CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME I

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Suleyman Aremu Muyibi
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Department of Biotechnology Engineering
Faculty of Engineering
International Islamic University Malaysia

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CHAPTER 1

SELECTION OF POTENTIAL FUNGAL STRAINS FOR THE PRODUCTION OF GLUCOAMYLASE USING NON-FOOD CASSAVA

Md. Zahangir Alam, Hamzah Mohd Salleh, JuwairiyahAbd Karim, Aliyu Salihu

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

ABSTRACT

The production of glucoamylase was carried out using a non-edible bitter cassava as substrate in the presence of two fungal strains (*Aspergillusniger* and *Basidiomycetes* sp.). Results from the screening phase showed that *Aspergillusniger* was the most potential fungus to be used for enhanced glucoamylase production. Optimization process using one-factor-at-a-time method of four medium components (cassava, glucose, yeast extract and minerals) led to maximum production of 65.63 U/ml based on the combination of 4% cassava, 1.5% glucose, 1% yeast extract and 0.05% minerals with biomass concentration of 26.06 g/L

Keywords: glucoamylase, *aspergillus niger,* optimization, cassava.

INTRODUCTION

Glucoamylase aids in the conversion of starches into oligosaccharides. Ikram-ul-Haq (2003) showed that several researches have been carried out on the production of amylase using synthetic media such as nutrient broth, soluble starch as well as other components that are expensive. These compositions can be replaced with more economical and available agricultural products and their wastes to reduce the media cost. Therefore in order to reduce the cost of production and the price of glucoamylase, some attempts have been made recently for productions of amylase under solid state and submerged fermentation using low cost media such as food wastes, agricultural products and by-products (Wang et al., 2008; Spieret al., 2006; Hernandez et al. 2006).

Malaysia produces many agricultural products such as rubber, palm oil, coconut, pineapple, sugarcane, cassava and sago. These products as well as their residues contain high proportion of carbohydrate; as such they can be transformed into useful products; since most of these materials are available at no cost or sold at relatively low price.

Glucoamylase (amyloglucosidase) hydrolyses glucose units from the non-reducing ends of amylose and amylopectin in a stepwise manner. It can also hydrolyse the 1,6-α-linkages at the branching points of amylopectin (Ellaiah al., 2002).

Thus, glucoamylases are industrially important biocatalysts that have been extensively used in the manufacture of crystalline glucose or glucose syrup either as soluble or