

Chapter 1

Introduction

1.1 Background

A fruit originating from Mexico called black sapote (*Diospyros digyna*) is one of the members of the Ebenaceae family with various medicinal properties (Jiménez-González & Guerrero-Beltrán, 2021). The taste of black sapote is slightly sweet with a soft texture similar to chocolate pudding (**Figure 1**). Black sapote is widely cultivated in Mexico, central America, the Caribbean and Colombia however it is rarely found outside mentioned countries. This fruit has high antioxidant activity because of its varying phenolic compounds and micronutrients. The high antioxidant activity can reduce the blood sugar level for type 2 diabetes, decrease fever and have laxative effects. However, the application of black sapote fruit is limited as a food ingredient since it's an uncommon fruit in countries outside Mexico, especially in Indonesia and the price is expensive. In Indonesia, black sapote is rarely cultivated and the price is in the range of Rp. 150,000 to Rp 300,000 per kilogram which is considered as expensive fruit. The black sapote as a climacteric fruit can take up to 18 days to ripen but the over ripened fruit is difficult to sell due to its unappealing appearance. Processing black sapote into kombucha is one of the solutions to minimize the food waste of over ripe black sapote.



Figure 1. Black Sapote Fruit (source: google images).

Kombucha is a type of fermented beverage usually made out of tea that is fermented by using a Symbiotic Culture of Bacteria and Yeast (SCOBY) (**Figure 2**). The SCOBY for tea fermentation contains acetic acid bacteria, lactic acid bacteria, and yeasts (de Miranda et al., 2022; Kapp & Summer, 2019). The fermentation of kombucha results in a unique sour and fizzy flavor and can be made with three simple ingredients namely tea, sugar, and a SCOBY. In order to enhance the flavor of kombucha, exotic fruit juices such as mango, orange, passion fruit, peach and apple may be added to kombucha (Kim & Adhikari, 2020). Moreover, the quality characteristics of kombucha were assessed by the physicochemical, microbial and sensorial properties. The main parameter to be analyzed is pH, brix, and total acidity content. Sweetness level (brix) plays an important role in the end product of kombucha. The brix level affects the fermentation rate where higher brix level results in lower pH, higher acidity content and darker color. Other than that, higher acidity content affects the sensorial property of kombucha which has a sourer taste. The taste preferred by most customers is tart with a slightly sweet taste.



Figure 2. Kombucha Drink (*source: google images*).

Functionally, black sapote has a high fruit flesh to seed ratio, sugar and water content, making it suitable for juicing and kombucha fermentation. In terms of the micronutrient and health benefits, black sapote is packed with antioxidants and enhancing its nutritional values is a great way to create a novel functional drink. With the abundance of black sapote fruits and the minimum research as well as processing methods on this fruit, this study provides a potential product development idea to utilize

black sapote in Indonesia. It is important to do study about producing Kombucha drinks using black sapote since the kombucha in the market is only made out of tea and the incorporation of this fruit gives a variety of flavor. In addition, the black sapote kombucha is also an innovation in the beverages industry.

1.2 Objectives

The objectives of this study are to:

1. Evaluate the effect of different fermentation time on the pH, brix, antioxidant and microbial population of black sapote kombucha.
2. Compare the pH, brix, and antioxidant activity of black sapote kombucha with commercial kombucha

1.3 Hypothesis

The hypothesis of this study is:

1. **H₀ (null hypothesis):** There are no significant differences in the pH, brix, antioxidant activity, and microbial population from the different fermentation time of black sapote kombucha.

H₁ (alternative hypothesis): There are significant differences in the pH, brix, antioxidant activity, and microbial population from the different fermentation time of black sapote kombucha.

2. **H₀ (null hypothesis):** There are no significant differences in the pH, brix, and antioxidant activity between black sapote kombucha and commercial kombucha.

H₁ (alternative hypothesis): There are significant differences in the pH, brix, and antioxidant activity between black sapote kombucha and commercial kombucha.