CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME I

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IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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IIUM PRESS

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Suleyman Aremu Muyibi, Mohammed Saedi Jami & Zaki Zainudin: Current Reasearch and Development in Biotechnology Engineering at IIUM Volume I

ISBN: 978-967-418-150-5

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

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CHAPTER 12

SCREENING OF LIGNOCELLULOSIC MATERIALS FOR THE PRODUCTION OF FERMENTABLE SUGAR

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ABSTRACT

A laboratory scale production of fermentable sugar using enzymatic hydrolysis was carried out. Three parameters affecting the production of fermentable sugar (optimum time, substrate, and enzyme concentration) were evaluted. Among the substrates, rice husk gave the highest yield of fermentable sugar compared to empty fruit brunches (EFB) and waste paper. In case of optimum time and enzyme concentration, 2 hrs and cellulase produced by*Phanerochaete chrysosporium*were found to be appropriate for the highest yield of sugar by rice husk.

Keywords: fermentable sugar, enzymatic hydrolysis, rice husk, *phanerochaete chrysosporium*

INTRODUCTION

Lignocelluloses are generally considered as the best substrates for the solid-state fermentation process. They hold tremendous potential for the production of enzymes. Agricultural residues contain lignocelluloses as the major component. The lignin, which occupies around 30% of the total composition of lignocellulosic residues, forms the barrier for the microorganisms to utilize cellulose as carbohydrate for their growth. Therefore various physicochemical treatments were conducted on lignocellulosic agricultural waste (Kodali and Ravendra, 2006).

A fermentable sugar from biomass refers to glucose and xylose which can be converted to ethanol (Ladicsh and Svarczkopf, 1991). Lignocellulosic materials contain both cellulose and lignin. Sources of lignocellulosic materials include wood, empty fruit bunches from palm oil industry, agricultural residues, water treatment plantsludge, grasses and other related substances. Lignocellulosic biomass is the most abundant renewable resources on earth (Bellamy, 1974; Ladicsh and Svarczkopf, 1991) and has attracted continuing efforts to be utilized in the production of biofuels and 72iochemical for a long time (Lynd et al., 1999; Sherrard and Kressman, 1945; Sudha et al., 1998; Ladicsh and Svarczkopf, 1991).

In the production of fermentable sugar, hydrolysis by acids and enzymes are the two methods that have been commonly used. (Sun and Cheng, 2002; Galbe and Zacchi, 2002).Thus, enzymatic hydrolysis has a number of advantages over the acid hydrolysis such as high yield of pure glucose, low environmental impact, and mild reaction conditions.