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Tracking microbial potential of degrading polycyclic aromatic hydrocarbons by CG-MS and qPCR

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The bioremediation of hydrocarbon-contaminated environments involves management of both biotic and abiotic factors, such as aeration, pH, addition of nutrients, temperature, etc. Regarding soil bioremediation, previous studies showed that low cost practices including aeration and setting soil pH to 7.0 can stimulate the soil microbiota to degrade hydrocarbons. Petrochemical oily sludge is a dangerous waste generated by petroleum refinery, and its accidental spill into the natural environment (soil, ocean, and rivers) causes injury to animals and humans, although for some bacteria it is not more than nutrients. It happens due to a huge genetic diversity that allows bacteria to degrade xenobiotic molecules throughout a large set of metabolic pathways. Considering it, why not to take advantage of this natural process? The study of bacteria that are able to degrade oily sludge quicker can help on managing environmental issues, through biodegradation and detoxification of toxic molecules. Hydrocarbon biodegradation research have increased due to GC-MS and advanced molecular biology approaches. The aims of this study were to evaluate the potential of a Bacillus cereus to degrade PAHs *in vitro* beneath three oily sludge concentration (0%, 1%, and 6%), and also, point out the metabolic pathways involved in the process. 34 metabolites involved with PAHs biodegradation were measured by CG-MS. It was detected that Bacillus cereus inoculation reduced about 70% of the oily sludge's PAHs added initially. This knowledge allows the selection of optimal biotic and abiotic condition to enhance controlled bioremediation processes.

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Advanced analytical techniques for the extraction and characterization of plant-derived essential oils by gas chromatography mass spectrometry

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In recent years, essential oils have a growing interest with positive health effects of their novel characteristics like antibacterial, antifungal and antioxidant activities. For the extraction of plant-derived essential oils, there is the need of advanced analytical techniques and innovative methodologies. An exhaustive study of hydro-distillation, supercritical fluid extraction, ultrasonic & microwave assisted extractions, solid phase micro-extraction, pressurized liquid extraction, pressurized hot water extraction, liquid-liquid extraction, liquid phase micro-extraction, matrix solid-phase dispersion and gas chromatography (one and two dimensional) hyphenated with mass spectrometry for the extraction through various plant species and analysis of essential oils have been provided. Essential oils are composed of mainly terpenes and terpenoids with lower molecular weight aromatic and aliphatic constituents.

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