TITLE: BIOSURFACTANT FROM *BACILLUS AMYLOLIQUEFACIENS* AS A TOOL FOR BIOREMEDIATION OF CONTAMINATED SITES

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ABSTRACT:

The growth of the oil industry has led to an increase in the number of accidents involving oil spills in the coastal and estuarine regions. A striking example was the Deepwater Horizont oil spill into Gulf of Mexico in 2010 known as the largest oil industry accident. Bioremediation is one the most cost effective and eco-friendly technology for recovering petroleum contaminated sites as it uses the vast metabolic potential of microorganisms. In this study, it was evaluated the use of biosurfactant produced by *Bacillus amyloliquefaciens* TIM49 in the removal of oil from a contaminated beach sand and its oil dispersion activity. Assays were carried out using 50 g of beach sand impregnated with 10 g of petroleum. The contaminated sands were treated with 150 mL of biosurfactant, 150 mL of 1% SDS, synthetic surfactant, and 150 mL of ultrapure water. The samples were incubated on a rotatory shaker at 150 rpm for 24 h at 30 °C. Then, samples were filtered, the sands were dried at 100 °C and the residual oil was extracted in Soxhlet extractor. For oil dispersion 0.15 g of crude oil was spilled onto the surface of 40 mL seawater in a 100 x 20 mm petri dish to form a thin layer of oil. After that, 100 µl of TIM49 biosurfactant was gently dropped on the center of the oil surface. The diameter of the clear halo formed by displaced oil was measured. Pure water and SDS 1% were used as negative and positive controls respectively. The biosurfactant removed more than 90% of beach sand oil, similar to SDS, whereas the water only removed 10% of oil. The biosurfactant produced by TIM49 also proved to be efficient in dispersing the crude oil, forming instantly clear halos equivalent to the diameter of the petri dish, maintaining such activity stable after 24 h. The synthetic surfactant also demonstrated similar oil dispersion activity, but the halo was highly unstable and regressed within 60 min. Thus, the biosurfactant produced by the strain TIM49 represents a potential alternative to the synthetic surfactants commonly used in oil spill cleanings with the advantages of being biodegradable and non-toxic.

Keywords: Bioremediation, Biosurfactant, Petroleum

Development Agency: Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Petrobras