

Research Article

## Distribution of available micronutrients as related to the soil characteristics in Malwa plateau region in southern Rajasthan

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### Summary

Ten typical pedons in Malwa Plateau region of Banswara district in Rajasthan were studied for vertical distribution of DTPA-extractable iron, manganese, zinc and copper and their relationship with some soil properties. Soil reaction, calcium carbonate, organic carbon and particle size fractions had strong influence on the distribution pattern of these micronutrients in the profile. The contents of available iron, manganese, zinc and copper were higher in surface horizons and decreased with depth in most of the pedons and ranged from 6.34 to 54.71, 2.42 to 57.64, 1.01 to 5.10 and 1.20 to 6.10 mg kg<sup>-1</sup>, respectively. All soils had adequate amounts of iron, manganese, zinc and copper. The available micronutrient content in these soils were in the order of Fe>Mn>Cu>Zn. DTPA extractable Fe gave significantly and negative correlation with pH, CaCO<sub>3</sub>, clay and CEC while significantly and positive correlation gave with organic carbon. Mn gave negative significant correlation with CaCO<sub>3</sub> and clay. Zn gave negative significant correlation with clay while Cu was positively significantly correlated with silt.

**Key words :** Available micronutrient cations, Soil properties, Malwa plateau

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## Introduction

Micronutrients are chemical elements required in very small amounts for growth and development of plants. Iron (Fe), manganese (Mn), copper (Cu) and zinc (Zn) are essential micronutrients for plant growth. Through their involvement in various enzymes and other physiologically active molecules, these micronutrients are important for gene expression, biosynthesis of proteins, nucleic acids, growth substances, chlorophyll and secondary metabolites, metabolism of carbohydrates and lipids, stress tolerance, etc. (Rengel, 2003; Gao *et al.*, 2008). Original geologic substrate and subsequent geochemical and pedogenic regimes determine total levels of micronutrients in soils. Total levels are rarely indicative of plant availability, because availability depends on soil pH, organic matter content, adsorptive surfaces, and other physical,

chemical, and biological conditions in the rhizosphere.

Availability of micronutrients influenced by their distribution in soil and other physico-chemical properties of the soil (Sharma and Chaudhary, 2007). Soil reserves are supposed to supply micronutrients for complete growth of the plant and synthesis of food as these are not regularly applied commonly as fertilizers. The knowledge of vertical distribution of cationic micronutrients in soil and interrelationship with soil characteristics is useful in understanding the inherent capacity of soils to supply these nutrients to plants and their downward movement to soils. In order to advocate more scientific and site specific nutrient management strategies to farmers, an understanding of the vertical distribution of micronutrient cations in the soils is essential. However, the available information in this regard for soils of malwa plateau of Banswara district of southern