122/B

Influence of soil properties on different fractions of Zn in paddy growing soils

D M D I Wijebandara
University of Agricultural Sciences, Dharwad - 05, Karnataka, India
(current affiliation: Coconut Research Institute, Lunuwila 61150, Sri Lanka)

Zn is found in soil in as number of discrete chemical forms differing in their solubility and thus availability to plants. The Water Soluble plus Exchangeable Zn (WSEX-Zn) and Organically Complexed Zn (OC-Zn) are considered to be available while Amorphous sesquioxide bound Zn (AMOX-Zn) is potentially available and Crystalline sesquioxide bound Zn (CRYOX-Zn), Manganese oxide bound Zn (MnOX-Zn) and Residual Zn (Res-Zn) are unavailable to plants. Distribution of these Zn forms depends on the chemical and physical properties of the soils. Therefore, this investigation was carried out to study the influence of soil properties on different forms of Zn in paddy growing soils.

Seventy five surface soil samples were collected from paddy fields in Nothern Dry Zone of Karnataka state, India. The processed soils were analysed for pH, Organic Carbon (OC), clay, free Calcium carbonate ($CaCO_3$), free Ferric oxide (Fe_2O_3), Cation Exchange Capacity, (CEC), total Zn and available Zn by standard analytical methods and different forms of Zn by sequential Zn fractionation procedure. The results revealed that concentration of different Zn fractions varied from soil to soil and the order of magnitude of different Zn fractions remained same viz., WSEX-Zn < OC- Zn < AMOX-Zn < CRYOX-Zn < MnOX-Zn < Res-Zn. The WSEX-Zn correlated significantly ($p<0.05$) and negatively with pH ($r=-0.739^{**}$) and $CaCO_3$ ($r=-0.551^{**}$) and positively with OC ($r=0.445^{**}$) and CEC ($r=0.414^{**}$). The OC-Zn showed significant and positive correlation with OC ($r=0.739^{**}$) and MnOX-Zn correlated positively and significantly with clay ($r=0.644^{**}$) in soils. The AMOX-Zn and CRYOX-Zn showed positive and significant correlation with Fe_2O_3 ($r=0.707^{**}$, $r=0.754^{**}$ respectively) and clay ($r=0.468^{**}$, $r=0.444^{**}$ respectively). The Res-Zn positively and significantly correlated with Fe_2O_3 ($r=0.766^{**}$), OC ($r=0.390^{**}$) and clay ($r=0.443^{**}$) of the soils. The Avail.-Zn significantly and negatively correlated with pH ($r=-0.441^{**}$) and $CaCO_3$ ($r=-0.283^{*}$) and positively with OC ($r=0.298^{**}$) and clay ($r=0.447^{**}$). Correlation data indicated that these fractions are in a state of dynamic equilibrium among different fractions. Multiple regression equations indicated that 44.2 to 81.5 % variation in all the Zn fractions explained by the combined effect of soil properties studied.

Financial assistance by ICAR/CARP MOA work plan is acknowledged.

*iraniew@gmail.com Tel: 031 2255300