IDENTIFICATION OF HIGHLY TOLERANT NATIVE FUNGAL ISOLATES TO POLYCICLIC AROMATIC HYDROCARBONS

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Introduction. Polycyclic Aromatic Hydrocarbons (PAHs) are an important group of persistent organic pollutants, with potential cytotoxic, carcinogenic, genotoxic and mutagenic effects on mammals. Removal of PAHs and other hydrocarbon compounds from contaminated soils has become an increasing environmental priority (1). Several genera of fungi contain species capable of degrading PAHs (2). The use of native microorganisms capable not only of degrading hydrocarbons but also having high levels of tolerance to PAHs would reduce the problems associated with adaptation, survival and activity on soils containing high amounts of heavy hydrocarbon fractions (3).
The aim of this work was to identify native fungal isolates from heavy crude oil-contaminated soils with high tolerance and potential for LMW and HMW PAHs degradation, in order to obtain biological material capable to improve remediation in soils impacted with heavy hydrocarbons.

Methods. 9 native fungal isolates previously obtained from heavy crude oil-contaminated soils were evaluated. Tolerance of isolates to several doses of Phenantrene (Phe), Pyrene (Pyr), and Benzo[a]pyrene (BaP) was tested by surface plate assays. A mixture of Phe, Pyr and BaP (1:1:1) dissolved in acetone were sparse in petri dishes with Toyama´s Medium and evaporated to yield superficial concentrations of 1000, 2000, 4000 and 6000 ppm. Plates were inoculated and incubated at 30°C. Radial growth rate measurements were made every 24 hours during 10 days. Plates without PAHs and inoculated with each of the isolates were used as controls.

Results. Figure 1 shows the ability of the fungal isolates to grow in the presence of PAHs. Fungal radial extension rates exhibited significant differences when growing in the presence of 1000, 2000, 4000 and 6000 ppm of the PAH mixture. *Fusarium equiseti* H3, *Penicillium commune* H12 and *Beauveria bassiana* H14 showed to be the most PAH-sensitive isolates. *Aspergillus flavus* H6 did not show a significant inhibitory effect at 2000 ppm, being the most PAH-tolerant isolate. *Rhizomucor variabilis* H9 showed no significant inhibition up to 1000 ppm with a high radial extension rate (0.316 cm/day), but at higher concentrations of PAHs its growth was severely affected. Only isolates of *Rhizomucor variabilis* H9 and *Aspergillus fumigatus* H19 were able to sporulate in the presence of up to 4000 ppm of PAHs. All the fungal isolates significantly decreased its extension rate at 6000 ppm compared to the control.

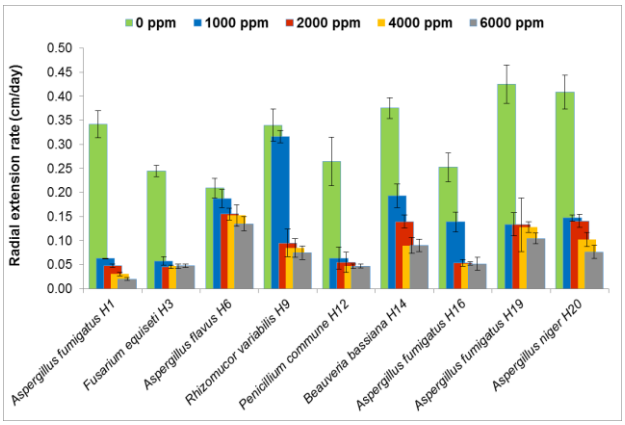

Fig.1 Radial extension rates (cm/day) of fungal isolates in presence of different concentrations of a mixture of Phe, Pyr and BaP

Conclusions. We identified native fungal isolates exhibiting high tolerance levels to LMW and HMW PAHs. This highlights the potential use of the fungal isolates for bioremediation of soils extensively impacted by petroleum hydrocarbons. Further studies on biodegradation and mineralization of mixtures of PAHs by these microbial isolates are needed for future development and improvement of remediation strategies for PAH contaminated sites.

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