TITLE: PRODUCTION OF BIOSURFACTANTS BY BACTERIA ISOLATED FROM ENVIRONMENTS CONTAMINATED BY PETROLEUM AND THEIR GROWTH IN SOIL AND MARINE WATER MICROCOSMS

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ABSTRACT:
Several microorganisms have the capacity to produce biosurfactants and to degrade petroleum hydrocarbons, which can be used in the bioremediation strategies for the recovery of environments polluted by petroleum and its derivatives. The present work aimed to evaluate the potential of biosurfactants production and degradation of diesel oil by bacteria isolates, as well as to evaluate the growth dynamics of bacteria introduced into sea water and soil with addition of diesel oil in laboratory conditions (microcosm experiment). Phylogenetic analysis of the isolates was performed on the basis of 16S rRNA sequences. The biosurfactant production capacity was analyzed by diesel oil emulsification, and rhamnolipid production tests on the medium with cetyltrimethyl ammonium bromide (CTAB) and methylene blue. The presence of the genes *rhlAB*, involved in the synthesis of rhamnolipids and *alkB*, involved in the degradation of alkanes of diesel oil was evaluated by Chain Polymerase Reaction (PCR). The microcosm experiments were carried out using soil and seawater contaminated by diesel oil. Phylogenetic analysis of 10 isolates of bacteria revealed that five isolates belonged to the genus *Bacillus* and five to the genus *Pseudomonas*. Emulsification of diesel oil was observed in four isolates in the Bushnell and Hass medium and in the nutrient broth. Eight isolates produced rhamnolipids in medium with CTAB and methylene blue, and the *rhlAB* gene was detected in four isolates, all belonging to the genus *Pseudomonas*, while the *alkB* gene was found in nine isolates. The results of the microcosm experiment showed that the density of two isolates of *P. aeruginosa* introduced into soil and seawater containing 1% of diesel oil increased from the fifth day of incubation indicating that the presence of diesel oil stimulated the growth of bacteria tested. The bacterial isolates analyzed in this study showed potential of application in bioremediation processes of environments contaminated by petroleum.

Kyewords: rhamnolipids, bacteria, diesel oil, microcosm.