

Comparative Analysis of *Schizophyllum Commune*, *Rhizopus* Sp., and *Pleurotus* Sp. Solid State Fermentation on Various Waste Substrates

Nur Fatin Maisarah Fairul Hisyam^a, Rohana Mat Nor^{a*}

Structured Abstract

Background: Malaysia, with its vast agricultural sector, generates a substantial amount of waste. Agricultural and agroindustrial wastes (AAW) have become one of the major environmental challenges. Improper disposal of these wastes can lead to soil degradation, water contamination, and serious ecological threats. The study investigates the potential of solid-state fermentation (SSF) using three fungal strains, *Schizophyllum commune*, *Rhizopus* sp., and *Pleurotus* sp., to valorise two types of AAW namely oil palm empty fruit bunches (OPEFB) and coconut husk, into value-added products.

Methods: This study aimed to evaluate the fermentation efficiencies of *S. commune*, *Rhizopus* sp. and *Pleurotus* sp. when using various substrates as fermentation substrates. The fungal strains were isolated and identified through both macroscopic and microscopic observation. Pure cultures were then inoculated onto soy bean grains to produce fungal spawns. These spawns were subsequently inoculated onto the prepared for SSF. Following fermentation, fungal growth performance and the nutritional value of fermented substrates were assessed. Additionally, gas chromatography–mass spectrometry (GC-MS) analysis was conducted to identify beneficial metabolites produced during SSF.

Results: Both *Rhizopus* sp. and *Pleurotus* sp. exhibited the highest substrate colonization, resulting in greater biomass production, substantial increase in protein content, and crude fiber reduction compared to *S. commune*. Nevertheless all fungal treatments demonstrated significantly better than the control ($p < 0.05$) GC-MS analysis verified diverse beneficial bioactive molecules, notably linoleic acid, an essential Omega-6 polyunsaturated fatty acid (PUFA), that plays several important roles in human and animal health, particularly in fermented OPEFB substrates.

Conclusion: In conclusion, the findings validate that fungal SSF is an appropriate, eco-friendly technique for upgrading AAW into health promoting bioactive and nutrient-rich products with support for sustainable waste management and circular bioeconomy applications.

Keywords: Solid-State Fermentation (SSF), Agricultural and Agroindustrial Wastes (AAW), Fungal Bioconversion, Oil Palm Empty Fruit Bunches (OPEFB), Coconut Husk

*Correspondence: rohana_micro@uitm.edu.my

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