# CHAPTER I

# INTRODUCTION

## 1.1 Background

The dependency of imported wheat flours has continuously increased with the increasing demand of wheat flour for the production of wheat-flour based food products such as noodle, bread, fried foods and common snacks like doughnuts (Fadilah, 2015), contributing to food security issues. In fact, wheat flour import increase from 6.7 million tonnes in 2014, up to 10.7 million tonnes in the year 2019 (Saajidah and Sukadana, 2020).

The increasing demand of wheat-based food products is due to the change of pattern in the modern citizen which have become increasingly interested in food products that are practical to serve (Fadilah, 2015). At the same time, the society is now increasingly concerned with the healthy aspect of the food products they consume due to an increase of health awareness. Therefore, doughnuts are often portrayed as unhealthy food especially due to its high fat content and the fact that they do not contribute to a lot of nutrients to the diet (Greene, 2004).

Doughnuts, with wheat flour as its largest composition, other than contributing to the continuous increase of imported goods, also has a high fat and is low in fiber (Panjaitan *et al*., 2017). Its high fat content is due to the margarine composition along with the common frying method which absorbs more external fat and contributes to higher total fat (Anwar *et al*., 2006). Various other healthier ingredients which are also local can be utilized in order to produce more nutritious

food products while also implementing food diversification to achieve food security (Panjaitan *et al*., 2017).

Indonesia possesses various kinds of plants that produce starch or carbohydrate-rich raw materials that can be utilized to produce basic food products or snacks. An example is the *iles-iles* plant (*Amorphophallus muelleri* Blume*)*, which is potential to be developed as a raw material, as wheat flour substitute. *Iles-iles*, among other tubers with high economic value potential, is one that has not been widely utilized locally (Kusmiyati, 2010; Jusuf and Ginting, 2014), due to the lack of knowledge within Indonesia citizens to properly process the raw tuber or chips into flour (Saputro *et al*., 2014). Although widely found locally, it is still sold to other countries in the form of chips, as the raw material to produce konjac flour (Panjaitan *et al*., 2017).

The utilization of *iles-iles* flour opens the opportunity to reduce wheat flour imports by using local richness. In addition, *iles-iles* is also beneficial as this tuber has a high dietary fiber content, especially glucomannan, which has many health benefits (Pasaribu *et al*., 2019), and a lower amount of fat compared to those of wheat flour (Panjaitan *et al*., 2017). In fact, *A. muelleri* possess the highest glucomannan among other tubers within the genus Amorphophallus (Wardani and Harijati, 2020).

To produce a healthier doughnut, the margarine was substituted with a healthier alternative from yellow pumpkin (*Cucurbita pepo*) that is comparably lower in fat amount but also has considerable amount of fiber (Arifin *et al*., 2019), and is also a local food material that is widely planted in Indonesia (Lolliani,

2017). As stated in Nuralizah *et al*. (2016), the average production of yellow pumpkin throughout Indonesia ranges from 20-21 tons per hectare; however, the consumption is still very low, being less than 5 kg per capita/year. The high production rate accompanied by the low utilization rate shows that yellow pumpkin is yet to achieve optimal utilization.

In this research, baking method was used instead of frying method to prevent absorption of additional fat. The utilization of both *iles-iles* and yellow pumpkin was expected to help support food diversification program and at the same time, create healthier doughnuts.

## 1.2 Research problem

*Iles-iles* and yellow pumpkin are two of Indonesia's local food materials that are widely produced but have not optimally utilized in the production of food products in Indonesia. The high consumption of wheat-flour based product has caused an increase in wheat commodity import and causes food security issues. Doughnuts are common snack in Indonesia which utilizes wheat flour as its major composition. Doughnuts are generally high in fat and do not contribute much to nutrition. The substitution of *iles-iles* flour and yellow pumpkin is expected to help support food diversification, reduce commodity import and create more nutritious doughnut that is beneficial for health when consumed.

## 1.3 Objectives

### 1.3.1 General Objectives

The general objective of this research was to produce baked doughnut with different substitution ratio of *iles-iles* flour and yellow pumpkin puree.

### 1.3.2 Specific Objectives

The specific objectives of this research include:

1. To process *iles-iles* into *iles-iles* flour and further purify it to minimize calcium oxalate content.
2. To determine effect of different substitution ratios of wheat flour to *purified iles-iles* flour and margarine to yellow pumpkin puree on organoleptic characteristics of baked doughnut; and to select the most preferred formulation of baked doughnut with the most acceptable sensory characteristics.