CHAPTER I
INTRODUCTION

First generation biofuels derived mainly from food crops serves many problems ranging from net energy losses to greenhouse gas emissions to increased food prices; therefore, second generation biofuels from lignocellulosic materials were developed (Menon *et al.*, 2012). In recent years, high crude oil prices and increasing concerns over global warming have renewed the interests in biobutanol production. Biobutanol is an attractive renewable liquid transportation biofuel. It has a better energy density and performance than ethanol and can be made from more sustainable feedstocks than biodiesel. Hence, biobutanol has the potential to substitute for both ethanol and biodiesel.

Thailand is a major agricultural producer with abundant agricultural resources and their by–products. These agricultural by–products could be used as biomass energy that is an alternative with the potential to replace a wide diversity of fossil based products within the energy sector. Lignocellulosic biomass mostly from agricultural wastes are a large quantity of raw materials and non–human sources such as bagasse, rice straw, and corncobs. The major component of these wastes is cellulose, which the microbial can change to biobutanol by fermentation.

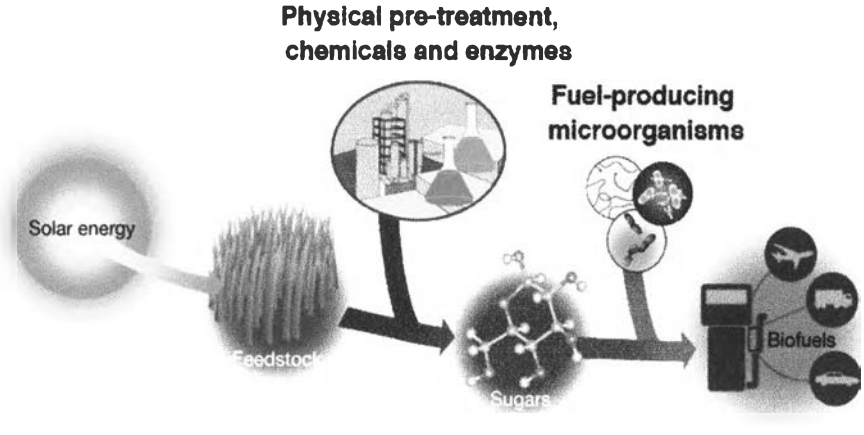

Figure 1.1 Biofuels production from lignocellulosic biomass (Cascone, 2008).

Corncobs are one of the potential lignocellulosic biomass that can be used to produce butanol by the Acetone–Butanol–Ethanol (ABE) fermentation. Butanol production from lignocellulosic biomass requires the hydrolysis of lignocellulosic biomass into sugars, that is performed with enzymes. Pretreatments of lignocellulosic biomass using alkaline or acid have been used to improve the accessibility of the enzymes. The purpose of the pretreatment is to remove lignin and hemicellulose. That exposes more cellulose to the enzyme.

Microwave radiation is an alternative method to improve efficiency of the pretreatment due to its high heating efficiency, easy operation, and rapid heating which improves the disruption of lignocellulosic biomass structure. Moreover, microwave radiation could be simply to combine with chemical reaction.

The objective of this work is to investigate the optimal pretreatment condition of corncobs to produce biobutanol. The hydrolysates of corncobs were prepared employing combination pretreatment using microwave and two–stage pretreatment, including sodium hydroxide pretreatment followed by dilute sulfuric acid pretreatment and enzymatic hydrolysis. Finally, acetone, butanol, ethanol (ABE) were produced from hydrolysed corncobs using *Clostridium beijerinckii* TISTR1461.