

TITLE: Identification of microbial consortia for biohydrogen production from different industrial sludge.

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ABSTRACT: Hydrogen (H₂) is a clean and promising source of energy for the future. H₂ can be produced by a number of processes, including microbiological processes using anaerobic organisms. At the same time, demand for biodiesel and its production have increased dramatically. Brazil is the second biggest biodiesel producer in the world and Rio Grande do Sul state holds the biggest production in Brazil with a volume of 1.1 million m³/year, equivalent to 28.3%. The glycerol is a by-product of the biodiesel production. It can be used as a substrate for mixed cultures, since 99% of the microorganisms live in consortia. This study evaluated H₂ production of three anaerobic sludge from, oil vegetable industry (OVI), wine industry (WI) and food industry (FI). The tests were carried out using a glycerol culture medium together with thermal pretreated inoculum. Flasks were purged with nitrogen gas for 10 minutes to insure anaerobiosis. The initial pH of the culture medium was set to 6.0. The flasks were kept under agitation at 140 rpm at 37°C. After 72 h a biogas chromatographic was performed. The best H₂ producer consortia had the microorganisms isolated. According to the evaluation, OVI sludge presented the highest H₂ production, which corresponds to 648.14 mL of H₂, followed by the WI sludge with 582.55 mL of H₂. From culturing, 9 Gram-negative bacilli were isolated from different culture media from OVI sludge and 14 gram negative bacilli from WI sludge. So far, all of them were capable to produce H₂, but in small amount when compared to the origin consortia production. The best H₂ isolated producers are in biomolecular identification process (PCR-DGGE). The consortia presents an important H₂ production and it can contribute to new sources of clean and renewable energy, using residual biodiesel glycerol as substrate.

Keywords: microbial consortia, glycerol, hydrogen, DGGE, microorganism

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