TXRF Total and ICP OES AAAc-EDTA extractable Trace Elements in Soil Samples from Muguga, Kenya, by Mr. Abdub Galgallo, MSc Student, Thursday 15th January 2015

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Mr. Abdub Galgallo making his presentation

ABSTRACT

In plant nutrition soil micronutrient concentration is commonly classified into two main categories; total concentration and extractable portion. The total concentration is not related to that potentially available to plants but is used to indicate the relative abundance of a particular element in a soil and its potential replenishing power. The extractable/soluble portion is the concentration as indicated by extraction methods like AAAc-EDTA and are usually considered as plant available. Although soluble concentrations are crucial in plant nutrition, the extraction procedures involved often require the use of a sizeable amount of chemical reagents and are time consuming.TXRF total and ICP/OES ammonium acetate ethylene diamine tetra-acetic acid (AAAc-EDTA) extracted Fe, Ni, Cu, Zn and Mn in a farm (Muguga) in Kiambu County were investigated. A relation could mean adoption of quicker, fairly nondestructive spectral methods like Total X-Ray Fluorescence Spectroscopy (TXRF) instead of conventional wet chemistry

methods like AAAc-EDTA. Topsoil pH, topsoil carbon and variation of total elemental concentration with depth were also investigated. The soil TXRF spectra was quantified using the automated Picofox inbuilt software and later using manual QXAS software package. The most abundant element in the sample was the least soluble while the least abundant was second highest in solubility. The most soluble of the five elements studied was Mn 64%, followed by Ni 42%, Cu 24%, Zn 23% and Fe <1%. Copper was the only sufficient nutrient while Mn and Zn were in excess. The samples were strongly acidic with mean pH of 5.4 and could have resulted in the excess solubility of the micronutrients.Pearsonôs correlation between the extracted and total concentrations was 0.90 for Ni, 0.80 for Zn, 0.59 for Mn, 0.57 for Cu and -0.33 for Fe. The extracted amount and pH had r values of 0.59 for Mn, 0.58 for Cu, 0.42 for Fe, 0.40 for Zn, 0.15 for Ni while that of the extracted portion and carbon were 0.76 for Zn, 0.74 for Mn, 0.66 for Ni, 0.36 for Cu and 0.09 for Fe. The elements with higher total concentration showed better relations between their top and subsoil concentrations. Topsoil to subsoil Fe, Mn, Zn Cu and Ni concentrations had r values of 0.87, 0.79, 0.74, 0.50 and 0.32 respectively. The Picofox inbuilt and QXAS software did not agree on a single measurement when quantifying Fe, Mn, Zn and Cu, however the two methods showed some agreements when quantifying Ni.