Abstract

Composting is not only an established technology for the treatment of organic waste but also a bioremediation method with great potential. The microorganisms responsible for the composting process can break down not only organic material but also a lot of pollutants. The bioremediation efficiency of composting depends on many process parameters, such as the type and amount of contaminated matrix and added organic material, moisture, nutrient ratio, etc., in addition to the kind and bioavailability of the pollutants themselves. To correctly assess the applicability of composting in specific cases and to set appropriate conditions, it is important to understand the influence of the individual parameters.

Soil contamination with polycyclic aromatic hydrocarbons (PAHs) and other aromatic hydrocarbons remains a problem in many locations. Composting can be a suitable remediation method for this type of contaminated material supposing PAHs are sufficiently bioavailable. In this dissertation thesis, the effect of the organic substrate composition on the removal efficiency of PAHs from historically contaminated soils was studied. The results indicate that if optimal composting conditions (moisture, aeration, etc.) are maintained and the maturation phase lasts at least one year, the final extent of PAH loss is not significantly dependent on the composition of the substrate. However, it is possible to influence the rate of PAH loss in the initial active phase to some extent. The effect of the ratio of contaminated matrix to residual material on the degradation of selected micropollutants was investigated in the case of sewage sludge composting. The sludge contains a lot of nutrients which makes it a suitable fertilizer, but at the same time, it may pose a risk due to the presence of some impurities. The results show that 75 % or more of sludge has a negative effect on the composting process. At the same time, it implies that sludge composting can effectively reduce the concentration of some drugs, while others are relatively resistant to degradation. In the case of substances particularly resistant to biodegradation, e.g. hexachlorocyclohexanes (HCHs), the solution may be based on a combination of biological and chemical methods. Composting has been proven in this work to be a suitable final step in the remediation of HCH-contaminated soil. Its main purpose was to reduce the ecotoxicity of the remediated material caused by the various degradation products produced during the previous biological-chemical phases.

[IN CZECH]