CHAPTER I

INTRODUCTION

1.1 Background

Gluten was a protein which found in cereal flours, including wheat, barley and rye which had been kneaded and water added and processed into dough. Gluten was responsible for the structure and shape of baked goods which made the baked goods to had good elasticity and caused the dough to rise because of the ability to trap the carbon dioxide that occured during fermentation (Heller, 2009). Besides of the important role in baked goods, gluten was also considered as harmful compound which can trigger celiac disease which was an auto-immune disorder condition where abnormalities of the jejunal mucosa on the celiac disease body which would suffered several symptoms including abdominal cramping, bloating, gas and constipation.

Cookies was increasingly consumed due to its tasty flavor, convenience to consume and could be consume by very wide range old of people started from young until elder. Cookies was made from soft dough and contain high fat percentage. Actually, cookies contain high in carbohydrate and fat but not on dietary fibre. Cookies that are sold in the market contain less than 1% of dietary fibre (Nutrition Data, 2014).

Corn flour or maize starch was the flour that milled from corn. Corn flour could be used as gluten-free baked product flour since corn flour contain low in protein that cause gluten was not formed during kneading and water adding to the

flour. Corn flour also could gelatinized at certain temperature when water added and heat applied on the flour. Actually, gelatinized corn flour give no any contribution on baked products characteristics especially on the sandiness texture which in previous research by Poerwoko (2012) that corn flour did not give any significant effect to the texture of the corn flour cookies produced .

Dragon fruit or Pithaya fruit was increasingly consumed and popular due to its attractive color of the fruit and flesh. Dragon fruit consist of three different species which differentiated by the pulp and peel color. Dragon fruit were reported to contain rich in antioxidant, including vitamin E and vitamin C, and polyunsaturated fatty acid which is beneficial for human. Nowadays, dragon fruit were getting more popular for processing fruit production utilization in producing beverages, jams, and candied fruits. The increasing of dragon fruit consumption and utilization were resulting also in increasing the by-product of the fruit. One of the by-product of dragon fruit was the peel which represent approximately 33% of the total fresh fruit weight (Amid *et al*., 2014). Dragon fruit peel was a functional waste which contain around 70-80% of total dietary fibre of the total peel weight. Besides dietary fibre, dragon fruit peels were also contained high in natural antioxidant (Zhuang *et al.*, 2012).

Indonesia also known as that the country with low dietary fibre intake which reported by Chairunisa (2007) stated that Indonesian people only consume dietary fibre around 10.5 grams per capita per day which comparing to the recommended daily intake or RDI, recommended dietary fibre intake was around 25-30 grams per capita per day. Further research also predicted the increasing patient of celiac

disease whose cannot consume gluten containing food due to autoimmune disorder in Asia-Pacific Region, including Indonesia. According to Saturni *et al*., (2010), gluten free diet could also cause low in dietary fibre content due to removal of cereal including wheat, barley, and rye which in conclusion celiac disease whose low intake in gluten might cause the dietary fibre intake decrease. Therefore, there was an opportunity to utilize the dragon fruit peel as the dietary fibre sources for production of gluten-free baked product as functional food which was expected to improve the dietary fibre intake for the baked product consumer and for people with celiac disease.

1.2 Research Problem

Indonesia was also known as the country with low dietary fibre intake as suggested in the recommended daily intake. Dietary fibre usually obtained from green leafy vegetables and fruits. Insufficient intake of dietary fibre could lead to several diseases such as diverticulitis, coronary heart disease, colon cancer, atherosclerosis, and diabetes. On the other hand, celiac disease was increased in much number which also known to less intake of dietary fibre due to the gluten removal diet. Moreover, there is also a need for gluten free material such as corn flour to be utilized in gluten free baked product for people who have problems with gluten ingestion or celiac disease. On the other hand, the popularity growth of dragon fruit in Indonesia result in increasing the dragon fruit by-product. This fruit waste had potential utilization as the nutritional source to be applied in the food product where parallel with the increasing of functional food demand. On the other hand, cookies that are sold in the market does not contain much dietary fibre content

to be the sources of dietary fibre. Therefore, the utilization of dragon fruit peel as the dietary fibre sources for baked product application such as cookies were expected to bring positive impact in terms of dietary fibre intake. However, there were still lack of research about the utilization of dragon fruit peel as the dietary fibre source for gluten-free cookie as functional food product application. Therefore, this research was conducted to study the blanching and drying temperature factors and impact of the dietary fibre affecting to the cookie characteristics.

1.3 Objectives

1.3.1 General Objectives

The general objective of this research was to research about the incorporation of red dragon fruit-peel as the source of dietary fibre to the gluten-free cookie product.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To determine effect of blanching methods to produce red dragon fruit-peel flour.
2. To determine effect of drying temperature to produce red dragon fruit-peel flour towards yield, hue degree, dietary fibre, and moisture content; and to select the best peel flour.
3. To determine effect of corn to red dragon fruit-peel flour ratio applied in different gelatinization state of corn flour incorporated in the cookies

production on the physical characteristics (hardness, lightness value, dimension, and dietary fibre content).

4. To analyze consumer acceptance and proximate composition of the best cookies produced.