

## **The treatment of oil palm empty fruit bunch fibre for subsequent use as substrate for cellulase production by *Chaetomium globosum* Kunze**

### **ABSTRACT**

The feasibility of using treated oil palm empty fruit bunch (OPEFB) fibre as a substrate for cellulase production by *Chaetomium globosum* Kunze was studied using a shaking flask fermentation system. The use of 2-mm chemically untreated OPEFB fibre increased cellulase production by about two times compared to 10-mm fibre. The effect of the different chemicals (NaOH, HCl, HNO<sub>3</sub>, EDA and EDTA) on the 2-mm fibre was also investigated. Treatment with these chemicals significantly ( $P < 0.05$ ) increased the cellulose and reduced the lignin contents. Fermentation using OPEFB fibre treated with HNO<sub>3</sub>(0.5% v/v) gave the highest cellulase production and this was related to its high cellulose content. Cellulase production increased further when autoclaved (121°C, 15 psi for 5 min), chemically treated OPEFB fibre was used. When autoclaved 2-mm OPEFB fibre treated with HNO<sub>3</sub> was used as a substrate, the maximum FPase activity and yield obtained were 0.95 U ml<sup>-1</sup> and 120.7 U g<sup>-1</sup> cellulose, respectively. The cellulase produced by *C. globosum* contained a high proportion of  $\beta$ -glucosidase. The ratio of specific activity of  $\beta$ -glucosidase to FPase was about 8. The production of all three major components of cellulase (endoglucanase, cellobiohydrolase and  $\beta$ -glucosidase) using pretreated OPEFB fibre were about three times higher than those obtained in fermentations using pure cellulose (Avicel and carboxymethylcellulose).

**Keyword:** Cellulase; Endoglucanase; Cellobiohydrolase;  $\beta$ -glucosidase; Pretreatment; *Chaetomium globosum*; Oil palm empty fruit bunch