Abstract

Polycyclic aromatic hydrocarbons (PAHs) are recalcitrant organic pollutants, which occur widely in the environment. Some of these compounds are carcinogenic and toxic, many studies therefore focus on suitable remediation technologies. It has been shown that composting is an efficient treatment for contaminated solid matrices. Changes in several enzyme activities during co-composting of PAH-contaminated soil were studied in this thesis. The total initial concentration of analyzed PAHs in the soil was 1065 ± 86 $\mu g \cdot g^{-1}$. The chosen activities represented well-known key enzymes involved in the transformation of PAHs or catechol as the central metabolite of PAH microbial degradation. At first, a method for extraction of the selected enzymes from the compost matrix was optimized. This approach was then used for the extraction of the enzymes from compost samples collected at each phase of composting. The activity of manganese peroxidase, laccase, tyrosinase and catechol-2,3-dioxygenase was detected during the cooling and the maturation phase. The only detected activity during the initial mesophilic phase was that of manganese peroxidase. The activities of catechol-1,2-dioxygenase and lignin peroxidase were not detected at all. Despite the fact that PAHs were substantially degraded, no influence of PAHs on the enzyme activities in compost was observed comparing to the control without contaminated soil. After 42 days of composting, the initial concentration of total PAHs in the reactor was reduced to 11–15 % of the original amount.

Keywords: enzyme assay, catechol 2,3-dioxygenase, ligninolytic enzymes, composting, polycyclic aromatic hydrocarbons

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