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Research Article

Management of zinc fertilizer for sustainable wheat [*Triticum aestvum* (L.)] production on soil test value of zinc in ustipsamment soils of Rajasthan

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Summary

Five field experiments were conducted in typic ustipsamment soil having available zinc status 0.28, 0.36, 0.48, 0.54 and 1.20 mg kg^{-1} during *Rabi* 2008-09 to 2010-11 for management of zinc fertilizer for sustainable and economical wheat production on soil test value of zinc. Eight levels of zinc sulphate *i.e.* 0, 5, 10, 15, 20, 25, 30 and 35 kg ha^{-1} were taken in a Randomized Block Design with three replications. The yield of wheat (grain and straw), phosphorus and Zn uptake were influenced by the rate of zinc. Application of $ZnSO_4$ @ 30 and 25 kg at site I and II, 20 kg at site III and IV and 5 kg ha^{-1} at site V gave significantly higher grain and straw yield of wheat over their lower doses. Zinc uptake by wheat increased with increasing levels of $ZnSO_4$ but phosphorus uptake decreased at higher levels of $ZnSO_4$ at site II, III, IV and V. Application of $ZnSO_4$ significantly increased the DTPA- extractable zinc in post harvest soil. A regression equation (Y=8.304 – 16.888 Log X) was derived to quantify the dose of $ZnSO_4$ as per available zinc status of soil for sustainable and economical wheat production in ustipsamment soils of Rajasthan.

Key words : Zn status of soil, Regression equation, Zn and phosphorus uptake, Soil test value, Ustipsamment

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Introduction

In cultivated lands the main cause of low productivity is due to declined soil fertility. Emphasis has been given to supplement the soils with major nutrients for better production in order to achieve the food production over 300 Mt by 2020 the plant nutrient requirement would be more than 45 Mt from both organic and inorganic sources and hardly 10 Mt could be expected from organic sources (Kanwar and Katyal, 1997), which is the main source of micro nutrients. Restoration of lost productivity has to be achieved through scientific soil, fertilizer and crop management practices. According to soil test findings use of high analysis fertilizers and limited recycling of plant residues the gap between removal and addition of secondary and micronutrients has widen especially N, P, K, S and Zn along with other micronutrients. Adoption of intensive cropping and cultivation of high yielding varieties have accentuated the appearance of micronutrients deficiencies in many part of India. Large number of soil sample analysis for micronutrient in India indicates that Zn (>45%) in the most limiting nutrient for sustainable productivity in majority of states (Singh and Saha 1995). More than 65000 soil samples from Rajasthan were analyzed during 2011-12 for micronutrients by soil testing laboratories, department of agriculture, government of Rajasthan indicate that 34 per cent samples are Zn deficient. Zn is one of the essential plant micronutrient and its importance for wheat productivity is similar to that of major nutrients. The crop requires small amount of Zn for their normal growth but its application is high due to low fertilizer use efficiency.

Therefore, a considerable amount of applied Zn remains