Chapter 1

Introduction

1.1 Introduction

Sorghum is considered to be one of the main cereal grains produced worldwide. In the United States, sorghum is usually utilized as animal feed. However, in semi-arid areas of Asia and Africa, sorghum is used for human consumption due to its plant resistance to drought (Xu et al., 2021). In Indonesia, some parts of the country already started to produce Sorghum to provide food and animal feed requirements (Pujiharti et al., 2022). This creates a possibility of sorghum utilization as a food product in the Indonesian Market.

In most countries, sorghum is usually used as an alternative for other staple crops such as corn. It is also used as a food alternative due to its gluten free nature and high phenolic content (Xu et al., 2021). Other than that, sorghum is also considered to be high in carbohydrate, protein (10%), fiber, and a rich source of amino acids (U.S Department of Agriculture, 2019). However, a large portion of components that are contained in sorghum is the presence of tannin (0.10 to 3.6%), which is an anti-nutrient that inhibits and decreases the absorption of protein and minerals during consumption (asropi et al 2022). Tannin also reduces palatability of the product due to its bitter taste (Onyango et al., 2013). Therefore, reduction of tannin is a necessary procedure to increase the effectiveness of nutrient absorption and the palatability of sorghum-based products. One of the possible methods that can be used to reduce tannin content is through fermentation (Onyango et al., 2013)

The process of fermentation mainly uses sugars as the main food source for the fermentative organism to grow. However, certain bacteria could also produce enzymes to utilize other chemical component as food source during the fermentation process. The metabolism process of tannin during the fermentation is described as follows: certain fermentative bacteria are able to produce tannase

enzyme, which degrades tannins into glucose and gallic acid. This glucose is then further utilized as a food source during the fermentation (Ananda et al., 2019). As the tannin content is reduced, the availability of protein to be absorbed upon consumption can be increased. However, as the process of fermentation utilizes fermentative bacteria, which makes the product prone risks of overfermentation and spoilage (Çopur et al., 2019). one way to preserve this kind of product while maintaining the nutritional component is by drying. Despite that, depending on the drying method used, the functional nutritive components are at risk of heat degradation as drying utilizes heat to vaporize water from the product. Therefore, to maintain the availability of these nutrient upon drying, drying technique such as the spray drying process with the addition of encapsulating agent are suitable to be used.

Spray drying is a relatively quick and simple drying methods used for beverages such as fruit juices. The principle of spray drying is basically the rapid drying of atomized droplets of liquid with high temperature air (Piñón-Balderrama et al., 2020). This creates a dry powder of the product with minimized exposure to heat and thus reduces the chance of heat degradation (Piñón-Balderrama et al., 2020). To further ensure the retainment of the nutritive component, an encapsulating agent such as maltodextrin are used to further protect or coat those components and prevent it from degradation by heat (Piñón-Balderrama et al., 2020).

Based on the reasons stated above, the assessment of kombucha products made from red sorghum is beneficial to be researched because of the several benefits that it could potentially present. Some of those is the increased nutrient uptake upon consumption to combat nutrient deficiency. Other than that, the compact and dry powder form may assist in the prevention of any alteration caused in the product due to microbial activity.

1.2 Objective

Based on the introduction above, the objective of this research includes:

- Produce a kombucha drink using red sorghum flour and SCOBY culture.
- To assess any protein content change in the final product of red sorghum kombucha dry powder.
- To assess any tannin content change in the final product of red sorghum kombucha dry powder.
- To assess any pH change in the final product of red sorghum kombucha dry powder.
- To assess the suitability of red sorghum flour as a substrate ingredient for kombucha through the analysis of microbial content of Kombucha.

1.3 Hypothesis

The hypothesis used for this research includes:

Hypothesis for protein content:

H0: the production of kombucha drink into a dry powder does not have an effect on the protein content.

H1: the production of kombucha drink into a dry powder does have an effect on the protein content.

Hypothesis for tannin content:

H0: the production of kombucha drink into a dry powder does not have an effect on the tannin content.

H1: the production of kombucha drink into a dry powder does have an effect on the tannin content.

Hypothesis for pH:

H0: the production of kombucha drink into a dry powder does not have an effect on the pH.

H1: the production of kombucha drink into a dry powder does have an effect on the pH.

Hypothesis for microbial content:

H0: there is no significant difference between the microbial count from day 0 and day 7.

H1: there is a significant difference between the microbial count from day 0 and day 7.