



Hydrophobic and hydrophilic fractions of dissolved organic matter in soils of different salinity

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Soil salinization induced by different natural and anthropic factors represents the greatest concern for desertification in Mediterranean areas.

The status and properties of soil organic matter are considered among the most important indicators for evaluating the extent of soil desertification. In particular, water soluble or dissolved organic matter (DOM) plays a number of significant chemical and biological functions in soil, including metal and colloid transport. Soil DOM can be operationally fractionated into two portions, i.e., the hydrophilic (HI) and hydrophobic (HO) fractions, which are characterised by different chemical properties and reactivity.

In the present work, three soil samples were collected at the depth of 0-50 cm in the area of Gela (Sicily). The first soil was subjected to moderate salinization due to continuous irrigation with saline water. The second soil underwent extended salinization by periodic floods by waters rich in NaCl originated from nearby halite quarries. The third soil was a control soil collected from an adjacent, non-salinized area. HI and HO fractions of DOM extracted from these soils were investigated by means of spectroscopic techniques including tridimensional fluorescence spectroscopy in the mode of emission excitation matrix (EEM) and Fourier transform infrared spectroscopy (FT-IR).

Results showed that soil salinity affects the amount and chemical quality of DOM and its HI and HO fractions. The FT-IR spectra were distinctive in differentiating HI from

HO fractions of DOM as a function of soil salinity. The EEM spectra of HO fractions exhibited a shift towards longer emission wavelengths and higher fluorescence intensity values as compared to those of the HI fractions, which could be ascribed to the different molecular structure and complexity of HI and HO fractions. Further, a marked quenching effect of fluorescence intensity of both DOM fractions was observed with increasing soil salinity. This effect could provide an immediate evaluation of soil salinity degree by direct comparison of fluorescence peak intensity.