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ISEB-2018

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Joint Conference

7th European **Bio**remediation Conference (EBC-VII) and
11th International Society for Environmental
Biotechnology Conference (ISEB 2018)

e-Book of Abstracts

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EMERGING CONTAMINANTS TRANSLOCATION IN VEGETABLES FROM CONTAMINATED SOIL

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ABSTRACT

Background information

Transfer of contaminants from soil, water and air to the food chain is considered as one aspect of food safety, a global issue receiving high priority worldwide. Emerging contaminants constitute a large group of compounds that includes pharmaceuticals, personal care products, plasticizers, surfactants, and herbicides used for a large number of applications. Many emerging contaminants have a high potential to pass through treatment processes commonly used for landfill leachates or in WWTPs and can thus be easily detected in effluents and in surface water, groundwater and soil. Thus, more knowledge of environment–food web transfer of such compounds is important.

In recent decades, a number of plant uptake models, ranging in scope from simple steady-state equations with one input parameter to compartment models containing several dynamic uptake, intra-plant processes and input parameters have been established to predict uptake of compounds. However, in order to verify or adjust existing uptake models for emerging contaminants, experimental or controlled field data are needed.

Transport of water and solutes, including contaminants, from soil via plant roots to aboveground compartments is driven by the water potential gradient created by plant transpiration. It has been shown that less hydrophilic organic pollutants, e.g. polychlorinated biphenyls, polyaromatic hydrocarbons and dioxins, can be taken up from the soil via roots. However, except for some plant species-dependent difference, uptake of these compounds via roots is general low. Due to their higher polarity, the emerging compounds might have a greater capability to be taken up by plant roots and further translocated within plants. However, information on the transfer into the terrestrial food web is still scarce.

The main objective of the present work was to compare the transfer of contaminants from soil to edible plant compartments (lettuce and tomatoes) of selected emerging organic contaminants in an experimental growth study on polluted soil with models outcomes.

The emerging organic contaminants analysed included benzophenone (BP), benzophenone-3 (BP3), bisphenol A (BPA), and nonylphenol (4-NP).

Main results

The translocation of 4-NP into edible vegetables was the highest between the analyzed contaminants and by-products. At the end of the test, NP concentration in the contaminated pots had significantly lowered (0.2-0.6 mg/kg d.w.). Lettuce grown on contaminated soils exhibited significant 4-NP concentrations (10-100 µg/kg fresh weight), suggesting potential translocation from the contaminated soil.

Modeling of pollutant translocation into vegetables was also performed and outcomes compared to experimental results. Starting from the concentrations obtained, the study is dedicated to the risk to human health through ingestion, comparing the values obtained through experimentation with toxicological reference parameters, RfD and TDI. The value obtained, especially for 4-NP, is not negligible compared to the reference indices adopted.

Conclusions

The toxicological risk for humans, by ingestion of EC contaminated vegetables, can not be excluded.

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