

Solid state fermentation using agroindustrial wastes to produce aspergillus niger lipase as a biocatalyst immobilized by an adsorption-crosslinking method for biodiesel synthesis

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Abstrak

Although technological advances have fueled the rising demand for lipase as a biocatalyst, commercial availability remains limited and costs prohibitive. To meet this need, an extracellular lipase enzyme from *Aspergillus niger* can be produced through solid state fermentation (SSF) using agroindustrial wastes including tofu dregs, coconut dregs, and corn bran. These agroindustrial residues still contain nutrients, especially lipids/triglycerides, making them a potential fermentation medium to produce lipase. Lipase with the highest activity level (8.48 U/mL) was obtained using a tofu dreg substrate, 4% inducer concentration, and 9-day fermentation period. This crude lipase extract was then dried with a spray drier and immobilized in a macroporous anion resin using the adsorption-crosslinking method. The immobilized lipase's activity was assayed by a biodiesel synthesis reaction; it showed 48.3% yield. The immobilized enzyme's stability was also tested through four cycles of biodiesel synthesis; in the fourth cycle, the enzyme maintained 84% of its initial activity.