Mapping of available heavy metals in Catamarca (Argentina)

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Copper, iron, manganese and zinc are four essential elements for plant growth. Mapping heavy metal migration and
distribution in soils is a preliminary step in assessing heavy metal availability in soils. However, data of qualitative
and quantitative trace elements composition of soils of Argentina are scarce. Despite the small amounts required by
plants, agricultural soils are usually deficient in one or more micronutrients, therefore, their concentration in plant
tissues falls below the levels that allow optimal growth. Soil nature plays a fundamental role in the availability of
micronutrients and their behaviour at a soil-plant level. The aim of this study is to determine the plant availability
and areas of deficiency in agricultural soils with risk of salinization. The presented maps have been elaborated
on the basis of the information provided by the monochromatic aerial photographs, scale 1:7000 and projected
using the topographic information of the National Topographic Maps. Soils were sampled according to the spatial
variation of soil types and land use. Sampling points were geo-referenced. Soil samples were analyzed at the
laboratory for complete physicochemical and mineralogical characteristics. The percentage of organic matter is
the determining factor in the presence and distribution of the available metals in the soils of the studied area, being
the top horizon the one of greatest accumulation. CuDTPA, FeDPTA and MnDPTA are mobile within the profile,
whereas ZnDPTA remains adsorbed without vertical displacement. ZnDTPA is the only available metal which
also shows differences due to soil salinity and textural classes. However, soil geochemical conditions imply low
extractability and a certain difficulty for micronutrient absorption by plants.