# MYCOREMEDIATION: DEGRADATION OF XENOBIOTICS BY MICROSCOPIC FUNGI

CSABA VÁGVÖLGYI[1], MÓNIKA VÖRÖS[1], BETTINA BÓKA[1], BILJANA ŠKRBIĆ[2], DEJANA PANKOVIĆ[3], LÁSZLÓ MANCZINGER[1]

[1]University of Szeged, Faculty of Science and Informatics
Department of Microbiology, Szeged, Hungary
csaba@bio.u-szeged.hu
[2]Faculty of Technology, University of Novi Sad, Novi Sad, Serbia
[3]University EDUCONS, Sremska Kamenica, Serbia
dejana.pankovic@educons.edu.rs

The contamination of water and agricultural soils by xenobiotics should be prevented, not only due to their direct toxic effect, but also because of their influence on the water biocenosis and their possible accumulation in the food chain. Very low concentrations of some xenobiotics (e.g., certain phenolics) cause organoleptic changes in the water that is not acceptable for the consumers, irrespectivly of their toxic properties. Many xenobiotics (or their degradation products), have carcinogenic, mutagenic, teratogenic immuno-modulating and endocrine disrupting properties. Some of the pesticides are very toxic to non-target organisms, e.g., fishes, aquatic invertebrates and members of the phytoplankton. In addition, pesticides reduce biodiversity in the soil, which results decreased soil quality, declined nitrogen fixation and mineralization of organic materials. Some xenobiotics taken up by plants and reach the consumers directly or through the food web so the quick microbiological detoxification in soil is important.
The high-risk compounds belong to the anilinogenic and phenoligenic ones: their microbial degradations result highly toxic chlorinated aniline and phenol derivatives. Such phenoligenic compounds are the 2,4-dichlorophenoxyacetic acid (2,4-D), and 2-(4-chloro-2-methylphenoxy) acetic acid (MCPA) herbicides. Their degradations result the highly toxic 2,4-dichlorophenol and 2-methyl-4-chlorophenol, respectively. The anilinogenic ones are the diuron, linuron, propham, chlorpropham, chlorotoluron, diflubenzuron, and dimethachlor herbicides. Their degradations result 3,4-dichloroaniline, aniline, 3-chloroaniline, 3-chloro-4-methyl-aniline, 4-chloro-aniline, and 2,6-dimethyl-aniline, respectively.
Mycoremediation is a process that uses fungi to remove contaminants from the environment. The white rot fungus *Phanerochaete chrysosporium* has significant pollutant-degrading capabilities with its oxidoreductases. The lignin-degrading enzyme system of this fungus also allows the breakdown of

different organic pollutants (xenobiotics). The most significant enzymes in these processes are the lignin peroxidase and the manganese peroxidase. In our laboratory, *P. chrysosporium* strains were isolated from various natural habitats. Their characterization revealed that one of these strains (Pha78) seems to be very promising for such remediation purposes. The degradation of different phenol and aniline derivatives by this isolate was investigated both in lignin peroxidase and manganese peroxidase inductive media. It proved, that this *Phanerochaete* strain could degrade many xenobiotics efficiently, especially in manganese peroxidase-inductive medium. Furthermore, *P. chrysosporium* strain Pha78 showed significant degradation activities on herbicides and phenol derivatives in microcosm experiments even in sandy soil. This work connected to the projects LACREMED (HUSRB/1002/214/147), PHANETRI (HU-SRB/1002/214/068) and the GINOP-2.3.3-15-2016-00006.