

# CHAPTER I

## INTRODUCTION

### 1.1 Background

Chocolate is a popular product that is consumed by almost everyone. It has a distinctive flavor, with many additional health benefits. This is mainly because chocolate contains polyphenols, especially in the form of flavanols that provide strong antioxidant actions (Crozier *et al.*, 2017). Chocolate itself comes from cocoa beans which are the seeds of the *Theobroma cacao* plant. This plant mostly grows in the area of West Africa, South America, and Southeast Asia (Motarjemi and Lelieveld, 2014). Along with technological advances, cocoa beans have now been processed into liquor, butter, and powder which can be applied in various food products such as cakes, candies, drinks, ice creams, and spreads (Beckett, 2011).

Currently, the world demand for cocoa is estimated to increase by 3% per annum. However, this increase could be a problem because some top cocoa-producing countries are experiencing low levels of productivity which led to a decrease in the growth of cocoa supply (Fahmid *et al.*, 2018). According to the International Cocoa Organization (2020), Indonesia as the world's sixth-largest cocoa producer continues to experience a negative trend in cocoa production over the past five years. In 2015, Indonesia produced 320,000 tonnes of cocoa. When compared to its production in 2019, there was a decline of 37.5% to only 200,000 tonnes.

Durian or *Durio zibethinus* L. is a seasonal tropical fruit that is very well known in Southeast Asian countries. A whole durian fruit consists of 30-33% edible flesh and 67-70% non-edible portion. Of that non-edible portion, 20-25% is the seeds (Ho and Bhat, 2015). In recent years, several studies have been conducted to utilize durian waste, especially the seed. This is because a whole durian seed has a lot of potentials due to its composition which contains 51.50% moisture, 43.60% carbohydrates, 2.60% protein, 1.90% ash, and 0.40% fat (Lim, 2012).

Based on the previous study conducted by Wijayahena and Jayaweera (2020), durian seed that undergone a similar cocoa processing step such as fermentation, drying, and roasting can produce flavors with characteristics similar to cocoa powder. This is because the fermentation of seeds encourages chemical changes that support the formation of flavor precursors such as reducing sugars and amino acids. Drying is responsible to facilitate the destruction of the membrane integrity of the seeds, thereby initiating flavor formation (Aprotosoae *et al.*, 2015). During roasting, the formation of flavor components such as pyrazines is getting more intense due to Maillard reactions involving flavor precursors (Afoakwa *et al.*, 2008).

In this research, durian seeds were processed into fermented and unfermented durian seed powders. The fermentation process was done to durian seeds by adding durian pulp and *tape* yeast. The addition of durian pulp was aimed to provide additional substrate for fermentation, while the addition of *tape* yeast was intended to promote a more controlled condition and accelerate the fermentation process. The fermented and unfermented durian seeds were dried and roasted in

the same condition. Roasting was done with combination of various temperatures and times. The resulting powders were applied in the making of brownie to study their sensory characteristics as they might change due to interactions with other ingredients and further processing steps.

## **1.2 Research Problem**

A previous study conducted by Wijayahena and Jayaweera (2020) showed that durian seeds can develop chocolate flavor components in the form of active pyrazines when processed like cocoa. This flavor formation is greatly influenced by fermentation and roasting conditions. In this research, durian seeds are processed into fermented and unfermented durian seed powders. The roasting of durian seeds is done with a combination of various temperatures and times. The characteristics of processed durian seed powders in the baked brownie have not been widely reported. However, interactions with other ingredients and further processing steps are likely to affect their characters in the product. Thus, more studies must be conducted.

## **1.3 Objectives**

### **1.3.1 General Objective**

The general objective of this research was to apply the cocoa powder substitute made from fermented and unfermented durian (*Durio zibethinus* L.) seed to baked brownie.

### 1.3.2 Specific Objectives

The specific objectives of this research were:

1. To determine the best seed roasting temperature in the production of cocoa powder substitute from fermented and unfermented durian (*Durio zibethinus* L.) seed.
2. To determine the best roasting time in the production of cocoa powder substitute from fermented and unfermented durian (*Durio zibethinus* L.) seed.
3. To evaluate the effect of fermentation in the degree of chocolate taste similarity between selected (*Durio zibethinus* L.) seed powders with Natural and Dutch cocoa powders.
4. To evaluate the characteristics of fermented and unfermented durian (*Durio zibethinus* L.) seed powders when applied to the baked brownie.

