

Characteristics of Humic Acids in Drained Floodplain Soils in Temperate Climates: A Spectroscopic Study

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Streszczenie

This study aims to assess the characteristics of humic acids (HAs) in floodplain soils. HAs were isolated from the Fluvisols located out of the embankment in the riparian forest (unflooded riparian forest) and within the embankment (inter-embankment), in the area periodically flooded. HAs from these soils were examined for quantity, structure, and humification degree using extraction methods as well as elemental analysis, UV-Vis, FTIR, EPR, and ^1H NMR spectroscopies. In the soils after drainage, a significant decrease in HAs has been observed compared to the periodically flooded areas. Obtained results showed that organic matter from periodically flooded soils is more humified and contains HAs with a more aromatic, lignin-like structure compared to the humus matter from unflooded Fluvisols. Humic acids from periodically flooded soil contained a lower amount of C and H compared to those isolated from unflooded soils located out of the embankment, which resulted in a less aliphatic or more aromatic character of their molecules. A higher H/C ratio of HAs from the Fluvisols after drainage exhibits more condensed aromatic ring or substituted ring structures in the molecules. Soils with organic matter with a higher humification index contained HAs with lower radical concentration values in comparison to soils with less humified organic matter. Results obtained show that in flooded areas with periodically reductive conditions, humic acids do not lose as many $-\text{OCH}_3$ groups as in better oxidized soils and therefore exhibit a lignin-like aromatic structure. It has been proven that the formation and dynamics of HA transformation may vary due to the water regime in soils.

Słowa kluczowe

humic substances, spectroscopic analysis, E4/E6 ratio, FTIR analysis, ^1H NMR spectra, anthropogenic impact on soil

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