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Production and Optimization of Laccase By *Marasmius cladophyllus* UMAS MS8 Using Agro–industrial Waste as Substrate

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Abstract: Fungal laccases are preferred due to their high redox potentials and low substrate specificity. For large–scale enzyme applications, low enzyme yield and high cost of production has remained the challenge. Therefore, this research investigates the feasibility of utilizing various types of lignocellulosic agroindustrial waste such as sago “hampas”, rice husk, and empty fruit bunch (EFB) as substrate in the production of laccase enzyme by endophytic fungus, *Marasmius cladophyllus* UMAS MS8 under both solid–state fermentation (SSF) and submerged fermentation (SmF). The substrate that produces the highest laccase enzyme either under SSF or SMF will be selected for further optimization. The optimization parameters include the incubation period, effect of inducer (Remazol Brilliant Blue R (RBBR) and copper) and supplementation of different nitrogen sources. Among the three agroindustrial wastes tested as substrate, EFB under SmF was found to be the most ideal substrate and fermentation bioprocess to produce laccase enzyme as it gives rise to the highest laccase activity of 0.0919 U/g after 12 days of incubation as compared to other substrates either under SSF or SmF. However, both inducer RBBR and copper had no induction effect on the production of laccase enzyme. While the supplementation of nitrogen source, peptone better yield on laccase enzyme production by EFB after 12 days of incubation. In conclusion, these shows the potential of EFB as a cost–effective substrate for laccase enzyme production, offering an alternative use for this common and abundant agro–industrial by–product.

Keywords: Laccase; Lignocellulosic; Empty fruit bunch; *Marasmius cladophyllus*; Agroindustrial waste