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Published Online: 09 June 2022

Degradation of palm pressed fibers via microbial Fenton reaction

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AIP Conference Proceedings **2454**, 030018 (2022); <https://doi.org/10.1063/5.0078706>

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ABSTRACT

Oil palm is a major commodity crop in Malaysia. Palm pressed fibers (PPF) is one of the major wastes generated during palm oil processing. Due to the large volume of waste generated each year, managing palm oil processing waste such as PPF remains as a challenging task in producing environmentally sustainable palm oil. Studies indicated that the application of microorganism can reduce the oil palm waste safely and cost effectively. This study aims to evaluate the degradation of PPF by model iron-reducing bacteria (IRB) strain, *Shewanella oneidensis* MR-1 and three locally isolated IRB strains, namely SG30, SG29 and KP20, via microbial driven Fenton reaction. With the present of oxygen, IRB undergo aerobic respiration to generate hydrogen peroxide (H_2O_2), while under anaerobic growth condition with Hydrous Ferric Oxide (HFO) was supplied as the sole electron acceptor, IRB reduce ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}). Fenton reaction between H_2O_2 and Fe^{2+} generated by IRB during aerobic and anaerobic respiration respectively, produced hydroxyl radicals that degrade PPF. The results show that after 7 days of incubation PPF degradation via Fenton reaction was greatest by *S. oneidensis* MR-1 (22.06 % dry weight) followed by SG30 (16.23%), SG29 (12.53%), and KP20 (9.13%), while abiotic control for the same experimental set up showed 2.61% of PPF compared to the three locally isolated IRB strains. Overall, this research potential application of microbial Fenton reaction to degrade PPF waste into more simple structure for downstream processing of PPF into

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