

## Richness, Composition and Predominance in Undefined Mixed Cultures for Fermentative Hydrogen Production

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### ABSTRACT

The fermentative hydrogen production has many approaches including those reports using monocultures or those reports using undefined microbial consortia. The last one has as advantages, high hydrogen production rates, operation under unsterile conditions and use of unrefined substrates such as a great variety of organic wastes. The metabolic capacities of undefined microbial consortia are higher than that of a monoculture, and therefore it is possible to convert very complex substrates into hydrogen, for instance, lignocellulosic substrates composed by cellulose microfibrils embedded in a matrix of hemicellulose and lignin. Several types of undefined microbial consortia have been used to produce hydrogen derived from sludge of hot-springs, beaches, anaerobic digesters, composts, wastewater treatment plants (WWTP). The objective of this work was to know the ecological attributes of richness, composition and predominance of these H<sub>2</sub>-producing consortia (HPC). For that, a total of 90 papers were reviewed in which the microbial structure was studied by molecular methods. An inventory of the reported species in the operation time with the highest hydrogen production was done. The results showed the HPC derived from the anaerobic digesters were those with the highest richness with a total of 109 species followed by those derived from composts with 78 species, WWTP with 68 species, hot-springs with 34 species and beaches with 12 species. The genera with the highest number of species reported were *Clostridium*, *Bacillus*, *Thermoanaerobacterium*, *Lactobacillus*, *Klebsiella*, *Magasphaera* y *Streptococcus*. All these genera belong to the phyla Firmicutes and Proteobacteria. The information presented in this review will be useful to understand the ecological relationships between the members of the HPC and therefore contribute to the better operation of the bioreactors at large scale.

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**Keywords:** *Clostridium*, consortia, microbial ecology.

