

# CHAPTER I

## INTRODUCTION

### 1.1 Background

Banana, being one of the most important Indonesian commodities, has a high rate of productivity. On the year of 2012, the amount of national banana production reached 5.4 million tons (Horticultural Department Indonesia, 2013). Square banana (*Musa balbisiana colla*), is a wild type of banana which contains lots of seeds. Usually this banana is unpleasant to be eaten or further processed due to the enormous amount of its seeds and therefore its utilization as a food ingredient is still limited. Despite of its limitations, according to research by Palupi (2012), square banana flour's dietary fiber content was significantly the highest as compared to *Ambon* banana flour, *tanduk* banana flour and *kepok* banana flour. Square banana was also found to be used in *Nata* production (Widyawati, 2008).

In addition, the daily intake of dietary fiber of Indonesian people is low, which is 10.5 grams per capita per day where the recommended daily intake (RDI) for dietary fiber is 25-30 grams per day (Puslitbang *Departemen Kesehatan* (Depkes) RI, 2013). Foods which are fortified with dietary fiber were reported to be able to lower the serum cholesterol level (Kirby *et al.*, 1981) as well as giving a protective effect against colon cancer, coronary heart disease, constipation as well as obesity (Burkit, 1971; Marlett, 2001; Pereira *et al.*, 2004). Lacking of dietary fiber supply might be the cause of increasing cases of obesity amongst Indonesian people.

There are several researches which have similar idea of incorporation of banana flour as a source of dietary fiber in food products, such as the research done by Martinez *et al.* (2009) which used unripe banana flour as an ingredient in pasta making. There is also a research done by Nurdjanah *et al.*, (2011) on the characteristics of chocolate biscuit prepared from square banana flour and wheat flour, as well as research by Loypimai and Moongngarm on the utilization of pre-gelatinized banana flour as a functional ingredient in instant porridge (2013) which focused on the same idea.

Cookies, which is a small baked goods made principally from flour, sugar and fat, is one of the products which is highly in demand by Indonesian people given that the average consumption rate of cookies in Indonesia is 0.4 kg/capita/year (Rosmisari, 2006). Cookies are usually made from wheat flour which contains gluten. Gluten is a group of protein found in wheat, rye and barley. Proteins in the gluten group give chewiness and stretchiness characteristics to particularly baked goods and pasta. Coeliac disease is a chronic inflammatory intestinal disease as a result of gluten hypersensitivity. Until now, the exact numbers of people who are suffering from coeliac disease in Indonesia is still not known, however it is expected to be approximately 1:100 (Fadhli, 2010). People with coeliac disease have limited options for food, as gluten containing food is highly restricted from the diet. Therefore, people with coeliac disease are unable to enjoy cookies unless the cookies are made gluten free. Mocaf (modified cassava flour) is often used as wheat flour substitute in gluten free cookies production. With the high demand for cookies, it was often made sugar free with the purpose of reducing its calorie and preventing dental

carries. Maltitol and Acesulfame-K was found to deliver cookies with the similar characteristics as the ones made from sucrose (Zoulias et al, 2000).

Since banana flour contains higher values of carbohydrate and dietary fiber content as compared to wheat flour or legume flours (Satuhu & Supriyadi, 1990) and it is one of the local commodities which is abundantly produced and free of gluten, therefore the incorporation of its flour in a modified cassava based gluten free cookies may bring a significant advantage in terms of dietary fiber intake.

## **1.2 Research Problem**

Square banana contains higher fiber as compared to several other banana species, however it is rarely consumed as other banana cultivars does, due to its massive amount of seeds which is unpleasant. Dietary fiber consumption in Indonesia is still very low and this could lead to several diseases like constipation, colon cancer, and obesity. Wheat-flour based cookies, which is more common to be sold in the market is restricted from the diet of the people with coeliac disease due to its gluten content in the wheat flour. Therefore, the utilization of square banana flour into cookies may help to solve these problems.

## **1.3 Objective**

### **1.3.1 General Objectives**

The general objective of this research was to develop the incorporation of square banana (*Musa balbisiana*) flour into modified cassava flour in the making of reduced calorie-gluten free cookies.

### 1.3.2 Specific Objectives

The specific objectives of this research were:

- 1) To observe the distinguishability between control cookies made with sucrose and cookies made with combination of maltitol and acesulfame-K with the same sweetness intensity.
- 2) To observe the effect of anti-browning pre-treatment methods of square banana flour and its ratio which incorporated with modified cassava flour towards physical characteristics (yield, hardness, dimension and color), and chemical characteristic (moisture content) of the cookies produced.
- 3) To determine the most preferred anti-browning pre-treatment of banana flour and formula of cookies made from square banana flour incorporated with modified cassava flour based on panelists preferences
- 4) To evaluate the nutrition composition of the most preferred cookies.