# CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME I

Editors:

Suleyman Aremu Muyibi
Mohammed Saedi Jami
Zaki Zainudin

IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

# CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

*(VOLUME I)*

**Editors:**
**Suleyman Aremu Muyibi**
**Mohammed Saedi Jami**
**Zaki Zainudin**

**Department of Biotechnology Engineering**
**Faculty of Engineering**
**International Islamic University Malaysia**

**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

CONTENTS

## CHAPTER 32

# PRODUCTION OF GLUCOAMYLASE FROM RICE BRAN USING POTENTIAL FUNGAL STRAINS

Md Zahangir Alam, Hamzah Mohd Salleh, Nurhidayah Binti Ahmad Hassan

Department of Biotechnology Engineering, Faculty of Engineering, International Islamic University Malaysia, Gombak, 50728 Kuala Lumpur, Malaysia

## ABSTRACT

Glucoamylase is a starch-converting enzyme which is widely used in textile and food industry and also in bio-ethanol production. Therefore, the production of inexpensive glucoamylase by using low cost agricultural residue was studied. Several potential fungal strains from local isolates – *Aspergillus niger* 0-102A, 0-109A, A-101, and Basidiomycete R01, R02 and R03 – were screened for glucoamylase production with rice bran as the substrate media. Maximum glucoamylase activity (362.56 U/g dry substrate-gds) was obtained from *A. niger* 0-109A in 96 h with an inoculum, moisture content and pH of 5% (v/w), 60% and 5, respectively at 32°C. The concentration of glucose, yeast extract, and minerals such as potassium, magnesium, sodium and ammonium was studied to determine the optimum media composition. From single factor experiments, the glucose and potassium concentration that contribute to optimum glucoamylase activity were 4% w/w (330.03 U/gds) and 0.06% v/w (453.70 U/gds) respectively.

***Keywords:*** glucoamylase, rice bran, fungal strains, enzyme, agricultural residue

## INTRODUCTION

Starch processing industry is a major industry which uses the starch-converting enzymes in the production of maltodextrin, glucose and fructose syrups. As the industry matures and shifts from traditional acid hydrolysis of starch to the use of enzyme, the demand for the starch-converting enzymes also increases. A number of these starch converting-enzymes belong to the α-amylase family and one of them is glucoamylase (Van der Maarel et al, 2002). In meeting the high command for glucoamylase, large scale production of this enzyme with the cheap or sustainable operational cost will be very attractive to the industry.

The current sources of starch and hence amylases for the major industry are maize, tapioca, potato and wheat. In the European Union, 3.6 million tons of maize starch, 2 million tons of wheat starch and 1.8 million tons of potato starch were produced in 1998 (Van der Maarel et al, 2002) and some of the quantity is bought by the starch process industries. Tea waste and copra waste have been reported as substrates for amylase production from