

CHAPTER I

INTRODUCTION

1.1 Background

One type of subtropical fruits that receives extra attention among many people in the world is kiwi. Green fleshed kiwi (also known as *Actinidia deliciosa*) is a common kiwi cultivar found in market and mostly available all year round. The characteristics of this fruit attract many people mainly from color, taste and nutritional value. Kiwi carry wide complement of healthy substances, such as an outstanding vitamin C and minerals. Thus, recently resulted in increased demand of this particular fruit (Leontowicz *et al.*, 2016).

According to Lee-Jones, (2014), from 2013-2015, the average of total exported kiwi fruit from New Zealand to Indonesia are estimated at 2724 MT. Since it is fully imported from another country, the market price of kiwi in Indonesia is relatively high. On the other hand, the distribution of kiwi is limited because the fruit is high in moisture content and very sensitive to softening. Rapid softening of kiwi caused by ethylene may result in deterioration in fruit quality. Moreover, kiwi tends to has a tender tissue that easily to bruising and mechanical damage during transport. Thus, kiwi fruits are prone to microbial infection of the wounds (Huang, 2016).

To increase the shelf life of kiwi, instant powder drink made from kiwi is consider as favorable option. It is one of the easiest ways to preserve the fruit and recognize as one of the best and convenient way for many people to make their own favourite drinks because it can be consumed by simply adding water to it.

Fruit powder is believed to have high economic value compared to liquid fruit juice due to its ability to extend the shelf life, reduce storage space, preventing potential growth of microbes and simpler packing and distribution. The production of fruit powder can be made using drying techniques. Common drying techniques used in the production of fruit powder are spray drying and freeze drying. However, both techniques require expensive equipment and may be a major consideration for production (Sangamithra *et al.*, 2014; Huang, 2016).

One of the cheapest and easiest way to produce a fruit powder is using foam mat drying. Foam mat drying technique is intended for products which is sensitive to heat, viscous and high in sugar content. The process begins by extracting fluids from the fruit and mixed with an addition of foaming agent and stabilizer to create a stable foam (Sangamithra *et al.*, 2014). The production of stable foam is intended to enlarge the surface area of product to be dried, thus accelerate the removal of water during drying process. Therefore, using low temperature of drying is allowed to produce free flowing powder with better nutritional retention (Sangamithra *et al.*, 2014; Kandasamy *et al.*, 2012). However, production of high quality foam mat dried powder are affected by several factors. It requires proper amount of additional ingredients such as foaming agent, stabilizer and also suitable drying conditions (Sangamithra *et al.*, 2014).

1.2. Research Problem

Foam mat drying is previously introduced and reviewed by several researchers since 1970s. It shows good reconstitution ability and has short drying time. The basic idea of foam mat drying is rather old and considered as a conventional drying technique (Affandi *et al.*, 2017; Jagtiani, 2012). Nutritional value of green kiwi fruit, including its high antioxidant, is prone to loss and deteriorate when exposed to high temperature. Foam mat drying is a drying method with relatively low temperature that may be able to retain the antioxidant as well as increase the shelf life of the fruit. This will fulfil the market demand along with the introduction of an alternative preservation technique. Since there is no implementation and research on foam mat drying to increase the shelf life of kiwi fruit, this study is done to find the suitable conditions to produce kiwi fruit powder. According to Sangamithra *et al.*, (2014), some factors that may affect the production of kiwi fruit powder using foam mat drying technique are the addition of foaming agent, foam stabilizer and also drying conditions. Thus, in the experiment several factors that may affect the production of foam mat dried kiwi such as the concentration of maltodextrin, concentration of carboxymethyl cellulose, concentration of egg albumen, whipping time, drying temperature and drying time will be discussed.

1.3 Objectives

1.3.1 General Objectives

The principal aim of this study is to determine the feasibility of producing green kiwi (*Actinidia deliciosa*) powder and characterize the powder for instant drink using foam mat drying technique.

1.3.2 Specific Objectives

1. To determine the optimum combination of carboxymethyl cellulose (CMC) and maltodextrin (MD).
2. To determine the optimum combination of egg albumen concentration and whipping time.
3. To determine the optimum combination of drying time and drying temperature.
4. To determine the characteristics of green kiwi powder as an instant drink.

