



Variability in soil micronutrients extracted by DTPA and Mehlich-3 at the plot scale in an acidic environment

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Land use practices affect soil properties and nutrient supply. Very limited data are available on micronutrient extractability in northwest Spain. The aim of this study was to analyse long-term effects of land use on the concentration, variability and spatial distribution of soil nutrients. To this end, neighboring forest and cultivated stands were compared. The study was carried out in an acid, rich in organic matter soil developed over sediments at the province of Lugo, northwestern of Spain. Adjacent plots with a surface of 100 m² were marked on regular square grids with 2-m spacing. Fe, Mn, Zn and Cu were extracted both by Mehlich-3 and DTPA solutions and determined by ICP-MS. General soil chemical and physical properties were routinely analyzed. In arable land, microelement concentration ranges were as follows: Fe (100 and 135 mg kg⁻¹), Mn (7.6 and 21.5 mg kg⁻¹), Zn (0.6 and 3.7 mg kg⁻¹), and Cu (0.2 and 0.7 mg kg⁻¹). In forest land, these ranges were: Fe (62 and 309 mg kg⁻¹), Mn (0.2 and 2.1 mg kg⁻¹), Zn (0.2 and 2.9 mg kg⁻¹), and Cu (0.1 and 0.2 mg kg⁻¹). With the exception of Fe-DTPA, microelement concentrations extracted both with DTPA and Mehlich-3 were higher in the cultivated than in the forest stand. Coefficients of variation were higher for the microelement content of the soil under forest. Principal component analysis was performed to evaluate associations between extractable microelements and general physico-chemical properties. At the studied scale, nutrient management was the main factor affecting the agricultural site, whereas soil-plant interactions were probably responsible for the higher variation within the forest site. Patterns of spatial variability of the studied nutrients at the small plot scale also were assessed by geostatistical techniques. Results were discussed in the frame of sustainable land use and organic matter decline with conventional tillage and sustainable land use