

Effect of rates and methods of zinc application on yield, economics and uptake of Zn by rice crop in flood prone situation

T. KUMAR AND V. KUMAR

Accepted : April, 2009

See end of the article for authors' affiliations

Correspondence to :

T. KUMAR

Crop Research Station
(N.D. University of
Agriculture and
Technology),
Ghaghrahat,
BAHARAICH (U.P.)
INDIA

ABSTRACT

A field experiment was conducted to study the effect of rates and methods of zinc application in rice under flood prone condition. There was significant increase in the yield and yield attributes of rice crop upto 45 kg ZnSO₄/ha. The content and uptake of zinc was also increased significantly with increasing levels of zinc sulphate. Soil applied Zn was superior as compared to its foliar application. Soil application of 45 kg ZnSO₄/ha was found to be the best which recorded the highest net monetary return Rs. 8111 ha⁻¹ with BCR 1.63.

Key words : Rice, ZnSO₄

Zinc plays a vital role in different plant metabolism process like development of cell wall, respiration, photosynthesis and other biochemical functions. Zinc is indispensable micronutrient for proper plant growth and development (Das and Saha, 1999). Zinc deficiency result in the inability of rice plant to support root system respiration during flood condition. (Slanten *et al.*, 2001). Zinc deficiency is corrected through the application of ZnSO₄.7H₂O which interact with various soil component like organic mater, clay sesquioxide, fixing or forming its insoluble complexes which ultimately decrease the availability of Zn in soil.

Therefore, the present investigation was undertaken to evaluate the efficacy of different methods and rates of zinc application for rice crop in flood prone situation.

MATERIALS AND METHODS

Field experiment was conducted during *kharif* 2001 and 2002 at Crop Research Station, Ghaghrahat, Bahraich (U.P.), a campus of N.D. University of Agriculture and Technology. The soil of experimental site was silty clay loam having pH 8.1, organic carbon 0.400/0, available NPK 242, 13, 130 Kg/ha, respectively and DTPA extractable Zn 0.43ppm. The experiment was laid out in randomized block design with three replications. The treatments consisted of a control, soil application of ZnSO₄ @ 15, 30 and 45kg/ha and foliar application @ 0.25%, 0.50% and 0.75%. In soil application, ZnSO₄ was broad cast into puddle soil and in foliar application, the required quantity of ZnSO₄ was dissolved in water to

obtain 0.25, 0.50, 0.75% Zn equivalent solutions and done at 30 and 60 days after transplanting. Rice crop was fertilized @ 80 kg N/ha as urea, 30 kg P₂O₅ through DAP and 30 kg K₂O through muriate of potash. The half dose of nitrogen and full dose of P and K were applied uniformly to all treatments at sowing and rest quantity of N was top dressed in two splits *i.e.* tillering and panicle initiation stage of rice crop. Thirty days old seedlings of rice variety "Barh Avarodhi" was transplanted at 20x10 cm spacing, 2-3 seedlings/hill in last week of July during both the years. Dry mater yield at different stages (30 days and 60 days) and yield of grain and straw at harvest, were recorded. Plant samples were digested in diacid mixture of HNO₃ and H₂SO₄ (5:2). Zn concentration in the digested extract were determined by atomic absorption spectrometer.

RESULTS AND DISCUSSION

Application of ZnSO₄ @ 45 kg/ha (B) produced significantly highest dry matter (930 g/m²) over rest of the treatments except foliar application of ZnSO₄ @ 0.75% and 0.50% (Table 1). This might be due to more availability of Zn near to rizosphere. (Varshney, 1988). Among the Zn applied treatment, the dry matter production was lowest with farmer practice. Similar trend was also recorded in respect of panicle/m². The treatment 4 significantly increased the test weight of grain (44.69) over farmer practice and rest of the treatments were at par with each other. This might be due to increased transpiration of photosynthesises from source to sink due to zinc application as reported by Sriramchandra and