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A Comparative Study of *Schizophyllum commune* and *Pleurotus* sp. for the Pretreatment of Oil Palm Empty Fruit Bunches (OPEFB)

Tuan Muhammad Irwan Syah Abdul Rahim[a], Rohana Mat Nor[a*]

Structured Abstract

Background: The oil palm industry generates significant biomass waste, particularly oil palm empty fruit bunches (OPEFB), which pose environmental and economic challenges due to their high lignocellulosic content. Efficiently managing this waste through biological pretreatment offers a sustainable solution. This study explores the potential of *Schizophyllum commune* and *Pleurotus* sp. for the pretreatment of OPEFB to enhance its usability for biofuel, biofertilizer, and animal feed production.

Methods: In this study*, S. commune* and *Pleurotus* sp. were cultivated on OPEFB substrates under controlled conditions. The OPEFB was first sterilized to eliminate any unwanted microorganisms and then inoculated with the fungal species. The substrates were incubated under optimal conditions for fungal growth, with parameters such as temperature, humidity, and aeration carefully regulated. Growth performance was monitored over a period of 7 to 14 days. At various intervals, samples were taken to measure the degradation of lignin, cellulose, and hemicellulose. Additionally, proximate analyses were performed to determine changes in the nutritional composition of the treated OPEFB, focusing on parameters such as protein and lipid content. Enzymatic activities of ligninases, cellulases, and hemicellulases were also assessed to understand the mechanisms underlying the biodegradation process.

Results: Both fungi demonstrated effective growth on OPEFB substrates. *S. commune* exhibited a higher lignin degradation efficiency, reducing lignin content to 19.67%, compared to *Pleurotus* sp. Proximate analysis revealed significant alterations in the nutritional composition of the treated OPEFB. Schizophyllum commune increased the protein content by 14%, while Pleurotus sp. boosted the lipid content by 45.17%. These findings suggest that both fungi can enhance the nutritional profile of OPEFB, making it a more viable resource for subsequent applications.

Conclusion: The findings suggest that S. *commune* and *Pleurotus* sp. are effective agents for the biological pretreatment of OPEFB, offering a sustainable and eco-friendly approach to waste management in the palm oil industry. By reducing lignin content and improving the nutritional value of OPEFB, the pretreated biomass can be more efficiently converted into biofuels, biofertilizers, and animal feeds. This research contributes to the development of sustainable waste management practices, supporting the circular bioeconomy by turning agricultural waste into valuable resources and reducing environmental pollution.

Keywords: Biological pretreatment, *Schizophyllum commune, Pleurotus* sp., oil palm empty fruit bunches (OPEFB), Lignocellulosic degradation.

*Correspondence: rohana_micro@uitm.edu.my

[a] School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia