

Improved cellulase production by *Aspergillus terreus* using oil palm empty fruit bunch fibre as substrate in a stirred tank bioreactor through optimization of the fermentation conditions

ABSTRACT

Response surface methodology (RSM) was performed to evaluate the effects of dissolved oxygen tension (DOT) and initial pH on the production of carboxymethyl cellulase (CMCase), filter-paper hydrolase (FPase), and α -glucosidase by *Aspergillus terreus* in a 2 L stirred tank bioreactor. Delignified oil palm empty fruit bunch (OPEFB) fibre was used as the main substrate under submerged fermentation. Growth of *A. terreus* and the production of three main components of cellulase were optimized by central composite design (CCD) design. Statistical analysis of results showed that the individual terms of these two variables (DOT and pH) had significant effects on growth and the production of all components of cellulase. Maximum growth (13.07 g/L) and cellulase activity (CMCase = 50.33 U/mL, FPase = 2.29 U/mL and α -glucosidase = 15.98 U/ml) were obtained when the DOT and initial culture pH were set at 55% and 5.5, respectively. A high proportion of α -glucosidase to FPase (8:1) in cellulase of *A. terreus* could be beneficial for efficient hydrolysis of cellulosic materials. The use of OPEFB as a main substrate would reduce the cost of fermentation for the production of cellulase.

Keyword: Oil palm empty fruit bunch; Cellulase; *Aspergillus terreus*; Dissolved oxygen tension; Response surface methodology; Submerged fermentation