

SOIL ALGAE AND CYANOBACTERIA OF POST-COAL MINING AREAS¹

A. Lukešová² and J. Frouz

Abstract: The importance of algae and cyanobacteria in soil formation and improving soil fertility is well known. The goal of this study was to determine the role of these photoautotrophic microorganisms at reclaimed surface brown coal mines along climatic gradient in the USA. Algal communities (AC) were studied in soil samples collected from three chronosequences (5 yrs after reclamation, about 20 yrs after reclamation, and undisturbed climax) established in Indiana/Illinois (IL), Tennessee/Kentucky (TN), and Wyoming (WY). Both species composition and abundance of algae and cyanobacteria were studied using direct epifluorescence microscopy and cultivation methods. The highest abundances and species numbers of algae and cyanobacteria were found in young successional stages 5 yrs after reclamation in IL (more than 60 species, abundance more than 10^7 cells g^{-1} dry soil) followed by TN and decreased with increasing successional age. No cyanobacteria and less than half of algal species, when compared to young stages, were isolated from corresponding climax forests. Similar trend was observed in reclaimed mines in Sokolov coal mining area in the Czech Republic. Despite high abundances, algal and cyanobacterial species richness found in both WY reclaimed sites was much poorer (less than 30 species isolated per site) compared to IL and TN reclaimed sites and increased in a corresponding prairie climax. Presented results indicate an important role of AC in studied reclaimed coal mines and show two different patterns of the AC development depending on climatic conditions and corresponding vegetation and soil properties.

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² Alena Lukešová, Soil Algologist, Institute of Soil Biology, Biology Centre ASCR, v.v.i. České Budějovice, CZ 37005, Jan Frouz, Ecologist and Zoologist, Institute of Soil Biology, Biology Centre ASCR, v.v.i., České Budějovice, CZ 37005.