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Bioremediation of palm oil mill effluent and lipid production by *Lipomyces starkeyi*: A combined approach

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ABSTRACT

The discharge of palm oil mill effluent (POME) on arable land causes large amounts of environmental distress due to its high concentration of phenolic compounds and chemical oxygen demand (COD). The approach of simultaneous microbial oil production and wastewater treatment is an attractive option to combine renewable energy production and environmental resilience. This study aims to produce cost effective microbial lipids using the oleaginous yeast *Lipomyces starkeyi* through the bioremediation of POME. A moderately dilute solution (50%) of POME showed higher microbial growth and lipid accumulation and offered a significantly higher degree of bioremediation. A lipid content of 21.32% was achieved with 50% POME, whereas the value was 15.14% for 25% POME. Three different techniques including ultrasonic treatment, Fenton's reagent and Fenton's + ultrasonic were employed to extract lipids from microbial biomass, and the maximum lipid concentration was obtained using the Fenton's + ultrasonic treatment. The degree of bioremediation was evaluated by the calculating seed germination index (GI) values. Higher GI values were observed for the 25% and 50% dilutions compared to undiluted (100%) POME. This combined approach can be a potential alternative technology that integrates bioremediation of POME with microbial lipid production.