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Microbial Strategies for Bioremediation of Weathered Oil at Harsh Conditions

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Petroleum products can change through weathering processes accentuated in arid climate, such as in Gulf area. This would guide to select the suitable strategy of bioremediation of the corresponding pollutants. Our approach combines chemometry, environmental microbiology and microbial systems, which is original. By using highly advanced analytical platform, a chemometry approach was set to identify the origin and the history of oil pollution in any site. Relatively unweathered oil was found inside heavily weathered oil and thus prevented further degradation of the interior oil. This was extended to demonstrate the origin of difficulties of bioremediation. An appropriate isolation and screening strategy allowed to construct a local collection of highly resistant hydrocarbon-degrading bacteria from weathered oil in Qatar. They were identified and differentiated through molecular techniques showing obvious diversity in the metabolic activities. Our findings demonstrated the adaptation routes employed by each isolate to survive and overcome the high oil-weathering. Each site polluted with oil components should be bioremediated by the intrinsic hydrocarbon-degrading bacteria. Interactions between soil/pollutants/bacterium were investigated and bioaugmentation-biostimulation strategies were optimized in Qatar. Intermediates of metabolic pathways can play the role of substrates or inhibitors for other bacteria. Some bacteria were inhibited through their respective activities. Here, one can conclude that bacteria may not be able to mutually benefit from their metabolisms for growth but rather inhibited. Bioaugmentation/stimulation of weathered oil contaminated soils was applied using biopiling technology at harsh condition and shown feasible if suitably selected indigenous bacteria are used.

Biography

Nabil Zouari is a Full-Professor of Biology and Environmental Microbiology at Qatar University. He received his PhD degree from the University of Technology of Compiègne (UTC, France). He has 36 years experience in Teaching and Research & Development in the fields of Environmental Technology, Enzyme Engineering, Industrial Microbiology and transfer of technology in France, Tunisia and Qatar. He published more than 78 papers in international indexed journals, covering all his fields of specialization. He developed 6 industrial applications in biotechnology. He created five start-ups in the field of biotechnology. He served as LPI in competitive projects, supervised dozens of graduate students, besides many administrative positions.