

Investigation of the reactivity of soil Water Extractable Organic Matter with Copper (II) - A case study

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The reactivity of water extractable organic matter (WEOM) *vis-à-vis* copper (II) was determined using the fluorometric approach following the Stern-Volmer modified model (Saar and Weber, 1980). WEOM was collected in the laboratory from soil samples obtained from an experimental site in the Mediterranean region in the south of France. The samples were passed over XAD-8 and XAD-4 resins connected in tandem to separate the hydrophobic (HPOA) and the transphilic acids fractions (TPIA), which were then used for the reactivity studies. Details on the sampling procedure and the preparation of WEOM fractions had been published previously in Hassouna et al. (2012).

The qualitative study of the properties of fluorescence of the two fractions using 3D-UV fluorescence spectroscopy revealed a higher sensitivity of peak A (Fulvic-like substances) to additions of Cu(II) compared to peak C (Humic-like substances). The decrease of the ratio between the two peaks (IA/IC) from 1.8 before copper additions to 0.6 suggested that less humified and more fluorescent type-A fluorophores are more involved in Cu(II) complexation than their counterpart type-C fluorophores, which are generally more humified and less fluorescent.

The conditional constants of stability ($\log K$) for both fractions analyzed in our study were within the ranges of those reported in previous studies for WEOM. $\log K$ for the HPOA fractions increased from 5.31 ± 0.15 to 5.64 ± 0.12 as soil depth increased from 0-30 to 60-90 cm. A similar trend was found in TPIA fractions with values of $\log K$ increasing from 5.31 ± 0.13 to 5.88 ± 0.21 at 0-30 and 60-90 cm, respectively. These observations indicate that less humified and more efficient fluorophores, dominant in WEOM extracted from deeper soil layers, are better ligands for Cu(II) complexation. The higher mobility of these entities across the soil profile confirms the important role which WEOM may play in the transfer and redistribution of Cu(II) between the different

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compartments of an ecosystem, such as an agro-ecosystem, surface or ground water sources.

Key words: Soil - Water extractable organic matter - Copper(II)-Hydrophobic acids (HPOA) - Transphilic acids (TPIA) - UV fluorescence spectroscopy

References

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