

Elucidating substrate utilization in biohydrogen production from palm oil mill effluent by *Escherichia coli*

ABSTRACT

The present work aims to elucidate substrate utilization from palm oil mill effluent (POME) for biohydrogen production. The experiment was performed in 150 mL serum bottles and the cultures were supplemented with autoclaved-pretreated POME or 0.05 M individual technical grade substrates to investigate the potential use of POME and substrates in preference towards biohydrogen production. The cultures were incubated at 37 °C for 24 h with mild agitation. The maximum hydrogen yield (MHY) obtained was 0.66 mol H₂/mol total monomeric sugars and productivity of 3551 μmol/1010 cfu were obtained from engineered *Escherichia coli*. The POME oligomeric sugars were not metabolized further, which render insignificant conversion of carbohydrates into hydrogen from POME. The yield of hydrogen production increased by 3.5 folds by engineered *E. coli* BW25113 compared to wild type *E. coli* BW25113. The preference of the substrates for biohydrogen production is in the following order; glucose > fructose > formic acid.

Keyword: Palm oil mill effluent; Biohydrogen; *Escherichia coli* Soluble sugars; Formic acid