

**Vegetation of post-mining sites determines  
soil microbial community structure and soil processes**

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**Abstract**

The aim of this thesis, which consists of four published articles, was to investigate the effect of vegetation on soil microbial communities and processes in de novo developing soil substrate on the brown-coal spoil heaps in the surrounding of city Sokolov.

Spoil material – soil clayey substrate, which had been gradually mined from the opencast brown coal mine, stratified onto spoil heaps and reclaimed by assisted afforestation with selected tree species or left for spontaneous plant succession, changes its biotic and abiotic characteristic in the course of time and particularly under the influence of plants. Changes of spoil substrate characteristics are related to the growth of plant roots and particularly also to the production of plant biomass, which is decomposed gradually and takes part of soil, where participates to soil organic matter. The process of plant dead materials decomposition and transformation is the function of the activity of soil organisms and among them notably soil microorganisms. Moreover, the presence of many of them is closely related to the presence of vegetation, whose symbionts or pathogens are. The exact mechanisms of the plant-microbes interactions and their extent still remain unclear. Experimental plots established at the brown-coal spoil heap, which are homogeneous in all other parameters except the composition of vegetation, allow us to study these relationships in the natural environment.

In this work, biochemical methods (spectrometry, chromatography) were used for the observation of microbial processes and for investigation of chemical changes in the course of litter decay process and further molecular-biological methods (16S rDNA taxonomic microarray, 454-pyrosequencing) were used for the observation of changes in composition of bacterial and fungal communities.

Particular experiments demonstrated that the vegetation type substantially influences the chemical soil characteristics, the course of microbial processes and the composition of microbial communities. Further, the performed experiments enabled to compare the effectivity of both used measures of soil ecosystem restoration and to support the opinion that the technical reclamation is not necessary the only an adequate measure of the rehabilitation of spoil substrate. Results showed, that the natural plant succession is, in the case of brown-coal heaps near Sokolov, an adequate measure of ecosystem restoration and a suitable option to the assisted afforestation.