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Biodelignification of Oil Palm Empty Fruit Bunches (OPEFB) by *Schizophyllum commune*

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Structured Abstract

Background: The palm oil industry is expanding to meet the global growing demand. However, the waste generated by industry remains abundant but underutilized primarily due to its high insoluble fibre content such as lignin. The aim of this study is to decrease the lignin content in the oil palm empty fruit bunches (OPEFB) using fungal enzymatic processes. Reducing lignin could improve OPEFB utilization, promoting a circular bioeconomy and sustainable waste management in the palm oil industry.

Methods: A white-rot fungus, *Schizophyllum commune,* was isolated from wild samples and employed as an inoculum in solid state fermentation (SSF) of OPEFB, which was conducted at room temperature for a duration of 14 days. Following fermentation, the OPEFB was subjected to analysis to determine its proximate composition and lignin content. Unfermented OPEFB was used as negative control. GC-MS analysis was performed to determine the components present in the treated OPEFB methanolic extracts. The obtained data from this study was subjected to Student's T-test statistical analysis

Results: The proximate analysis revealed a highly significant ($p<0.01$) increase of more than 110% in protein content and a decrease of approximately 10% lignin in the treated OPEFB. The GC-MS analysis exhibited the disappearance of 20 out of 23 components detected in the untreated OPEFB disappeared in the treated substrates, suggesting degradation during SFF. Additionally, among the nine detected components in the treated OPEFB, five were newly emerged, indicating the appearance of the degraded components. Two of them, stigmasterol and L-arabinitol, displayed a wide range of potent pharmacological effects, making them valuable compounds with potential therapeutic applications.

Conclusion: This study has successfully demonstrated the potential of *S. commune* in degrading and enhancing the value of lignocellulosic material in OPEFB. The delignified and improved OPEFB holds promising potential for various applications such as a nutritious feed ingredient for livestock and aquaculture

Keywords: Biodelignification, OPEFB, solid state fermentation, *Schizophyllum commune*

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