



Phytoremediation of a highly creosote-contaminated soil by means of *Salix viminalis*

Karin Öneby¹, Leticia Pizzul¹ and Ulf Granhall¹ Mauritz Ramstedt

¹Department of Microbiology, SLU, P.O. Box 7025, 75007 Uppsala, SWEDEN

Email: mauritz.ramstedt@mykopat.slv.se

Objective

To study the effect of willow (*Salix viminalis*) on the degradation of polycyclic aromatic hydrocarbons (PAHs) in a highly creosote-contaminated soil.

Results

The presence of *S. viminalis* enhanced degradation of all the studied PAHs (Fig. 1). The highest dissipations were observed for fluoranthene (79%) and pyrene (77%). For those compounds, some degradation also occurred in pots without plants, 35 and 19% respectively. Degradation of anthracene (67%) and benzo[a]pyrene (43%) was found only in pots with *S. viminalis*.

The higher number of bacteria in the treatments with plants, compared to the initial soil and the soil without plants (Fig. 2) indicates an increase in microbial activity. This activity, and possibly a higher release of biosurfactants, could explain the enhanced degradation obtained with plants.

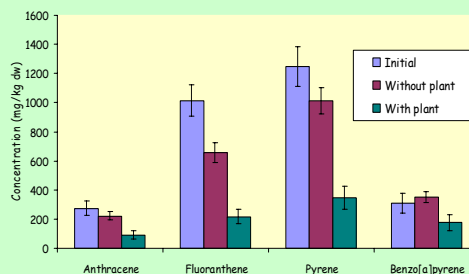


Fig. 1. PAH concentrations in the creosote-contaminated soil, initially and after 10 weeks of treatment with or without plant.

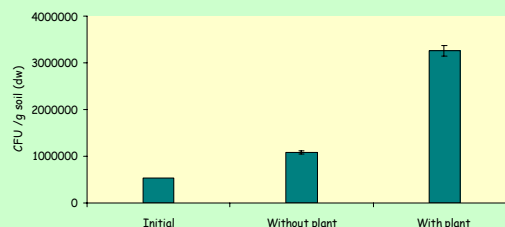


Fig. 2. Bacterial number (CFU/g dry soil) in the creosote-contaminated soil, initially and after 10 weeks of treatment with or without plant.

Conclusions and future perspectives

The use of *S. viminalis* in phytoremediation is quite promising. The disappearance of benzo[a]pyrene is of particular interest due to its recalcitrance.

Our future plans are to investigate the mechanisms behind the disappearance of PAHs and to evaluate other willow clones for their potential to reduce organic pollutants in soil.

Background

Phytoremediation is the use of plants to clean up contaminated sites and is based on biological processes involving the capability of plants and related microbial populations to accumulate, break down or to reduce the mobility of contaminants.

Creosote, a common wood preservative, consists of up to 85% different PAHs. PAHs are organic contaminants of highest concern because of their toxicity, and mutagenic and carcinogenic properties.

Materials and methods

Salix viminalis (clone 78 183) was grown in pots containing a highly creosote-contaminated soil from a former wood impregnation site belonging to the Swedish Railway Administration, in Krylbo. Pots without plants were also included. The experiment was carried out for 10 weeks in a greenhouse. Anthracene, fluoranthene, pyrene and benzo[a]pyrene were analysed by GC-MS. The microbial number was obtained by viable count (CFU g soil⁻¹).

mauritz.ramstedt@mykopat.slu.se

