I. INTRODUCTION

1.1 Background

Thermophilic bacteria produce thermostable enzymes that are very important in industrial and biotechnological processes such as molecular biology techniques for research and diagnostic uses (enzymes that process DNA and RNA) and the ability of enzymes to convert flour, food, waste management, paper making and synthesis of substances organic matter (Vielle and Zeikus,2001).

Based on the optimum growth temperature, microorganisms are generally distinguished from psychrophilic, psychotropic, mesophilic, thermophilic, and hyperthermophilic microorganisms. Psychrophilic bacteria live in a temperature range of 0-20°C and. Psychotropic bacteria can grow at a temperature of 0-35°C. Mesophyll bacteria can grow at a temperature of 20-45°C and thermophilic bacteria grow at a temperature of 45-65°C. Hypertermophilic bacteria live at temperatures above 90°C and maximal at 100°C, but in some bacteria they can live at temperatures of 80-113°C (Prescott,2002).

For industrial needs generally isolated from various types of microorganisms. Microorganisms can produce enzymes in varying amounts and types, the production time is faster and easier to control. Production and trade of enzymes by hydrolytic enzyme groups such as amylase, protease, catalase and lipase (Poernomo, 2003).

One type of enzyme that has an important and unparalleled role in the growth of biotechnology is the lipase enzyme. This enzyme has special properties that can break the ester bonds in fat and glycerol. In addition, lipase has the ability to catalyze organic reactions both in aqueous media and in non-water media (Sumarsih, 2004). Lipase enzymes play a role in the separation of fatty acids and the dissolution of oil stains in industrial equipment so that oil can be dissolved in

water. Some of the reactions catalyzed by lipase enzymes include hydrolysis, alcoholysis, esterification, and interesterification reactions (Dosanjh and Kaur, 2002).

The use of enzymes in industry has problems related to high temperatures in industrial processes so that enzymes that are stable and which have high activity at high temperatures (thermostable enzymes) are needed. Most thermostable enzymes on the market come from mesophilic bacteria and fungi. Thermostable enzymes from thermophilic bacteria are potential enzymes to overcome industrial technical constraints. Another obstacle is the production of thermostable enzymes from very low thermophilic mechanisms. To overcome this obstacle, several approaches have been taken to find new sources of thermostable enzymes from thermophilic microorganisms that grow in unique habitats, temperatures suitable for producing thermostable enzymes and genetic engineering to produce thermostable enzymes with high expression (Nyoman Tika, Redhana, Ristiati ,2007).

In general, enzymes produce speed, specifications, and control of the reactions in the body. Enzymes function as catalysts, namely compounds that increase the speed of chemical reactions (Marks, *et al*., 2000). Each enzyme has a maximum activity at a certain temperature, enzyme activity will increase with increasing temperature until the optimum temperature is reached. After that further temperature increases will cause enzyme activity to decrease (Megiadari, 2009).

Lipase enzyme is an enzyme that works to hydrolyze fat and oil. Based on the physiological functions, lipase enzymes have an important role to hydrolyze fats and oils into fatty acids and glycerol which are needed in metabolic processes. This lipase enzyme can break down the ester bonds in fats so that they become fatty acids and glycerol (Poedjiadi and Supriyanti,2007).

North Sumatra is a province that has several hot springs, one of which is Sipoholon Hot Springs, Tarutung. Various researchers have obtained thermophilic bacterial isolates in producing certain enzymes in hot springs at Sipoholon, Tarutung. Therefore, there is a need for a study of bacteria in the Sipoholon hot water source, Tarutung which is capable of producing thermostable lipases. Based on the previous description, a study will be conducted on "Isolation and Screening of Lipase Enzymes from Thermophilic Bacteria in the Sipoholon Tarutung Geothermal Area, North Sumatra".

1.2 Formulation of thProblem

Based on the background of the problem above, the problem can be formulated in this study, namely:

1. Are thermophilic bacterial isolates from Sipoholon-Tarutung Hot Springs capable of producing lipaseenzymes?
2. How is the macroscopic and microscopic thermophilic bacteria that have the potential to produce lipase enzymes from Sipoholon-Tarutung hot springs?

1.3 Purpose of theResearch

The objectives in this study are:

1. To obtain and isolate thermophilic bacteria from the producer of the lipase enzyme.
2. To know the macroscopic and microscopic thermophilic bacteria that have lipolytic potential from Sipoholon-Tarutung hotsprings.

1.4 Benefits of theResearch

The expected benefit of this research is to add a collection of thermophilic bacteria producing thermostable lipase enzymes, to obtain the character of thermophilic bacterial isolates from Sipoholon-Tarutung hot springs and to contribute to science especially in the fields of Microbiology andEnzymology.