CHAPTER I

INTRODUCTION

Agricultural wastes, food processing wastes and municipal wastes in Thailand are large in quantity and also have made environmental, social and economical aspects (1). To solve these problems, many scientists and researchers have tried to study how to gain benefits from these materials; for examples, food and animal feed (2) fuel and energy (3), and chemicals (4, 5). In principle, energy can be recovered from waste materials by either direct or indirect methods. In the latter one, energy can be produced by means of pyrolysis (liquid and gaseous products by heating in an oxygen-free or oxygen-deficient condition, 6) and fermentation (production of methane gas, hydrogen gas and ethanol, 7, 8). Fermentation is a microbial process which microorganisms utilize or convert biomass wastes to valuable products.

Biogas digestion is a microbial process which is one of the promising technologies for developing countries. In Thailand, researches in this area were extensine (9, 10, 11), but all were emphasized on environmental factors, e.g., temperature, loading, agitating, and etc. The study of microorganisms in the digester was limited, expecially, cellulolytic bacteria and methanogenic bacteria. Cellulose is the main component of cell wall in plant residues or cellulosic wastes. It is believed that suitable substrate versus suitable microbes may increase gas yield in the anaerobic

digester. The present studies of utilization of cellulose as the substrate for biogas production were conducted to define futher the effeciency of biogas technology in Thailand. The fundamental studies of pure cultures in biogas production were initiated and performed in 5 parts : (i) isolation and selection of cellulytic bacteria, (ii) isolation and selection of methanogenic bacteria, (iii) biogas production from cellulose by co-culture, (iv) biogas production from biomass wastes by co-culture, and (v) biogas production from cellulose and biomass waste by mixed culture.