CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME I

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CHAPTER 25

CELLULASE PRODUCTION FROM RICE STRAW AND CORN COB BY SOLID STATE BIOCONVERSION

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ABSTRACT

Rice straw and corn cobs are among the abundant agricultural wastes in Malaysia that can serve as solid substrates for the production of cellulases. Solid state fermentation (SSF) of rice straw and corn cobs was carried out in the presence of two potential fungi (*Trichoderma reesei* and *Aspergillus niger)* to produce cellulase. The results obtained in this study revealed that the highest cellulase activity of 99.256 U/ml was achieved after two days of fermentation. The optimum culture conditions that led to the highest cellulase activity were 0.25 % (w/w) peptone, 1.0 % (w/w) cellulose, 3.0 % (v/w) mineral solution, 0.25 % (w/w) KH_2PO_4 and 67 % moisture content. This study showed the potential of using these two agricultural residues for cellulase production.

Keywords: rice straw, corn cobs, cellulase, *trichoderma reesei, aspergillus niger*

INTRODUCTION

Recently, there is a worldwide interest towards converting agricultural residues into food, feed, chemicals and fuels. Cellulose is the most abundant polysaccharide in lignocellulosic materials. The cellulose present in those materials may be converted into ethanol and glucose through saccharification and fermentation processes in the presence of hydrolytic enzyme, cellulase. Thus, nature of the enzyme, structure of the substrate and the enzyme-substrate interactions are among the most important factors influencing this process (Datta, 1989; Benu et al. 1999).

Cellulase production is the most significant step in the biotechnological revolutionary production for various industries including chemicals, bioethanol, food, brewery and wine, animal feed, textile and laundry, pulp and paper, and agriculture (Bhatand Bhat, 1999). It was estimated that about 20% of the world industrial enzymes' market consists mainly of cellulases, hemicellulases and pectinases (Bhat and Bhat, 1999). Thus, high cost of cellulase is one of the major hindrances that affects the commercialization of several processes. However, these effects can be alleviated since various agricultural residues have potentials to be used as alternative substrates for cellulase production. Agricultural wastes such as corn cobs, wheat straw, soybean stalks, cassava peel and rice straw are potential sources of