# EKSPLORASI FUNGI DARI LIMBAH POME DAN POTENSINYA UNTUK MIKOREMEDIASI

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## INTISARI

Limbah POME (*Palm Oil Mill Effluent*) merupakan limbah cair hasil dari ekstraksi minyak tandan buah segar di Pabrik Kelapa Sawit (PKS). Parameter yang digunakan untuk mengukur kualitas limbah POME meliputi BOD, COD, TSS, dan kadar minyak. Limbah POME dari PKS dapat merusak lingkungan jika kandungan dari limbah tersebut tidak diolah dengan baik. Tujuan dari penelitian ini adalah untuk mengetahui spesies fungi yang berpotensi sebagai agen remediasi limbah POME. Beberapa tahapan yang dilakukan dalam penelitian ini yaitu isolasi fungi dari limbah POME, skrining isolat fungi potensial berdasarkan uji kualitatif enzim amilase, lipase, selulase, dan protease, serta analisis fisikokimia terhadap sampel limbah cair (BOD, COD, TSS, minyak, dan pH). Selanjutnya dilakukan identifikasi isolat fungi potensial berdasarkan karakter morfologi. Hasil isolasi menunjukkan sebanyak 100 isolat fungi berhasil diperoleh dari limbah POME. Seluruh isolat tersebut diseleksi melalui uji kualitatif enzim, di mana sebanyak 25 isolat memproduksi enzim selulase, 25 isolat memproduksi amilase, 25 isolat memproduksi protease, dan 23 isolat memproduksi lipase. Berdasarkan keempat uji enzim tersebut, diperoleh lima isolat fungi, yaitu $L1_{(10)}$, $O2_{(8)}$, $T3_{(5)}$, $T3_{(13)}$, dan $T3_{(16)}$, yang mampu memproduksi seluruh enzim dan berpotensi untuk mikoremediasi limbah POME. Selanjutnya dilakukan uji degradasi limbah POME menggunakan spektrofotometer terhadap kelima isolat tersebut. Hasil degradasi menunjukkan bahwa isolat fungi optimal adalah $T3_{(16)}$, dengan efisiensi degradasi tertinggi pada konsentrasi 25%, 50%, 75%, dan 100%, yaitu masing-masing sebesar 77,82%, 61,80%, 27,66%, dan 23,16% setelah 168 jam inkubasi. Berdasarkan karakterisasi morfologi, isolat $T3_{(16)}$ memiliki kemiripan dengan genus *Pythium*. Hasil pengamatan menggunakan SEM menunjukkan bahwa sel fungi mengalami kerusakan dan penebalan dinding sel, yang merupakan mekanisme pertahanan terhadap stres lingkungan serta bagian dari proses biosorben limbah POME. Isolat *Pythium* $T3_{(16)}$ menunjukkan performa optimal dalam menurunkan parameter pencemar BOD sebesar 95,10%, COD sebesar 95,15%, minyak sebesar 99,94%, dan TSS sebesar 94,77%, serta penurunan pH dari 5,0 menjadi 7,2.

**Kata kunci** : Limbah POME, *Phytium*, SEM, dan Degradasi.

# EXPLORATION OF FUNGI FROM POME WASTE AND THEIR POTENTIAL FOR MYCOREMEDIATION

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## ABSTRACT

POME (Palm Oil Mill Effluent) is a liquid waste generated from the extraction process of fresh fruit bunches in Palm Oil Mills (PKS). Parameters used to assess POME quality include BOD, COD, TSS, and oil content. POME from palm oil mills can cause environmental damage if its pollutants are not properly treated. This study aimed to identify fungal species with potential as remediation agents for POME. Several stages were carried out in this study, including the isolation of fungi from POME, screening of potential fungal isolates based on qualitative enzyme assays (amylase, lipase, cellulase, and protease), and physicochemical analysis of the liquid waste samples (BOD, COD, TSS, oil, and pH). Subsequently, potential fungal isolates were identified based on morphological characteristics. The isolation process yielded 100 fungal isolates from POME. All isolates were screened through qualitative enzyme assays, where 25 isolates produced cellulase, 25 produced amylase, 25 produced protease, and 23 produced lipase. Based on these four enzyme assays, five fungal isolates—$L1_{(10)}$, $O2_{(8)}$, $T3_{(5)}$, $T3_{(13)}$, and $T3_{(16)}$—were identified to produce all four enzymes and were considered potential candidates for POME mycoremediation. Degradation tests of POME were then conducted using a spectrophotometer on the five selected isolates. The results showed that the most optimal fungal isolate was $T3_{(16)}$, which achieved the highest degradation efficiency at concentrations of 25%, 50%, 75%, and 100%, with respective degradation rates of 77.82%, 61.80%, 27.66%, and 23.16% after 168 hours of incubation. Based on morphological characterization, isolate $T3_{(16)}$ showed similarity to the genus *Pythium*. SEM observations revealed cellular damage and thickening of fungal cell walls, indicating a defense mechanism against environmental stress and a biosorption response to POME. The *Pythium* $T3_{(16)}$ isolate demonstrated optimal performance in reducing pollutant parameters, including BOD by 95.10%, COD by 95.15%, oil by 99.94%, and TSS by 94.77%, while increasing the pH from 5.0 to 7.2.

**Key word** : POME Waste, *Phytium*, SEM, and Degradation.