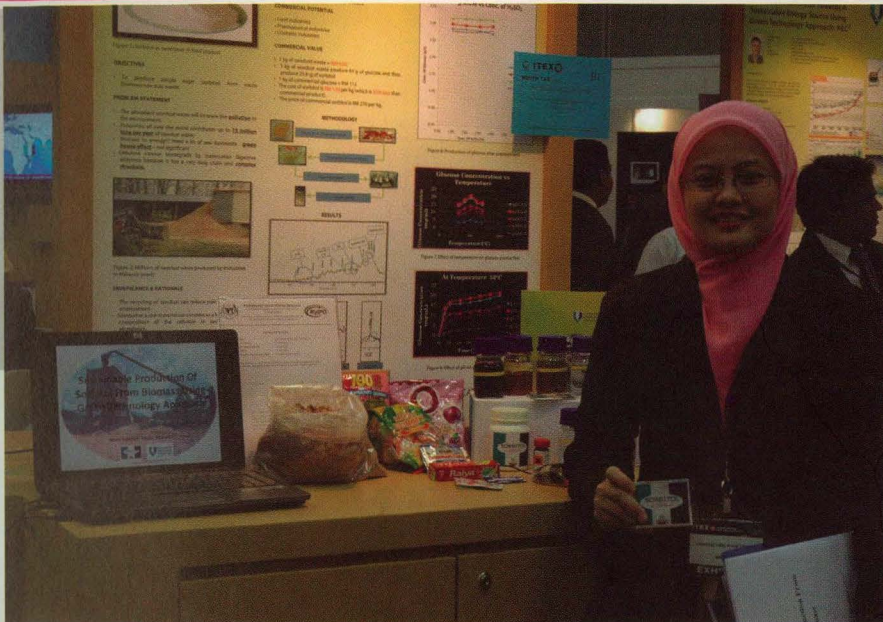


Sustainable Production Of Sorbitol From Biomass Using Green Technology Approach

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INTRODUCTION

Sorbitol is a monosaccharides composed of six-carbon sugar alcohol. Sorbitol is produced from glucose by digestion with *Lactobacillus* bacteria during fermentation process. This research use glucose which is produced from one of nature's most abundant raw material cellulose (sawdust) using enzymatic reaction. Sorbitol is a low caloric sugar alcohol that is widely used in a range of food products such as confectionery, chewing gum, candy, desserts, ice cream, and diabetic foods, based on its sweetness and its high solubility. Sorbitol has a relative sweetness of around 60% compared to that of sucrose and displays, a fold higher solubility in water than mannitol. It is non cariogenic and may be useful to people with diabetes. These properties have led to the commercial application of sorbitol in food, pharmaceutical and cosmetic industries as a nutrient, sweetening agent and excipient.

BACKGROUND OF THE PROBLEMS

Malaysia is blessed by an abundant source of natural cellulose-based raw materials which can be utilized and manipulated to produce higher value added specialty fine chemicals. Sawdust is

a waste by-product of the timber industry that is either used as cooking fuel or a packing material. It is composed of three important constituents such as cellulose, lignin, and hemicelluloses. Sawdust is not only abundant, but also it is actually an efficient adsorbent that is effective to many types of pollutants, such as dyes, oil, salt and heavy metals. Industries all over the world contributes up to 15 million tons per year of saw dust waste which can increase the pollution of the environment.

One of the major components in sawdust is cellulose. Cellulose is a polymer of glucose which the specific structure of cellulose favours the ordering of the polymer chains into tightly packed, a highly crystalline structure that is water insoluble and resistant to depolymerisation. Cellulose cannot biodegradable by mammalian digestive enzymes because it has very long chain and complex structure. It will take a long time to biodegradable so it consider as a non biodegradable. Cellulose can be enzymatically hydrolyzed to glucose units and then fermented to sorbitol.

Sorbitol is a specialty chemical which is used as a sugar replacement with calorie free and

noncarcinogenic, which is safety for diabetic. It is suitable for diabetic as they does not produce or properly use insulin, which is needed to convert sugar, starches and other food into energy needed for daily life. WHO has estimated that in the year 2030, Malaysia would have a total of 2.48 million people with diabetes. Globally there is a rising trend in the prevalence of diabetes due to many factors such as population growth, aging urbanization and increasing prevalence of obesity and physical inactivity.

SIGNIFICANT & RATIONALE

Technically the major advantages of this invention are the ability to produce and separate sorbitol simultaneously and continuously without any downtime for membrane cleaning procedure, reactants recovery and separation process by using FER system. This invention also breaks the traditional barrier of membrane technology application in biotechnology, whereby the production of simple sugar is always limited by membranes fouling. Commercially, the market of sorbitol is lucrative and hence this invention will lead to a significant financial implication on our local industry if this novel FER system is to be used commercially. Cost effective, modular form and energy efficient are advantages offered by the presence of this FER system. The developed system is purposely designed to handle variation of feed stream compositions regardless of the substrate varieties and compositions. Furthermore the invented pretreatment system and employed in the system design is capable of handling various types of enzymes in the feed stream.