



TECHNOLOGY OPPORTUNITY

Bacteria-Assisted Phytoremediation

INTRODUCTION

From 1996, the Centre for Environmental Sciences (CMK) at Hasselt University has built-up expertise on the role of plant-associated bacteria during plant growth and development and the exploitation of these partnerships to improve phytoremediation efficiency. In 2004, the proof of

concept for bacteria-assisted phytoremediation of organic contaminants was published in Nature Biotechnologies. In a next phase, this proof of concept was successfully extrapolated to other plants and contaminants and to a full-scale field trial. Ultimately, the spin-off bio2clean was launched in 2015 to commercialize bacteria-assisted phytoremediation of organic contaminants.



UHASSELT

KNOWLEDGE IN ACTION

PHYTOREMEDIATION

The Solar-Powered Pump and Treat, and Biostimulation

PUMP AND TREAT

... is a common method for cleaning up contaminated groundwater with dissolved chemicals. Groundwater is pumped from wells to an above-ground treatment system that removes the contaminants.

Trees can pump 200 liters of groundwater per day and in this way attract high amounts of contaminants. This process is completely solar-powered. Moreover, some of these trees such as poplar and willow are phreatophytic, meaning their roots always reach the groundwater, even on e.g. 10m depth.

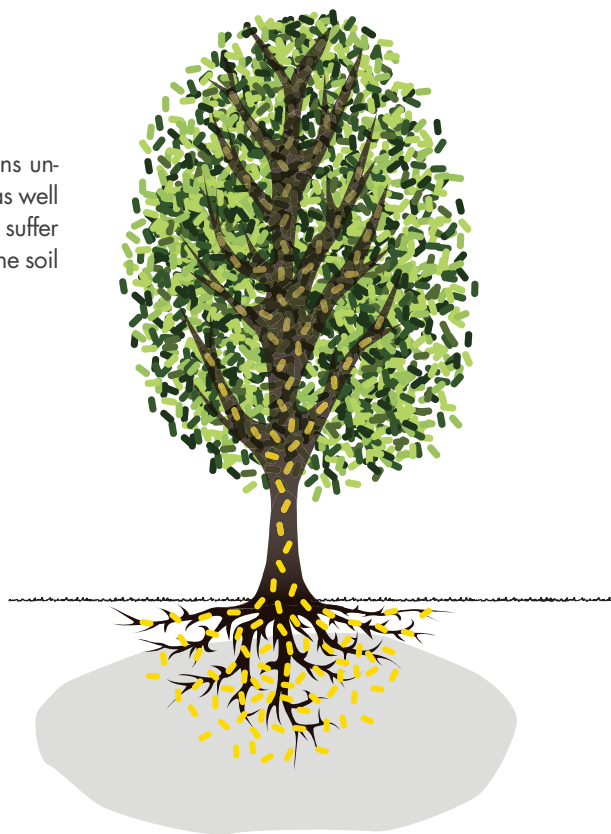
But... there is a reverse to every medal...

In case of natural phytoremediation, the degradation capacity remains uncontrolled. The degradation efficiency is affected by the plant species as well as by the present micro-organisms. If degradation fails, plants might suffer from phytotoxicity and volatile contaminants can be transported from the soil and groundwater through the leaves to the atmosphere.

BIOSTIMULATION

The term "biostimulation" is often used to describe the addition of electron acceptors, electron donors, or nutrients to stimulate naturally occurring microbial populations.

Planting a tree increases the 'rhizosphere effect': microbial populations are strongly stimulated in the rooting zone due to the root exudates acting as additional carbon sources. Introducing a tree also strongly contributes to an improved aeration of the soil, stimulating aerobic degradation processes.



BACTERIA-ASSISTED PHYTOREMEDIATION

To cure soils and groundwater contaminated with organics

In order to ensure an efficient degradation, bacteria with the appropriate characteristics are enriched inside the plant by means of inoculation.

The ideal bacteria to inoculate are bacteria that

- are capable of degrading the desired contaminant,
- are living in the rhizosphere and/or inside the plant,
- and have plant growth promoting traits

BIO2CLEAN (SPIN-OFF)

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