CHAPTER I

INTRODUCTION

The petroleum crisis of 1973 strongly influenced Thailand's economy as 75 % of the energy used in Thailand was at the time imported petroleum products. As a result a great deal of effort was put into the development of renewable energies as a substitute to petroleum. As an agricultural country, Thailand produces and wastes a considerable amount of crop residues which could be used as an energy source. There are two basic classifications of processes to convert crop residues to fuels : biochemical and thermochemical conversions. Crop residues may be converted to biogas consisting of methane and carbon dioxide by biochemical conversion processes. These processes are suited for digestible crop residues. The major advantage of such processes is the possibility of producing a high calorific content gas. Thermochemical conversion processes can also convert crop residues to fuel. Such processes can be classified as direct combustion, pyrolysis and gasification. Direct combustion is suited for most direct heat applications, pyrolysis is suited for the production of charcoal and pyrolytic oils, and gasification produces a low calorific gas containing carbon monoxide and hydrogen. Charcoal gasification had been used in Thailand in World War II, to power buses and trucks but was later abandonned. As a result of the 1973 energy crisis there has been a renewed interest in gasification technology in Thailand today. Several organizations in Thailand

are presently doing research and development on gasifer systems. Most researchers are developing these systems for internal combustion engines for irrigation and electricity generation mostly based on charcoal and wood fuels. A few researchers are developing direct fire systems, again using wood as fuel. Most of the development work done today in the world consists in tuyered, closed-top gasifiers with wood, charcoal, and occasionally biomass residues such as coconut shells and corn cobs. However such a design is unsuitable for low density biomass residues and to remedy this problem for rice hull gasification large diameter open top gasifiers with no throats have been developped (1,2,3). The emphasis of this present work is to test a simple batch gasifier of a design which has an open top and no throats to gasify a variety of shredded biomass.

The objective of this thesis are as follows :

1. Test the gasifier using crop residues such as rice hull, hammer milled corn cobs, wood shavings, bagasse, water hyacinth stems.

2. Study some gasification parameters such as fuel characteristics (type of biomass , shred size, moisture) and operating conditions (air flow rates)

3. Observe and describe the phenomena and problems that occur for eventual use with other fuels and gasifier sizes.