CHAPTER I

INTRODUCTION

Energy consumption in developing countries has increased more than fourfold over the past three decades and is expected to continue increasing rapidly. For many developing countries, imported petroleum will be the source of this energy. Petroleum engines are widely used as sources of power in developing areas in tractors, irrigation pumps, village generators and trucks. Increasing use of petroleum will intensify local air pollution and magnify the global warming problems caused by CO_2. [1]

Recently, because of increases in crude oil prices, limited resources of fossil oil and environmental concerns there has been a renewed focus on vegetable oils and animal fats to make biodiesel fuels. [2]

Fatty acid methyl esters, known as biodiesel, derived from triglycerides by transesterification with methanol have received the most attention. The main advantages of using biodiesel are its renewability, better-quality exhaust gas emissions, its biodegradability and given that all the organic carbon present is photosynthetic in origin, it does not contribute to a rise in the level of carbon dioxide in the atmosphere and consequently to the greenhouse effect. [3]

There are four primary ways to make biodiesel, direct use and blending, microemulsions, thermal cracking (pyrolysis) and transesterification as the biodiesel from transesterification can be used directly or as blends with diesel fuel in diesel engine.[2] The fatty acid methyl ester are attractive as alternative diesel fuels. Transesterification, also called alcoholysis, is the displacement of alcohol from an ester by another alcohol in a process similar to hydrolysis, except than an alcohol is used instead of water. This process has been widely used to reduce the viscosity of triglycerides.[3]

The main sources of biodiesel are vegetable oil, such as palms, soybeans and *Jatropha curcas*, and animal fats. In recent years, the researches have discovered that microorganisms like fungus, bacteria, yeast and seaweeds can produce oils. For example, *Mortierella* are the groups of fungi that organisms can produce oil up to 46.3% dry weight.[4] In addition, *Chaetoceros muelleri* and *Chlorella protothecoides* are the groups of microalgea that can produce oil up to 55% dry weight.[5]

RCBC (Research Centre for Bioorganic Chemistry) group have discovered some endophytic fungi of *Zingiber cassumunar* which can produce oil up to 40%. Therefore, this research is to continue investigation on the oil production of the endophytic fungus and on the use of this oil as a raw material for biodiesel production.

1.1 Objective of the research

- To study oil production of endophytic fungus.
- To study the process of biodiesel production from oil of endophytic fungus.