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Study of Microbial Community Structure Using Phospholipid Fatty Acid Analysis (PLFA) at a Chromium Contaminated Site

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Microbial communities have always performed a crucial role in almost any type of environment. Strong evidence supports microbes being able to modify toxic metals into a more stable form. A common example is hexavalent chromium (Cr-VI), which can be reduced to non-hazardous trivalent state (Cr-III). The main focus of this study is to examine the microbial community structure in a chromium contaminated environment at Hanford, Washington. Phospholipid Fatty Acid Analysis was used as a biochemical approach to analyze the microbial community structure based on their different signature lipids biomarkers. Due to the extreme low biomass of the Hanford soil samples (<10⁴ cells/g), various enrichment approaches were applied to increase the biomass by promoting microbial growth. Stimulation of the sediment with various electron donors increased the densities to 10⁶ to 10⁸ cells/g in less than 1 week. The PLFA shows that the biomass from the samples belongs mainly to bacteria, that all major groups of microbial communities are present. The PLFA analysis also showed that the original microbial community was under nutrient from the ratio of cis/trans isomers. *Geobacter sp.*, sulfate reducers, and gram-positive bacterial species increased after the enrichments. Since the groups that increased have also been shown to reduce chromium to less toxic forms, suggesting the biostimulation may decrease mobility and toxicity of chromium in the soil at this site.

Key words:

PLFA
Microbial Community structure
Chromium contaminated soil