

Saccharification of pretreated oil palm empty fruit bunch fiber using cellulase of *Chaetomium globosum*

ABSTRACT

The effectiveness of different chemical and physical pretreatments to alter cellulose structure and to reduce hemicellulose and lignin contents in oil palm empty fruit bunch (OPEFB) fibers for subsequent use as substrate for enzymatic saccharification was studied. The saccharification was carried out using concentrated cellulase preparation from culture broth of *Chaetomium globosum* strain 414 containing 10 U/mL FPase, 285 U/mL CMCase, and 60 U/mL β -glucosidase. The use of 0.5% NaOH to treat OPEFB by soaking at 30 °C for 4 h gave the highest rate and degree of hydrolysis followed by 0.5% HNO₃, HCl, EDA, and EDTA. Autoclaving the chemically treated OPEFB fiber at 121 °C for 5 min improved the hydrolysis by 2-fold. The improvement in hydrolysis was related to a decrease in the hemicellulose and lignin contents and an increase in the cellulose content. The qualitative hydrolysis yield for autoclaved OPEFB fiber treated with 2% NaOH was 85.9%. During saccharification of OPEFB using cellulase of *C. globosum*, the amount of glucose produced was higher while the amount of cellobiose produced was lower than those obtained with commercial cellulase of *Trichoderma viride*.

Keyword: Cellulase; Endoglucanase; Cellobiohydrolase; β -glucosidase; *Chaetomium globosum*; Cellulosic material; Oil palm empty fruit bunch