



Variability of humic acid properties depending on their precursor material: a study of peat profiles

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Analysis of variation of peat composition, presence of trace elements in the peat and HSs within peat profiles can give information on the character of transformation of organic matter, important for C biogeochemical cycling, but also about impacts of climate change and human activities. In peat the transformation and decay process of living organic matter (humification) is retarded by the acidic and anaerobic environment, but at the same time the peat can provide information on environmental and paleo-environmental conditions of the past.

The aim of the present study is to analyze the elemental and functional composition, spectral characteristics of humic acids isolated from a well characterized raised bog peat profiles to evaluate the impact of the character of humification processes on the peat HA properties.

A comparative and complex characterization of humic acids (HAs) isolated from peat profiles of different origin in Latvia was carried out. Elemental and functional analysis of the isolated HAs was done, their acidity and molecular weights estimated. Spectral characterization included UV-Vis, IR, and electron spin resonance and fluorescence spectra. Structural characterization of HAs was by both ¹H and ¹³C nuclear magnetic resonance spectra. Comparison of position of studied humic acids in the Van Krevelen graph was done, thus locating them in the biogeochemical transformation processes of organic matter. Properties of HAs isolated from the Latvian peat were compared with HA from other sources (soil, water, coal and synthetic humic substances). Major properties of peat HAs depended on their origin, indicating the importance of humification processes. HAs isolated from peat of more recent origin were more similar to soil HAs, but from older sources there was a greater degree of humification. Changes of surface tension of solutions of humic acids stress the differences in aggregation character – ability to form supramacromolecular complexes of humic substances and impact of environmental conditions on the surfactant properties of humic matter.

Amongst the main objectives of the study was the identification of the dependence of the humic acid properties on the composition of original living matter in the peat, especially considering high variability of peat composition in the studied bogs. Despite some correlation between peat botanical composition and properties exist, in general the similarities are much more expressed, thus indicating the significance of microbial decay processes on the properties of humic material.

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