

Impact of biochar substrates on the fate of selected organic contaminants in soil

Ines Vogel, Rene Schatten, Florian Worzyk, and Konstantin Terytze
Freie Universität Berlin, WG Geoeontology, Berlin, Germany (vogeline@zedat.fu-berlin.de)

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Freie Universität of Berlin

Soils around the capital of Germany, Berlin, in the federal state of Brandenburg still suffer from former military use: there are large abandoned areas contaminated especially with petroleum-derived hydrocarbons and polycyclic aromatic hydrocarbons – altogether more than 230.000 ha representing 8 % of the whole Brandenburg territory. On the other hand there is increasing demand for available agricultural space for the production of renewable raw materials.

An interdisciplinary research project – LaTerra - seeks for innovative system solutions applying regional produced biochar substrates to enhance soil biological activity in order to accelerate pollutants degradation and get the area back to agricultural use. In addition to pollutants reduction biochar substrates are also intended to enlarge quality of these poor sandy soils.

Pot, lysimeter and field trials are performed to demonstrate physical, chemical and biological advantages. Results regarding leaching of contaminants, soil-plant transfer and soil biological parameters will be presented.

The application of biochar substrates on different levels resulted in enhanced biological activity like soil respiration and nitrification rates. According to the amount of biochar substrates application the reduction of petroleum-derived hydrocarbons was accelerated reaching degradation rates of more than 90 %. PAH contamination was not degraded the same way but bioavailability was reduced, there was significantly lower transfer of PAH in plant roots at the plots with biochar substrates application.

Leaching of PAH and petroleum determined by batch tests according to DIN 19529 (determination of mobilisable nutrient and contaminant contents) showed differing results. Soil plots with petroleum contamination and biochar application had exponentially reduced petroleum concentrations in leachate against non-treated variants.

Furthermore leaching of potassium and phosphorus was reduced with increasing amounts of biochar substrates application. In addition, results from column trials according to DIN 19528 for the determination of leaching dynamic will be introduced.

Results are embedded in search for more resource efficiency of organic wastes in the region, area revaluation and climate protection.