

DETOXIFICATION OF PETROLEUM AND DIESEL OIL BY MICROBIAL CONSORTIA FROM MARINE ENVIRONMENT

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Abstract:

Marine environment is susceptible to contamination by petroleum due to its close relationship with the oil industries. Therefore, microorganisms isolated from this environment possess a great potential to produce specific metabolites and could have a great importance in bioremediation process of this ecosystem. To set up a bioremediation study, a toxicological study of the contaminants after the treatments is required. In this context, the present study aimed the selection of the best consortium able to detoxify petroleum and diesel oil among ten consortia previously structured with different combinations of 4 ligninolytic fungi isolated from marine invertebrates of Brazilian coast, 2 bacteria isolated from oil reservoir (off-shore), 2 marine lipolytic yeast from Antarctic and 1 marine fungus lypolitic from the Brazilian coast. All the consortia were subjected to incubation for 14 and 21 days at 25 °C and 150rpm in 50mL of mineral medium containing 1% of petroleum or diesel oil. The following control tests were also performed: consortium without pollutants; mineral medium + pollutants; only mineral medium. The assays were centrifuged for 30 minutes at 10.000rpm and the supernatants were used for toxicity tests with *Artemia* sp. (for both pollutants assays) and microtox (only for diesel assays). Results of toxicity using *Artemia* sp. indicated that the consortium 6 (21 days) was a potential detoxifier, since amongst 90 *Artemia* sp. used, 34% and 40% remained alive for the assays containing diesel and petroleum, respectively. In the control medium only 7.77% and 16% remained alive with diesel and petroleum, respectively. In the control without the pollutants 95.5% of *Artemia* sp. remained alive. Additionally, the values obtained in tests on microtox (*Vibrio fischeri*) showed a reduction in toxicity also for the consortium 6 after 21 days of incubation, with a EC50 of 15.99% in 30 minutes of exposure, while in control of the medium with diesel the EC50 in the same period was 2.38%. The consortium 6 (composed by 2 ligninolytic fungi from marine invertebrates of Brazilian coast, 1 bacteria from oil reservoir and 1 marine lipolytic yeast from Antarctic) was selected as the most effective for pollutants detoxification and will be submitted to the evaluation of different parameters in order to optimize the conditions using experimental design.

Keywords: marine biotechnology, toxicity assay, petroleum, diesel, bioremediation

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