CHAPTER I

INTRODUCTION

1.1 Background

Coffee was globally consumed as a refreshment. The consumption of coffee increases every year, with a minimum of 1.8% increase (ICO, 2020), making it a prideful commodity after petroleum in terms of trading and money values (Kurian and Peter, 2007). This popular beverage was known for the aroma and stimulant action and is enjoyed worldwide. *C. liberica* and *C. excelsa* are the two infamous coffee species aside from the *famous C. robusta* and *C. arabica*. Great varieties of coffee beans are widely cultivated in Indonesia including *C. liberica* and *C. excelsa*, as the climate in Indonesia supports the growth of these coffee beans. *C. liberica* are best grown in warm equatorial forest in which Jambi and Malang both possess (Waller, 2007; Shukla, 2020). *C. excelsa* are tolerant to drought whereas Batam and Aceh relatively has lower humidity, making it suitable to grow the typical coffee (Susandi, 2019; Rahmayani, 2015; Lubis *et al*, 2017). *C. liberica* is known to have traits of jackfruit aroma and taste, while *C. excelsa* has a bitter, sour and astringent taste (Illy, *et al*, 2005). These two coffee beans species are not well utilized as beverage and is overshadowed by the more popular traits of *C. robusta* and *C. arabica* coffee beans. The consumption of coffee is highly related to multiple health benefits such as precenting type 2 diabetes, cancer, liver diseases and other forms of cardiovascular disease (Pham and Preedy, 2015).

Fermentation was traditionally the solution to preserve and enhance the shelf-life of perishable food products. The evolution of fermented food and

beverage was highly developing, especially in the past few years. It contributes to the diet of industrialized countries, as the products are equally essential for nutrition in developing countries, such as Indonesia (Hasan *et al*.,2014).

There are wide range of fermented beverage. One of the most popular fermented beverage is wine. Wine derives from fermented grapes and are generally classified as alcoholic drink. 66% of the world grape production are made into wine (Jackson, 2020). Excessive consumption of wine may lead to serious cardiovascular disease. However, there are notable health benefits wine brings to the human body. Flavonoids of wine acts as antioxidant that promotes protective abilities against chronic heart diseases, anti-inflammatory and anti-hypertensive traits. Resveratrol, a non-flavanoid compound in wine is also known to treat cardiovascular disease, cancer, moreover prevents hypertension, stroke and heart failure (Haseeb *et al*, 2017).

Amongst the many popular fermented beverages, fermented coffee beverages are not very common or widely recognized. Fermented coffee beverages are coffee-based beverages that underwent yeast or lactic acid bacteria fermentation. The fermentation helps produce new aromas and flavors that masks the harsh flavor of coffee and create a new refreshing coffee-based beverage (Milo and Duboc, 2003). One example of these fermented coffee base beverage is coffee kombucha. Coffee kombucha utilizes “tea fungus” which is a starter culture made from a mixture of lactic acid bacteria and yeast. The tea fungus utilizes the sugar and any fermentable carbohydrates in the coffee as substrate. Fermentation of coffee this way produced coffee that is low in pH, high in caffeine and dark-colored coffee beverage (Watawana *et al*., 2015).

In this study, the utilization of *C. liberica* and *C. excelsa* coffee beans as fermented beverage is done to increase its utilization as well as studying the organoleptic acceptance of coffee-based fermented beverage that is rarely found in the market. According to a patent from the United States, fermentation in coffee beverages resulted in a product with floral and fruity aroma and is overall more favorable in terms of flavor and aroma (Milo and Duboc, 2003). The coffee beans used in this study are *C. liberica* from Jambi and Malang and *C. excelsa* from Batam and Aceh coffee beans. Furthermore, the effect of different yeast and sugar concentrations as well as different fermentation time on the physicochemical and organoleptic properties of the fermented coffee beverage was also studied.

1.2 Research Problem

C. liberica and *C. excelsa* coffee beans were often neglected by coffee producers and consumers due to its lack of fame and less desirable flavor. The utilization of these coffee beans in fermented coffee beverage may support the cultivation of these beans and increase its use in the food industry. The fermentation process is essential as it greatly affects the physicochemical and organoleptic properties of the coffee beverages. Factors like concentrations of yeast and sugar, as well as fermentation time will contribute to the final flavour characteristics. Fruits and cereals are often the raw materials used in the production of fermented beverage. As mentioned before, the use of coffee as the base of fermented beverage is still uncommon. The complexity of flavor in coffee offers potential in exploring coffee as the basis of fermented beverage. Since limited information can be found on fermentation of coffee beverage, the sugar concentration, yeast starter

concentration, fermentation time and coffee beans origins appropriate for fermented beverage production need to be studied.

1.3 Objectives

1.3.1 General Objectives

The general objective of this research is to utilize *C. liberica* and *C. excelsa* coffee beans in the making of fermented coffee beverage.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To determine the most preferred yeast and sugar concentrations for fermentation of coffee beverages based on organoleptic properties, pH, total soluble solids and alcohol content of the fermented coffee beverage.
2. To determine the most preferred coffee beans origin and fermentation time based on the organoleptic properties, pH, total soluble solids and alcohol content of the fermented coffee beverage.