CHAPTER I

INTRODUCTION

1.1 Background

Nowadays, with advanced technology, people tend to eat something which is not only delicious but also has good nutrition and gives a positive impact on the human body. Many carbohydrate foods on the market are very quickly digested and absorbed in the body. When the foods are quickly digested it will promote increasing the blood glucose and insulin levels which can contribute to many diseases such as diabetes and cardiovascular disease. Therefore, people are more likely to consume food which provides satiety with low calories and low glycaemic index. The important component that can promote the number of the glycaemic index in the carbohydrate foods is starch (Woodruff and Saudek, 2005).

Starch can be classified into three types based on their digestibility: Rapidly Digestible Starch (RDS), Slowly Digestible Starch (SDS), and Resistant Starch (RS). RDS and SDS are starch that can be absorbed in the human small intestine. While resistant starch is the number of starch that cannot be absorbed in the small intestine of healthy human. Resistant starch does not contribute to the blood glucose level. Therefore, the number of resistant starch contained in the food is become consideration due to both its potential health benefits and functional properties. The amount of resistant starch in the food can be produced by various modification such as physical, chemical, and enzymatic modification

(Hung, *et al*., 2014; Setiarto, 2015).

According to Hung *et al.,* (2015), the physical modification techniques such as heat-moisture treatment are known to changes the physicochemical characteristic of starches, such as increase gelatinization temperature, decrease granular swelling, increase granular stability, decrease viscosity which it is improve water binding, without destroying their granular structure. The annealed starch showed resistance to the enzyme digestion and the starch is increased enzymatic susceptibility by reducing the relative crystallinity (Chung, *et al.,* 2010).

Roots and tubers are part of the world's food supply which approximately 55 percent of the production is consumed as food. Taro (*Colocasia esculenta*) is one of the potential tubers that can be used as the source of functional food (FAO, 1999). Bogor taro is one of the local resources of roots and tubers in Indonesia with the production up to 1.1340 ton in 2016 (Bappeda, 2017). However, in Indonesia, Bogor taro is a minor crop, thus the utilization of Bogor taro is still low. It is commonly utilized as a snack such as chips. Besides snack, it can also be used as the raw material of flour and starch production. Bogor Taro starch is easy to be digested to become simple sugar with the help of alpha-amylase in the body (Ariyanti, *et al*., 2014). Bogor taro has a potential used as the source of high resistant starch since the starch content in the Bogor Taro is high (Setiarto, 2015).

1.2 Research Problem

Bogor taro is one of the potential tubers which can become the source of food supply. The production of Bogor taro is high, however the development of

Bogor taro is limited. The tubers of Bogor taro can be utilized as snack and flour which mainly consist of starch. One of the important parts of starch is the resistant starch. Resistant starch becomes a consideration and as the important part since it can reduce the glycaemic index and blood glucose level which will be beneficial for the diabetic patient and can reduce the risk of diabetes for healthy people. Due to this reason, the starch form Bogor taro can be classified as functional ingredients.

However, RS content in the natural taro is considered as low (3.5-4.0%). Therefore, physical modification such as hydrothermal methods is needed to produce Bogor taro as functional ingredients. This research is focused on producing the highest resistant starch by using combination of different initial moisture content and heating temperature and by using different heating time.

1.3 Objectives

1.3.1 General Objectives

The general objective of this research is to investigate the physicochemical characteristics of physically modified Bogor taro starch and to increase the resistant starch content of Bogor Taro starch.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To investigate the combination of moisture content and temperature on the gelatinization enthalpy (ΔH) of Bogor Taro starch
2. To investigate the heating time on the gelatinization enthalpy (ΔH) of Bogor Taro starch

3. To study the physicochemical characteristics (amylose and amylopectin content, solubility and swelling, viscosity, color, and DSC profiles) and the resistant starch properties of the modified Bogor taro starch