TITLE: HIDROCARBONOCLASTIC BACTERIA DENSITY IN CRUDE OIL BIOREMEDIATION ON MARINE ENVIRONMENTS SIMULATIONS

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ABSTRACT:

Bioremediation techniques use environmental microorganisms to eliminate organic contaminants of the environment. Oil hydrocarbons are among the most harmful marine environments contaminants. The dispersion of nutrients and microorganisms added on the contaminated site is a limiting factor to success of the technique. The aim of this work was evaluated the ability of microbial cells of two hydrocarbonoclastic bacterial strains to remain on the water/oil interface. Microcosms (50 mL) were built simulating bioremediation strategies. Water from Trindade Island coast and inorganic nutrients were used on the experiment. Simulations with addition of 1.0 x 107 cell mL^{-1} of *Rhodococcus rhodochrous* and *Nocardia farcinica* individually or together were performed. For simulating a cell and nutrients dispersion on the water, half of the microcosms water volume was replaced 15 times along 30 days with the same water initially used on the experiment. During the replaces, water was removed from the bottom of the microcosm to do not remove the oil on the surface. After 30 days the microcosms were fixed with 2% formalin and filtered on 0.2 µm polycarbonate membranes for proceed with the Fluorescent in situ Hybridization (FISH) technique, using RhLU e Gor596 probes. Microscopic analysis showed that the total prokaryotic community average density varied from 0.5 x 107 cell mL^{-1} (control treatment) to 3.41 x 108 cell mL^{-1} (treatment containing nutrients and both bacteria species). The treatment with *R. rhodochrous* cells addition, the density after 30 days was 1.5 x107 cell mL^{-1}. In the same way, on the one with *N. farcinica* cells addition the density reach up 1.3 x 107 cell mL^{-1}, indicating growth of the two species and its maintenance on the water/oil interface. On treatment containing *R. rhodochrous* and *N. farcinica*, the average densities were of 5.91 x 107 cell mL^{-1} and 4.33 x107 cell mL^{-1}, respectively. The total of *R. rhodochrous* and *N. farcinica* cells represents 27.9 % of the entire prokaryotic community. This demonstrates that these bacteria may have synergic interactions during the growth using hydrocarbons as carbon and energy source and too that the cells remain on the water/oil interface to facilitate the uptake of hydrophobic organic compounds. This works suggest that these bacterial cells can acquire hydrophobic characteristics and so have potential to bioaugmentation application in marine ecosystems.

Keywords: bioaugmentation, microbial ecology, environmental contamination.