

Biodegradation of empty fruit bunch (EFB) in liquid fermentation using mixed microbes from palm oil mill effluent (POME): effect of aeration rate

ABSTRACT

The biodegradation of oil palm empty fruit bunch (EFB) in liquid fermentation using microorganism complex obtained from palm oil mill effluent (POME) under non-axenic condition was studied. A parallel study on carboxyl methyl cellulose (CMC) as substrate was also conducted as a comparison. The effects of the operating parameters of fermentation, aeration rates on the degradation of EFB and CMC were studied. The degradation was performed at agitation speed of 150 rpm in a 10 litre bioreactor under process parameter for a 10 day period. The evolution of dry matter (DM) and chemical oxygen demand of solids (CODs) were used to measure the performance of the non-sterile liquid fermentation process on the solid degradation of EFB and CMC. The effect of aeration rate on the reduction of DM and CODs differs. For EFB, a 10 fold increase in DM reduction was observed when the aeration rate was raised from 0 to 1.0 vvm. On the other hand, the increase in DM reduction of CMC was lower than that of EFB as a result of the increased aeration rate. The highest CODs reduction for EFB (64.82%) and CMC (20.2%) was achieved at aeration rate of 0.5 vvm. Aeration rate of 0.5 vvm was selected as the rate for optimum biodegradation.

Keyword: Aeration rate; Empty fruit bunches (EFB); Carboxyl methyl cellulose (CMC); Non-axenic fermentation; Liquid fermentation