Abstract

Many organic compounds are released to the environment and can be harmful to living organisms. These compounds are often persistent and toxic. Some are mutagens, carcinogens, endocrine disruptors or they can cause an increase in bacterial resistance. They tend to accumulate in nature and their transformation is a long-term process. Therefore, various remediation techniques are needed for decontamination. Remediation and bioremediation processes depend on many factors which should be critically evaluated.

This dissertation thesis studies the relationship between bioavailability, biodegradation and toxicity of polychlorinated biphenyls, polycyclic aromatic hydrocarbons and fluoroquinolone antibiotics. These compounds of different origin, character and properties were degradated by ligninolytic fungi. Desorption behaviour of pollutants from historically contaminated sites, degradation potential of ligninolytic fungi, ongoing degradation mechanisms, transformation products and their toxicity were studied as important factors for evaluation of mycoremediation and its environmental impact.

The results show that determination of bioaccessible fraction by sequential supercritical fluid extraction is very useful for precise prediction of biodegradability of pollutants. The evidence that ecotoxicity and bioaccumulation correlate with bioaccessibility of polycyclic aromatic hydrocarbons is also provided. Degradation experiments indicate that individual fungal strains have various degradation efficiencies. *Pleurotus ostreatus* was the most effective fungus in transformation of polychlorinated biphenyls and chlorobenzoic acids. On the contrary, fluoroquinolone antibiotics were rapidly degradated by *Trametes versicolor* and *Irpex lacteus*. In addition, many unknown transformation products were identified. The ecotoxicological data show that fungal transformation of pollutants did not always cause a decrease in toxicity or residual antibacterial activity. Biodegradation by ligninolytic fungi has important remediation potential. However, studies of bioavailability, biodegradation and toxicity are always necessary for suitable application of remediation techniques in order to decrease the environmental risk at contaminated sites.