

EFFECT OF A BIOTECHNOLOGY FROM A PURPLE NON-SULPHUR BACTERIA ON THE MICROBIAL COMMUNITY OF WATER BEFORE AND AFTER TREATMENT

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RESUMO

The analysis of key-microorganisms components in wastewater is crucial for assessing its quality and potential health risks, ensuring public health and environmental safety. Purple non-sulfur bacteria (PNSB) such as Rhodopseudomonas palustris are target-microorganisms of many sustainable studies due to its biotechnologies that achieve resource recovery from wastewater. This study aimed to determine the potential of R. palustris biotechnology to recover the wastewater based on the quantity of key-microorganisms in the water before and after treatment. Water samples were collected at two times: before treatment (at day 0, corresponding to the raw wastewater from a fishery slaughterhouse), and after treatment (at day 7, corresponding to the period of R. palustris incubation with wastewater in bioreactors). At day 0, the wastewater was homogenized in pasteurizer and sampled (triplicate) for microbiological Then, the wastewater (triplicate). was (76.8°C/30minutes). After ranging 35°C-40°C, the wastewater was pumped to 6 bioreactors (25L/each), and inoculated with 250mL of R. palustris (MFRP01, pre-reactivated in Pfennig broth) for incubation during 7 days. At day 7, the wastewater of each bioreactor was centrifuged (7000rpm/4°C/4 min) and sampled (triplicate) for microbiological analysis (triplicate). For mesophyllic aerobes, samples were diluted and spread in yeast extract agar (YEA, 35°C/44h and 24°C/68h). For molds and yeasts, dilutions were spread on potato agar containing 2% acidified glucose (24°C/5days). The presumptive colonies of total coliforms were counted in chromogenic coliform agar (35°C/24h, positive:red-pink colonies) and the confirmatory test was performed through oxidase (positive:purple colonies). The Salmonella was determined through the most probable number method in Hektoen Enteric agar (37°C/18h, positive:black-green colonies). Before treatment, total mesophyllic aerobic counts, indicated an average initial bacterial load of $2.3 \times 10^7 \pm 0.41$ (35°C) and $2.3 \times 10^7 \pm 0.23$ (24°C) CFU/mL. After treatment, the bacterial load reduced 14.7% and 21.42%, respectively. Mold and yeast initial counting was 8.3x10⁴±3.7 and after treatment was 0, revealing a reduction of 100%. Total coliforms initial counting was 4 CFU/100mL±2.31 and after treatment was 1 CFU/100mL±0.58, with a reduction of 75% in bacterial load. Salmonella was $5.5 \times 10^9 \pm 2.97$ CFU/mL and after treatment was $3.0 \times 10^9 \pm 1.69$, showing a reduction of 55.15%. These results highlight the potential to reduce 100% of mold and yeast and 75% of total coliforms from wastewater through microbial technology of a PNSB, providing a new sustainable method that contributes to environmental safety.

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