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Biocatalytic Conversion of Lignocellulosic Biomass into Biohydrogen via photofermentation route

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Lignocellulosic biomass as largest sinks for fixed global carbon can be used as both a carbon source for microbial growth and biocatalyst assisted photoheterotrophic fermentative biohydrogen production. Hydrogen being a carbon neutral fuel is an ideal energy carrier, which may be produced more efficiently from biomass derived ingredients by microbial fermentation. But limitation in this regard is removal of lignin barrier and conversion of biomass into simple fermentable components. The present study explores advanced ecofriendly solution for lignocellulose valorization and biohydrogen production. For this purpose, a nature inspired enzyme cocktail was extracted for evaluation of its potential for lignocellulosic valorization by applying on variety of biomass and biocatalyst mediated conversion of obtained hydrolysate into biohydrogen was investigated. Four different types of biomass including wheat straw, rice straw, sorghum, and paper waste have been selected with 2 % loading rate. While soluble carboxymethylcellulose (CMC) was used as reference. The results revealed maximum fermentable ingredients upto 5.39 and 4.38g/L in paper waste and wheat straw, respectively. However, maximum biohydrogen in produced mixture of gases was noticed upto 66% and 54% from hydrolysate of paper waste and wheat straw, respectively. On the basis of these findings it is concluded that lignocellulosic biomass is sustainable source of biohydrogen. Process optimization would render enhanced yield by maximum utilization of lignocellulose derived fermentable contents.

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