

Effect of physical and chemical properties of oil palm empty fruit bunch, decanter cake and sago pith residue on cellulases production by *Trichoderma asperellum* UPM1 and *Aspergillus fumigatus* UPM2

Abstract

The effect of cultivation condition of two locally isolated ascomycetes strains namely *Trichoderma asperellum* UPM1 and *Aspergillus fumigatus* UPM2 were compared in submerged and solid state fermentation. Physical evaluation on water absorption index, solubility index and chemical properties of lignin, hemicellulose and cellulose content as well as the cellulose structure on crystallinity and amorphous region of treated oil palm empty fruit bunch (OPEFB) (resulted in partial removal of lignin), sago pith residues (SPR) and oil palm decanter cake towards cellulases production were determined. Submerged fermentation shows significant cellulases production for both strains in all types of substrates. Crystallinity of cellulose and its chemical composition mainly holocellulose components was found to significantly affect the total cellulase synthesis in submerged fermentation as the higher crystallinity index, and holocellulose composition will increase cellulase production. Treated OPEFB apparently induced the total cellulases from *T. asperellum* UPM1 and *A. fumigatus* UPM2 with 0.66 U/mg FPase, 53.79 U/mg CMCCase, 0.92 U/mg β -glucosidase and 0.67 U/mg FPase, 47.56 U/mg and 0.14 U/mg β -glucosidase, respectively. Physical properties of water absorption and solubility for OPEFB and SPR also had shown significant correlation on the cellulases production.

Keyword: Cellulases; Submerged fermentation; Solid state fermentation; Enzymatic hydrolysis; Water absorption and solubility; Crystallinity