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ENVIRONMENTAL IMPACT OF ORGANOCHLORINATED PESTICIDES

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Abstract

Microbial diversity can be influenced by many biotic and abiotic factors including the presence of organochlorinated pesticides. This work investigates the influence of organochlorinated pesticides such DDT, HCH and HCB on bacterial diversity. Microorganisms were isolated from two different types of soils; contaminated soil from a landfill in Neratovice and uncontaminated soil. The contaminated soil from Neratovice is contaminated with high concentrations of pesticides and heavy metals. Microorganisms obtained from these soils were grown in mineral media with addition of the pesticides DDT, HCH and HCB both individually and in combination. Changes in microbial diversity associated with this selective pressure were monitored by molecular method T-RFLP. Microorganisms most widely represented in the contaminated soil were eliminated in the first weeks of the experiment and were replaced by known organochlorine degrading bacteria belonging to families *Chitinophagaceae* and *Hyphomicrobiaceae* and genus *Terrimonas*. The ability to degrade DDT, HCH, HCB was tested on the basis of the results of measurements by gas chromatography with electron capture detector.

Our study also investigates the toxicity of these compounds (DDT, HCH and HCB) and their metabolites. As a prokaryotic model system the luminescent bacteria *Vibrio fischeri* was chosen together with the analysis of growth and viability of four different bacterial species. The eukaryotic model was represented by the seeds of *Lactuca sativa*, var. capitata. Mutagenicity was tested using the Ames test with bacteria *Salmonella typhimurium* his-. As other eukaryotic model system mammalian tissue culture was chosen. The pesticide DDT was significantly toxic for all examined bacterial species. The test with the luminescent bacteria *Vibrio fischeri* proved high toxicity of the herbicides, but the toxicity of metabolites did not exhibit so high values. For the eukaryotic model, represented by the seeds of *Lactuca sativa*, var. capitata, the toxicity of each single insecticide was comparable. By investigating the toxicity of these compounds and the mechanisms of their action we can reduce their impacts on the environment and analyze and prevent potential hazards.

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