

Investigating the Effects of Plant Root Exudates on PAHs Bioavailability to Soil Microorganisms in Contaminated Brownfields : Research Methodology.

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Context

As a result of heavy industrial past activities, an estimated 6,000 brownfields require remediation in Wallonia. This number rises to over 3.5 million in Europe. Polycyclic Aromatic Hydrocarbons (PAHs) represent 17% of treated pollutants in Wallonia (Aldric *et al.*, 2011).



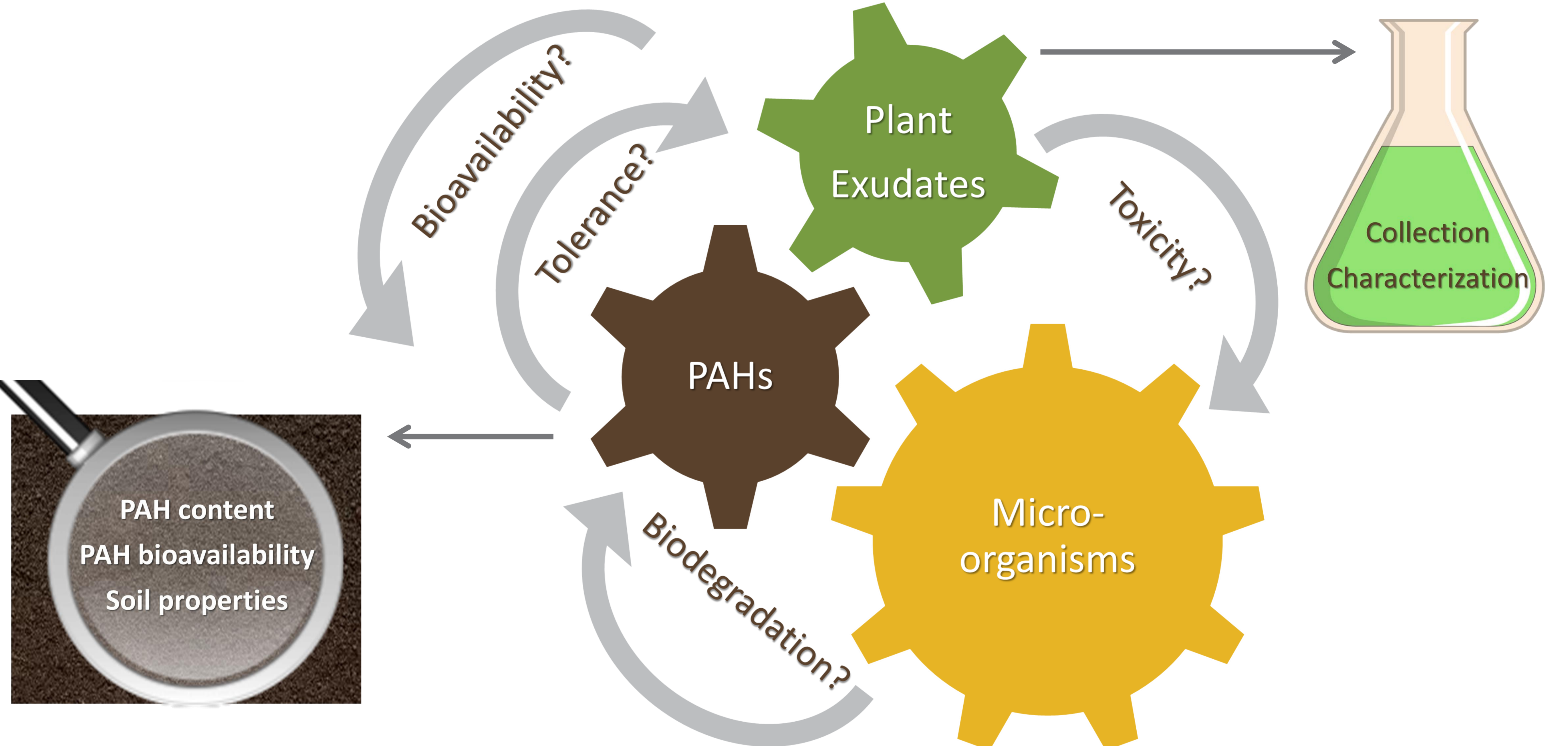
Objective



Current remediation techniques are rather expensive and technically demanding (Megharaj *et al.*, 2011). Based on the observation that PAHs soil content decreases in the presence of plants (Cheema *et al.*, 2010), the PhD aims at developing alternative PAHs remediation techniques in brownfields. It is articulated around three research axes.

Research axes

The **first axis** focusses on plant exudates and how they may improve PAHs bioavailability to soil microorganisms and enhance their degradation. This will be investigated by (i) characterizing several contaminated soils (physico-chemical parameters) and PAH content and factors of bioavailability, (ii) selecting a plant model and collecting root exudates, and (iii) evaluating the effects of exudates on PAHs bioavailability.



The objective of the **second axis** is to evaluate the effects of plant exudates on PAHs degrading microorganisms by (i) comparing PAHs biodegradation in the presence/absence of exudates and (ii) assessing the potential toxic effects of exudate compounds on the microbial communities.

The aim of the **third axis** is to study plant-pollutants interactions by (i) establishing the plant tolerance to several contamination levels and (ii) following PAHs bioavailability when facing real exudation rates, on the field.

References

Aldric J-M. *et al.*, 2011. Potentialités d'application des technologies biologiques pour la dépollution des sols en Wallonie. *Le Journal des Ingénieurs*, **132**, 6-13.
Cheema S. A. *et al.*, 2010. Degradation of phenanthrene and pyrene in spiked soils by single and combined plants cultivation. *Journal of Hazardous Materials*, **177**(1-3), 384-389.
Megharaj, M., *et al.*, 2011. Bioremediation approaches for organic pollutants: A critical perspective. *Environment International*, **37**(8), 1362-1375.

