Effect of selected organic materials on soil humic acids chemical properties.

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Streszczenie

Environmental friendly agricultural management has an urgent need for finding a sustainable strategy for the usage of different by-products from bioenergy production. These are either used as soil amendments or fertilizers. This study is aimed at evaluating if and how soil organic matter changes after the application of biochar, compost, and digestate. A pot experiment was conducted with Haplic Cambisol (low range arable soil) in Phytotron CLF PlantMaster (Wertingen, Germany). The chemical composition of isolated humic acids (HA) was determined by an inductively coupled plasma-mass spectrometer (ICP-MS). FT-IR spectroscopy and CHNS analysis were used for detailed chemical and optical characterization. Soil magnetic properties - radical concentration, g-parameters of radicals, and iron ions were evaluated by EPR spectroscopy. The results showed that amending arable soil with biochar, digestate and compost results in chemical and structural changes of humic substances. The radicals originated in biochar and digestate are built-in to the structure of the humic acid, which was confirmed by EPR g-parameter values. Despite a relatively high concentration of paramagnetic metal ions Fe and Mn the effect of semiquinone radical quenching was not observed. That suggests a conclusion that metal ions of studied amendments are binding in HA structure and did not disturb natural radical processes in the soil. It was also concluded that the effect of applied material depends mainly on its chemical properties and the soil type.

Słowa kluczowe

Biochar, digestate, compost, soil humic acids, metal ions, EPR spectroscopy

Adres publiczny

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