CHAPTER I

INTRODUCTION

1.1 Background

Maintaining a healthy lifestyle and immune system is one of the important things to do especially during this COVID-19 pandemic. Compounds like vitamins, minerals, antioxidant and polyphenol can boost the immune system and also give other positive benefits to the body. One of the products where these compounds can be found is in tea (Alagawany *et al*, 2021). According to Khamidah and Antarlina (2020), one of Indonesian people's lifestyle is drinking tea and this can give an opportunity to develop the production of kombucha.

Kombucha is a traditional natural fermented tea created with symbiotic cultures of bacteria and yeast or also called SCOBY that contains beneficial compounds like organic acid, minerals, different vitamins, proteins and polyphenols. Health benefits of kombucha includes antibacterial, anticancer, antidiabetic, reduce cholesterol, improve immune system and reduce blood pressure (Mousavi *et al*., 2020; Jakubczyk *et al*., 2020). A study by Hiremath *et al*. (2002) reported on the effects of fermented tea on the blood sugar levels of 24 subjects aged 45-55 where daily consumption of 60 mL of kombucha for 90 days was proven to normalize blood sugar values with non-insulin-dependent diabetes mellitus. The production of kombucha is mainly using green or black tea where both tea are produced with different processing methods and have different antioxidant and phenolic content. However, according to Jakubczyk *et al*. (2020), different type of

tea, fermentation time, tea concentration and starter concentration may influence antioxidant potential, pH, and alcohol content.

Indonesia is known to be the most important exporter of cacao (*Theobroma cacao* L.*)* in the world where in 2010 Indonesia was the third largest exporter by producing 550,000 tons of dry seeds and around 94% of the cacao planting area is managed by smallholders in Indonesia. The demand of exporting cacao seeds from other countries is getting higher (Rubiyo and Siswanto, 2012). On the other hand, in the cultivation of cacao plant, leaf trimming must be done (Supriyanto *et al*., 2014). According to DPKP (*Dinas Pertanian dan Ketahanan Pangan*) Jogjakarta (2021), the cacao leaves trimmed is used as animal feed and organic fertilizers. Therefore, cacao leaves has not been fully utilized.

Cacao leaves contain alkaloids like theobromine, caffein, anthocyanin, leucoanthocyanin and catechol. They also contain polyphenols like epicathecin, epigallocatechin gallate, epigallocatechin, gallic acid and epicatechin gallate. Caffeine content and total polyphenols of cacao leaves are higher than *Camellia sinensis* green tea leaves. Cacao leaves also contain selenium which is essential for the growth of humans and even animals (Supriyanto *et al*., 2014; Hassan *et al*. 2004).

A research made by Supriyanto *et al*. (2014) concluded that cacao leaves can be used as a refreshing beverage where cacao leaves were utilized to make tea. The result shows that the most preferred tea was made from cacao leaves withered for 10 minutes and it has very brown colour, slight leaves aroma and slightly bitter and astringent taste. The total polyphenol ranges from 0.42 to 74 mg/100g which is lower than the commercial *Camellia sinensis* green tea that is tested and the

antioxidant activity ranges between 20.31 to 36.86% which is higher than the tested commercial *Camellia sinensis* green tea. Another research is made by Hidayana and Kusuma (2017) where cacao leaves were utilized to produce kombucha based on fermentation time. 50 grams of green tea leaves are brewed in 1 litre of water and let cool before adding the mother tea. Then, it is fermented for 7 and 14 days. The cacao tea leaves are made using green tea processing method and it was concluded that the highest antioxidant activity of cacao leaves kombucha was obtained after fermentation for 14 days and was higher than green tea. Therefore, this study was done to determine the best tea processing method to make cacao tea leaves and to determine the best tea and mother tea concentration and fermentation time to make kombucha from cacao leaves (*Theobroma cacao* L.).

1.2 Research Problem

Indonesia is one of the biggest exporter of cacao. In the production of cacao seeds, cacao trees is trimmed therefore producing waste such as cacao leaves and branches. Cacao leaves has many components like antioxidant and polyphenols that can be utilized as food products and is beneficial for the human body. However, until the present days, cacao leaves has only been utilized as animal feed and organic fertilizers in Indonesia.

Kombucha is a fermented tea beverage which has many beneficial components and health benefits. It is mainly made from green tea and black tea. Green tea and black tea is made with different processing methods and has different antioxidant and phenolic content. Cacao leaves has the potential as a main ingredient to produce food products like tea and kombucha. But there are no studies

that have been done to produce kombucha from cacao leaves with different ratio of cacao leaves tea and mother tea concentration. Other than that, fermentation leads to the formation of organic acids and formation of chemical components in kombucha. Therefore, different tea and mother tea concentration and fermentation time can affect the physicochemical and sensory properties of kombucha. The utilization of cacao leaves can increase food diversity in Indonesia.

1.3 Objectives

The objectives of this study was divided into general and specific objectives.

1.3.1 General Objectives

The general objective of this study was to utilize cacao leaves to produce kombucha with different tea concentration and fermentation time.

1.3.2 Specific Objectives

The specific objectives of this study were:

1. To determine the best tea processing method of cacao tea leaves based on its physicochemical properties.
2. To determine the best ratio of cacao leaves tea and mother tea concentration and fermentation time to produce kombucha with the preferred physicochemical and sensory properties.