

CHAPTER I

INTRODUCTION

1.1 Background

Indonesia is a country which has various flavors of foods due to the variety of herbs and spices. A lot of them can fruitfully grow in the soil of Indonesia. One of the famous spices is ginger. Instead of Indonesia, ginger is one of the most widely used spices used by people all around the world. It can grow in tropical and subtropical countries. Ginger can be traded in the market as ginger powder, ginger oleoresins, ginger oil, and processed ginger (Ravindran, 2017).

Ginger (*Zingiber officinale* Rosc) is one of the spices commodity and medicine which is applicable to various kinds of products due to its good and specific taste and aroma. The usage for health is improving digestion, increasing appetite, strengthen the stomach and prevent the infection. Ginger is also very beneficial due to its high antioxidant content (Yuliani and Kailaku, 2009). According to Sudarsono and Yuswanto (2010), small white ginger has antioxidant value (IC₅₀) up to 13.70 mg/mL which is categorized as high.

There are three types of ginger being developed and cultivated in Indonesia based on its color and size of rhizomes, they are *jahe gajah* (big white ginger), *jahe merah* (red or blue ginger), and *jahe emprit* (small white ginger) (Wiedhayati, 2016). There are numbers of compounds in ginger which are bioactive and contributed to odor, taste, and pungency. Among all of ginger type, *jahe gajah* is the best type of ginger which is approachable and can be added in food and beverages. The pungency of fresh ginger comes from gingerol. Gingerol is the main

compound in fresh ginger, while shogaol and zingerone are the derivatives of processed ginger. Paradol will give hot sensation to the mouth, while zingiberene is one of the components in volatile oil which contributes to odor (Setyawan, 2002).

Until now, ginger is still used as ingredients for many Indonesian food and beverages. A lot of small industries in Indonesia still applies traditional technique to produce the ginger powder. Fresh ginger is generally processed to be ginger powder because it has short shelf life and the sprout of fresh ginger is easy to grow. Ginger can be dried by sun drying in a single layer at open yard until brown color is obtained. Dried ginger is shown by irregular wrinkled surface dry ginger which shows dark brown color (Jayashree *et al.*, 2014). Another way, people use traditional stove and pan, boil the ginger solution with high temperature, and stirred manually until the instant powder obtained. This condition can cause flavor loss during production process (Apriyana *et al.*, 2017).

According to Jayashree *et al* (2014), drying of ginger usually leads to loss of volatile oil compound by evaporation and this loss could be as high as 20% during sun drying, there must be optimum drying method to retain more volatile oil. Nowadays, there are several drying method which are more beneficial, effective, and prevent least compound loss in ginger. The drying method can be done in solar drying and mechanical drying. Solar drying covers open sun drying and sun screen, where mechanical drying covers oven and cabinet drying. Sun screen is similar with open sun drying, but there is white screen to covers the product and not directly exposed to sunlight. Oven is directly heating the product

using hot steam air. While in cabinet drying, the air is indirectly heated (Octyaningrum, 2015).

In this experiment, the optimum slicing size and and pre-treatment method (soaking or un-soaking) were determined. The optimization of solar and mechanical drying methods were also determined due to the optimum flavor and antioxidant activity of ginger powder had not been achieved. The aim was to have optimum flavor and antioxidant activity. The optimum flavor can be seen when its sensory acceptability by hedonic test has been fulfilled.

1.2 Research Problem

Ginger is one of the traditional spice which is involved in Indonesian food ingredients. It has various compounds (gingerol, shogaol, zingiberene, and zingerone) which contribute to flavor and antioxidant activity of ginger. Due to its relaxing aroma and taste, ginger is also often enjoyed for refreshments by dissolving ginger powder in warm water (Fatonah and Wijaya, 2011). Unfortunately, the producers do not give attention to the flavor compounds, as the aromatic compound disappears during processing which requires high temperature.

In the previous research from Jayashree *et al.* (2003), sun drying, solar tunnel drier, and mechanical drying were proved as the drying methods which retain the flavor of ginger. As there is not much information about antioxidant activity, the concern at the effect of drying methods towards antioxidant activity is needed. In this research, the optimum slicing size and pre-treatment method (soaking or un-soaking) were achieved as those factors affect the rate of drying ginger powder. Solar drying (open sun drying and sun screen) and mechanical drying (oven and

cabinet drying) were optimized to determine the optimum drying methods towards flavor and antioxidant activity of ginger powder.

1.3 Objective

The objectives of this experiment were divided into general and specific objective, which are listed below.

1.3.1 General Objective

The general objective of having this research was to optimize the drying methods of ginger to obtain ginger powder with optimum flavor and antioxidant activity.

1.3.2 Specific Objective

The specific objectives of this experiment were:

1. To determine the pre-treatment method and slicing size of the fresh ginger in terms of IC_{50} value and water activity.
2. To determine the optimum solar and mechanical drying method, drying time and soaking time in terms of sensory properties and IC_{50} value of ginger powder.
3. To compared three types of ginger powder obtained from solar drying and mechanical drying method.