1. INTRODUCTION

The lignocellulosic materials represent the largest reservoir of potentially fermentable carbohydrates on earth. It is estimated that approximately 100 billion tons of renewable resources as cellulose and hemicellulose are produced annually worldwide by photosynthesis, (Dale, et. al., 1985).

Cellulose is probably the most abundant biological compound in our world, in the form of lignified cellulose (wood), and or pure cellulose in paper, fibers, and textiles . Cellulose is the predominant waste material in agricultural residues, in the form of straw, stalks, stems, and husks, and the main waste product, both in nature and man-made.

Bioconversion of cellulosic materials to sugars which could be used as a source of food, fuel and chemicals is of potential importance in view of the increasing pressure on the existing food and energy sources,(Ryu and Mandels, 1980 and Mala, et. al., 1983) .

Lignocellulosic materials are abundant and consist mainly of cellulose (40-60%), with lesser, but significant, amounts of hemicellulose (20-30%) and lignin (15-30%), (Dekker and Wallis, 1983) . These renewable resources provide us with fuel, feed, and fiber and could become the basis for a much larger fermentation industry if a number of technical problems were solved . For example, inexpensive sugars could be produced however, if they are to be obtained from lignocellulosic conversion, as a cheep sources .

The annual production of sucrose in Egypt reached to about 2million tons and the majar part of this sugar is imported . To cover this shortag of sucrose in the local market some valuable by products e.g. glucose syrup, high-fructose syrup and ethanol alcohol might be produced from renewable lignocellulosic materials .

These lignocelluloses can be hydrolyzed to soluble products by acid or enzymes . The hydrolysis of cellulose by acid so far has not been commercially feasible due to degradation of the product, interaction of acid with non-cellulosic materials and corrosion of equipment resulting in low yields, impurities in the syrups, and high capital costs. Therefore, the enzymatic hydrolysis of cellulose process should be preferable but needs more investigations to reach the optimal condition.

Enzymes are being used increasingly as catalysts for chemical conversion, but they are expensive and have limited stability. Consequently chemists developed various methods for decreasing enzyme expense and increasing their stability. The best method is a process known as immobilization. The immobilization of enzymes will play an increasing important role in biotechnology .

The aim of this investigation is to study the enzymatic conversion of some lignocellulosic materials (wheat straw, corn cobs, corn stalks and sugarcane bagasse) to high fructose syrup . The optimal conditions for cellulase, hemicellulase, B-glucosidase and isomerase enzymes were discussed in details . Beside that B-glucosidase was immobilized on different supports and activity, stability and the kinetic behaviour of the immobilized enzyme was evaluated .

The saccharification and isomerization processes were throughly studied to obtain the most suitable conditions for high fructose syrup production from the lignocellulosic materials under investigation .