Chapter 1

Introduction

1.1 Background

The demand for food has increased along with population growth. The issue of food loss and waste (FLW), where food that is still edible is going to be thrown away, is a problem linked to food insecurity. Worldwide, around 31% of waste is generated, including 17% in food service, home, and retail, and 14% in production and distribution, totaling over 1 billion tons of FLW each year. From an economic perspective, this is equivalent to IDR 213-551 trillion (Aaron & Budiman., 2025). According to this data, Indonesia is the country that contributes the most food waste, second only to the United States. The majority of this waste consists of leftover fruits and vegetables (Manrich, A., 2024).

Apples are the most important fruit produced worldwide after bananas and watermelon, making them the third most important fruit. The apple is a fruit cultivated in tropical, temperate, desert, and subtropical environments (Chen et al., 2021). According to the USDA, in 2023-2024, apples were harvested in around 84 tons. China accounts for 57% of global production. Both fresh and processed apples are commercially produced; all seeds, stamps, pulp, and peels are often discarded as byproducts (Iqbal et al., 2021). Apple byproducts are leftover materials produced during apple processing that are improperly handled. This could be considered unwanted, damaged, or discarded fruit (Sahd et al., 2023).

Apple fuji is an imported fruit, which needs a long international supply chain to reach Indonesian ports and be distributed. Within this time of supply chain, usually the apple becomes rotten having

bruises that damage the skin which will be rejected from the supermarket. An imported apple like apple fuji are coated with wax to extend the shelf life of the apple, act as the moisture retention, and pathogens shield. The public's perception that apple skins should be peeled off and thrown away may be strengthened by the existence of this wax. From this case it can result in a significant amount of food waste.

Apple contains fiber, vitamin C, and minerals, and is rich in nutrients. Apples also have a wide range of phytochemicals, including antioxidants, flavonoids, and polyphenols. Apple peel is beneficial due to its high levels of flavonoids, and phenolic compounds, which act as natural antioxidants. These antioxidants help protect the body from oxidative damage caused by free radicals and can also reduce the risk of chronic diseases such as cancer, heart disease, and diabetes.

Using agricultural waste, like apple peels, is an essential step toward sustainability in such situations. Apple peels contain valuable nutrients and bioactive substances that can be used to make products such as apple peel tea, rather than being discarded as waste. In addition to potentially lowering the country's FLW rate, this trash-processing program provides economic value to a previously underutilized resource.

One of the oldest ways to preserve the vegetable and fruits from decaying is by drying them. The principle of drying is to reduce the water activity, which can cause the food to deteriorate by a deteriorative chemical reaction and inhibit microbial growth. When the food is dried, it is critical to minimize the components that can cause the dried product to deteriorate and to increase the inactivation of microorganisms and enzymes to prevent spoiling and improve safety.

From the previous study, there are a lot of studies that have been conducted. Based on Sari & Hardiyanti (2013) has been conducted from dragon fruit peels as the tea infusion. According to Alibas

et al. (2020) the study is using green apple *Mallus communis* L. var. "Granny Smith. Another study from Henríquez, C et al. (2010), analyzes phenolic compound degradation during drum drying of apple peel byproduct. While this study focuses on different types of apples, which include apple fuji and also focuses on the physiochemical and biological quality changes on apple peel tea during the storage period.

1.2 Objective

The objective of this study is to assess the differences in drying methods affecting and stability of physical and antioxidant properties in the apple Fuji tea.

1.3 Hypothesis

H0: There is no significant difference between dehydrator and oven drying on the stability analysis

H1: There is a significant difference between dehydration and oven drying on the stability analysis.

H0: There are no significant changes in quality during the storage period of dried apple peel tea.

H1: There are significant changes in quality during the storage period of dried apple peel tea.