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CHARACTERIZATION OF THE ORGANIC CONSTITUENTS OF LOAMY SOIL SOLUTIONS

J. CELERIER[1], M. POULAIN[1], C. RODIER[1], L. LEMEE[1], L. CANER[2] and A. AMBLES[1]

[(1)] Synthèse et Réactivité des Substances Naturelles UMR CNRS 6514- FR2703
Faculté des Sciences, 40 avenue du Recteur Pineau, 86022 Poitiers Cedex
[(2)] Hydrogéologie, Argiles Sols et Altérations – UMR 6532
Faculté des Sciences, 40 avenue du Recteur Pineau, 86022 Poitiers Cedex

Total soil organic matter content is a key attribute of soil quality since it has far-reaching effects on soil physical, chemical, and biological properties. However, changes in contents of organic carbon (C) and total nitrogen (N) occur only slowly and do not provide an adequate indication of important short-term changes in soil organic matter quality that may occur.

Labile pools of organic matter can be considered as fine indicators of soil quality and are much more sensitive to changes in soil management practices. Dissolved (soluble) organic matter consists in organic compounds present in soil solution. This pool acts as a substrate for microbial activity and its leaching greatly influences the nutrients, organic matter content and the pH of groundwater. Various extractable organic matter fractions, including hot water-extractable and dilute acid-extractable carbohydrates, which are involved in stabilization of soil aggregates, have also been suggested to be important. Despite its importance, the quality of dissolved organic matter (DOM) is highly variable and little information is available on the relation of DOM quality to the structure and composition of its parent soil organic matter (SOM).

The objective of the present work is to develop a better knowledge of the quantity and the quality of the organic matter present in soil leaching. The nature of the organic matter was investigated at low and high molecular levels by different extraction and degradation techniques.

Soil solutions were obtained from field plot using porous ceramic cups (at 15, 30, 60 and 100 cm depth) equilibrated in soil for more than18 months before sampling. Additionally, the plots were equipped with soil moisture sensors. Three plots were amended with a green waste compost (50, 100 and 150 t/Ha).

Ceramic cup, hot water and dilute acid soil solutions were analyzed and compared to Soil Organic Matter. For each sample, bulk characterization (TOC, UV, 3D fluorescence, pH measurements) was achieved. Then, after Solid Phase Extraction (SPE), the molecular fraction was studied by Gas Chromatography coupled to Mass Spectrometry (GCMS). Humic

substances were separated (dialysis, XAD resins) into three fractions, respectively: colloidal, hydrophobic and transphilic OM. The different humic fractions of OM were submitted to flash pyrolysis and thermochemolysis (pyrolysis using tetramethyl ammonium hydroxide as alkylating agent).

Field plot and column leaching studies were thus used to quantify the impact of adding green wastes compost to soils on Carbon sequestration, organic molecules leaching, and on the formation and stabilization of clay-humic complexes.