threshing were analyzed adopting standard laboratory methods. Wheat variety "HUW 234" was sown at 22.5 cm rows apart on December, 15 during both year. The wheat was fertilized with 120Kg N + 60Kg P₂O₅ + 40 Kg K₂O ha⁻¹ and received four irrigations. All improved packages of practices were adopted for both crops. The rainfall received during the Kharif 2000 and 2001 was 980 mm and 1075 mm respectively and Rabi 2000-2001 was 41.3 mm and 52.5 mm respectively.

RESULTS AND DISCUSSIONS

Yield Attributes:

Addition of 25 Kg ha⁻¹ ZnSO₄ alongwith recommended doses of fertilizer (RDF) resulted significantly higher values of all yield attributes like panicle m⁻² panicle weight and 1000 grain weight over RDF alone (Table-1). This is because of synergistic effect of Zn with other nutrients improved the availability of nutrients for crop resulted in higher values of yield attributes. Similar results were also reported by Chappale and Badole (1999). Application of RDF alongwith pressmud @ 5, 10, 15 and 20 t ha⁻¹ improved all the yield attributes significantly over rest of the treatments. The improvement in all yield attributes with

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