

EFFECT OF CONTINUOUS APPLICATION OF ORGANIC AND INORGANIC FERTILIZERS ON MICRONUTRIENT STATUS IN MAIZE-WHEAT SYSTEM ON TYPIC USTOCHREPT

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ABSTRACT

A long term fertilizer experiment was laid on Typic Ustochrept at Instructional farm, Rajasthan College of Agriculture, Udaipur under All India Co-ordinated Research Project during *kharif*, 1997 in a randomized block design for growing maize-wheat in sequence involving varying doses of N, NP, NPK with FYM, Zn, S and Azotobacter. Results of the experiment indicated that DTPA extractable micronutrients viz., Fe, Mn, and Cu increased with the application of FYM alone and in combination with chemical fertilizers, whereas, DTPA-Zn content was higher in NPK + Zn and NPK + Zn + S treatment. A highly positive and significant relationship was obtained between available cationic micronutrient and cation exchange capacity, hydraulic conductivity and organic carbon.

Key words : Fertilizer experiments, Integrated nutrient management, DTPA extractable micronutrients.

Long term fertilizer experiment is the best tool to assess the influence of continuous application of fertilizers on crop production and soil health under high input soil management technology. One of the reason for deterioration in productivity was found to be associated with micronutrient deficiencies under intensive cropping system. The depletion rate of DTPA extractable micronutrients was higher in soil treated with chemical fertilizers alone as compared to plots treated with FYM. Yadav and Alok Kumar (1998) reported that the depletion rate of DTPA-extractable micronutrients was higher in soils treated with chemical fertilizers alone as compared to the plots treated with green manures and fertilizers after completion of 12 cycles of rice-wheat sequence in an Inceptisol. Zinc had a pronounced effect on maize crop cultivated on Ustochrepts (Brar and Biswas 1997, Brar and Pasricha, 1998). It has been reported that DTPA extractable Cu and Fe content of the soil increased whereas, DTPA extractable Mn decreased in all the treatments of LTFE at Pantnagar, which is in progress since 1971 in loamy sand (Ustochrept) soil (Brar *et al.*, 2001). In the present investigation, an attempt was undertaken to study the long term effect of continuous application of organic and inorganic fertilizer to maize-wheat system on micronutrient status of Typic Ustochrept.

MATERIALS AND METHODS

A long term field experiment on sandy clay loam soil was initiated in the year 1997 with maize-wheat cropping system at Instructional Farm, Rajasthan College of Agriculture, Udaipur. The soil of the experimental field was sandy clay loam in texture, non-saline and slightly alkaline in reaction (pH 8.2, EC 0.48 dsm^{-1}) (Table 1). The experiment consisted of 12 treatments replicated four times in a randomized block design. These are : T₁ – 100% NPK (based on soil test values); T₂ – 100% NPK + Zn; T₃ – 100% NPK + S; T₄ – 100% NPK + Zn + S; T₅ – 100% NPK + seed treatment with *Azotobacter*; T₆ – FYM @ 10 t ha⁻¹ + (100% NPK- NPK of FYM); T₇ – 100% NPK + FYM @ 10 t ha⁻¹, T₈ – FYM @ 20 t ha⁻¹; T₉ – 150% NPK; T₁₀ – 100% NP; T₁₁ – 100% N; and T₁₂ – Control.

The 100% NPK dose, based on soil testing of initial soil, was 90 kg N, 30 kg P₂O₅ and 15 kg K₂O ha⁻¹ for maize as well as wheat. The fertilizers used were diammonium phosphate, muriate of potash, zinc sulphate and elemental sulphur. The FYM, S and Zn were applied only once in a year during *kharif* season. Maize (cv. Ganga-2) and wheat (cv. Raj 3077) were raised as test crops in the cropping system. At the harvest of maize crop of the year (2004-05) and wheat crop of year (2005-06) soil samples (0-15 cm) were drawn to assess available micronutrient cations with DTPA (Lindsay and Norvell, 1978), organic carbon (Walkley and Black, 1934), CEC (Piper, 1950) and hydraulic conductivity (Black, 1965).