

Impact of basidiomycete fungi on the wettability of soil contaminated with a hydrophobic polycyclic aromatic hydrocarbon

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Background

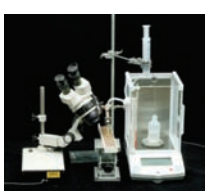
- Polyaromatic hydrocarbons (PAHs) present a challenge to bioremediation because they are hydrophobic, thus influencing the water availability and repellency of soil.
- Certain basidiomycete fungi are known to degrade PAHs but the effect on water repellency is not known.
- We hypothesised that basidiomycetes will effectively reduce repellency levels in PAH contaminated soil. This should improve the effectiveness of bioremediation.

Measuring microscale soil water infiltration and repellency

Mini Infiltrometer developed with a tip size of 2 mm radius.

Three parameters are determined:

1) Water Sorptivity – rate of water uptake at the onset of wetting.

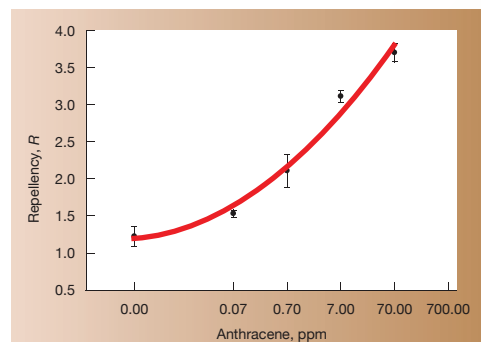


2) Ethanol Sorptivity – removes impact of repellency, related to pore structure.

3) Water Repellency – ratio of ethanol to water sorptivity, highly sensitive at low levels.

Impact of PAHs on Soil Water Repellency

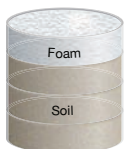
- Repellency increased with the amount of Anthracene added to soil.



Soil Microcosms

- Four 32 mm diameter x 10 mm height rings taped together. Bottom three rings filled with soil. Evaporation reduced by sealing bottom and placing foam bung in the top ring.

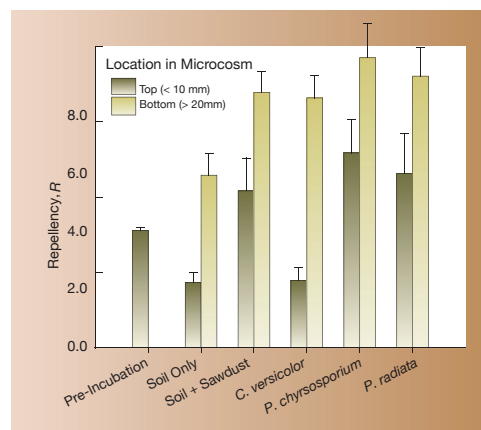
- Soil polluted with anthracene at 7 ppm.



- Soil inoculated with either *Phanerochaete chrysosporium*, *Coriolus versicolor* or *Phlebia radiata* and incubated for 19 days.
- Repellency measured in the top (<10 mm depth) and bottom (>20 mm depth) soil sections.

Can fungi reduce repellency from PAH in Soil?

- Only *C. versicolor* remediated repellency in soil ($P < 0.001$).
- At >20mm depth, no fungi influenced repellency.



Conclusions

- PAHs can induce water repellency in soil.
- One species of basidiomycete fungi tested (*C. versicolor*) could reduce repellency associated with PAH contamination.
- Further work needs to examine (i) longer incubation times, (ii) assess degradation of PAH and (iii) impact of fungi on other organisms in soil.

Acknowledgements

The Scottish Crop Research Institute receives grant-in-aid from the Scottish Executive Environment and Rural Affairs Department. We thank Ian Snowball for technical assistance.