

EXTRACTABILITY AND AVAILABILITY OF CATIONIC MICRONUTRIENTS IN SOILS OF EGYPT

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ABSTRACT

Determining the most reliable extractant for soil available Fe, Mn, Zn, and Cu which extracts the element from the same pools in soils almost like the plant does was the aim of this investigation. To satisfy this aim, surface soil samples (0-30 cm) were collected from 97 different locations representing the most cultivated and non-cultivated soils in Egypt. Soil Fe, Mn, Zn and Cu were extracted with the following extractants:

Acid ammonium acetate EDTA (AAAc-EDTA), Mehlich III, Coca-Cola, CAT, Ammonium bicarbonate DTPA (AB-DTPA), DTPA, Westerhoff 0.43M nitric acid (WH), and Bi-distilled water (BDW). A greenhouse experiment was conducted and barley (*Hordeum Vulgare* Var. Giza 123) was used as an indicator plant and grown in plastic pots containing 800 g soil. The concentration and uptake of Fe, Mn, Zn and Cu by barley plants were determined. The obtained results could be summarized as follows: In case of iron, there is no difference between Fe uptake and Fe concentration as plant parameters used as functions of Fe availability in soils where the defined most effective extractant was AB-DTPA with both of them. Concerning manganese, the most effective extractant in case of using Mn uptake was CAT, but with Mn concentration it was Coca-Cola. With zinc, DTPA extractant was the most effective extractant for Zn according to the relationships between extractable Zn and its concentration or uptake by plant. The best extractant with using Cu uptake was Mehlich III and with Cu concentration was WH.

The soil concentrations needed to reach the critical nutrient concentrations in plant are 11 mg kg^{-1} , (ABDTPA-extractable Fe), 2 mg kg^{-1} (Coca-Cola-extractable Mn), 0.4 mg kg^{-1} (DTPA-extractable Zn), and 5 mg kg^{-1} (WH-extractable Cu).