# Produksi lipase ekstraseluler terimobilisasi hasil fermentasi solid state aspergillus niger pada substrat bungkil inti sawit, bungkil kedelai, dan coir pith = Production of extracellular immobilized lipase from solid state fementation of aspergillus niger on palm kernel cake soybean meal and coir pith as substrates

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Abstrak

Lipase mikrobial telah menunjukkan potensi besar sebagai biokatalis di berbagai sektor industri bioteknologi mengingat kemampuannya untuk melakukan aktivitas hidrolitik pada temperatur dan tekanan rendah. Berdasarkan hasil riset, diketahui limbah agoindustri mampu bekerja sebagai substrat yang baik pada proses produksi lipase melalui fermentasi substrat padat (SSF). Penelitian ini bertujuan untuk melakukan sintesis lipase ekstraseluler hasil fermentasi kapang Aspergillus niger dengan metode SSF pada limbah agroindustri berupa bungkil kedelai, bungkil inti sawit, dan serbuk sabut kelapa. Kondisi optimum produksi lipase dikarakterisasi lebih lanjut dengan memvariasikan konsentrasi induser minyak zaitun dan waktu fermentasi.
Diperoleh aktivitas spesifik tertinggi 6,22 U/mL dari substrat bungkil kedelai pada waktu fermentasi 9 hari dan penambahan 4% induser. Kinerja lipase dianalisis lebih lanjut pada sampel lipase ekstrak kering hasil pengeringan melalui metode spray drying dan lipase terimobilisasi secara adsorpsi-crosslinking pada resin anion-makropori. Lipase hasil spray drying menunjukkan aktivitas 45 U/g enzim dengan enzyme loading 48,78%. Lipase terimobilisasi diuji nilai aktivitas dengan reaksi hidrolisis dan stabilitas enzim dalam mengkatalisis reaksi interesterifikasi sintesis biodiesel rute non-alkohol pada reaktor batch dengan perbandingan mol reaktan minyak kelapa sawit dan metil asetat 1:12 pada suhu reaksi 40oC selama 50 jam. Diperoleh hasil bahwa lipase terimobilisasi memiliki aktivitas 7,64 U/mL dengan nilai yield relatif 57% dari yield awal setelah empat kali siklus interesterifikasi.
<hr><i>Microbial lipase has shown great potentials in acting as a biocatalysts in many biotechnological applications due to its ability to perform hydrolitic activities at low temperature and pressure conditions. Many research proves that agroindustrial residues can be an ex-cellent substrate for the production of lipase by solid state fermentation (SSF). This study aimed to produce extracellular lipase from solid state fermentation of filamentous fungi Aspergillus niger by SSF on agroindustrial residues such as palm kernel cake, soybean meal, and coir pith. Fermentation was carried out at room temperature, initial pH of 7, with no improved condition by stirring or aeration. Produced enzymes were later characterized at several inducer concentration and incubation period.
This research obtained lipase with highest activity of 6,22 U/mL coming from soybean meal with 9 days of incubation and addition of 4% olive oil inducer. Lipase activity was further investigated by spray drying and immobilizing anion-macroporous resin. Spray dried lipase showed 45 U/g enzyme activity and enzyme loading of 48,78%. Immobilized enzyme activity was analyzed by hydrolisis and stability was analyzed by utilizing it as a biocatalyst for interesterification reaction in non-alcohol route of biodiesel synthesis in batch reactor with mole comparison 1:!2 of reactant palm oil and methyl acetate in reaction temperature of 40oC and 50 hour cycle. Immobilized enzyme have activity of 7,64 U/mL and relative yield of 57% after four

cycle of interesterification.</i>