

CHAPTER I

INTRODUCTION

1.1 Research Background

Indonesian cuisine is embellished by spices that are found throughout the country. It dominates flavor profile of the food, so that spices are considered as the most important food adjuncts for dishes (Yanuarti & Afsari, 2016). Moreover, utilization of spices in Indonesian cuisine is also affected by the large production of the crop, proven by 3 of the spices kind placed on 5 vegetable commodities with highest production in 2017, which consist of shallots, cabbage, red chili, potato, and bird's eye chili (*rawit*) in decreasing order. The production of shallots reached 1.47 million tons, while red chili (*Capsicum annum L.*) and bird's eye chili were produced up to 1.21 and 1.15 million tons, respectively (*Badan Pusat Statistik*, 2018).

However, geographic coordinate of this country influences spices production, generating fluctuative quality and also market price (Anwarudin *et al.*, 2015). Rainy season, for instance, increases chance of crop failure which makes spices be less preferable as investment, but to grow and replace the plantation area with another crop (rice, for instance) for its high dependence on water supplied from the rain. Chili is one of the spice example that got negatively affected by weather change. As one of the most popular spice utilized by the citizens, the demand of chili will not drop all over the year. Insufficient yield production of chili for the demand creates a significant price raise and cause sudden inflation

inside the country. According to Yanuarti and Afsari (2016), price of chili could reach IDR 100,000 per kilogram of the fruit on famine season.

Chili fruit is processed into other form of products to retain its availability and to fulfill demands, countering the drawbacks during the season. Chili powder and chili sauce, for instance, are very popular for the convenience to adjunct dishes. Heat treatment process that is involved in the processing counters the short shelf life nature of chili (Gonzalez & Barrett, 2010). Moreover, addition of other ingredients contribute to flavor profile of chili and also eating sensation, including texture and impressions (Liong *et al.*, 2016).

As for its sauce form, chili is mainly combined with thickening agent, water, and the other food additives to add flavor and consistency (Havrlentova *et al.*, 2013). Starch is used as the thickening agent, giving rheological and textural properties to the product. Recent studies on starch utilization were focused in obtaining the influence of starch type and the properties of sauce, including the physicochemical and sensory characteristics (Arocas *et al.*, 2010). To develop the rheological properties, starch needs to be heated and stirred based on its gelatinization nature, inducing the breakdown of starch granules to leach complex starch molecules (Román *et al.*, 2016).

Furthermore, there are several factors known to affect viscosity of chili sauce, such as stirring rate, type of starch, heating rate, end point temperature, and cooling and storage condition (Okechukwu & Rao, 2007). Those factors are having a proportional direction effect to viscosity, but severe exposure may give undesirable drawbacks (Gonzalez & Barrett, 2010). For example, over gelatinized starch as effect of over end point temperature causes starch granules to implode,

yielding a decrease in viscosity. Overheated sauce may also lead to color degradation. Improper handling may even cause syneresis and retrogradation, where water separation occur on the product (Vaclavik & Christian, 2007). For that regard, it is important to study about the optimum processing condition of chili sauce, which includes the processing time and temperature.

Since chili sauce has been broadly consumed throughout society, developments on producing better product quality has become a trend. Selection of best quality raw ingredient is one of example, but some companies are limited on their budget. For instance, big companies start to minimize the utilization of food colorants to develop the color of chili sauce, but rely on carotenoid pigments as natural color contributor of red chili fruit (Arimboor *et al.*, 2015). In order to get the color, chili must be on its best quality, meaning higher raw material cost. Moreover, utilization of starch type that influence viscosity of chili sauce also plays role on the ingredient cost. Nowadays, most big companies utilize modified starch to thicken the sauce. Modified starch is starch which structure is altered by treatment with physical or chemical agents (Olayinka *et al.*, 2015).

One of the benefit is an increase of viscosity as modification may induces starch swelling capability and insolubility. The production cost might incomparable to the scale of company production and sales, but could not be applied on start-up companies. Start-ups usually combined modified starch with native starches that commonly utilized for producing sauce dishes, such as corn starch, wheat starch, and rice starch. Corn starch is which mostly utilized to thicken sauce since it gives smooth texture, sheen appearance, and is gluten free, but may be unstable through storage time (Senanayake *et al.*, 2014). For that

regard, combination of native and modified starches is recently studied to obtain the desired and acceptable physicochemical and sensory quality of the product based on the type and concentration of the utilized starches.

1.2 Research Problem

Ingredients for constructing chili sauce product interact among each other. Although studies have stated formulations in certain processing ways to produce chili sauce, different utilization of raw material affects the characteristics of end product (Havrlentova *et al.*, 2013; Panda, 2010). In particular, utilization of any thickening agents give different physicochemical and sensory characteristics when being processed in certain condition and concentrations. For that regards, physicochemical and sensory characteristics of chili sauce processed in predetermined formulations with certain processing condition and concentration of thickening agents (combination of corn starch and modified starch) would like to be known.

1.3 Objectives

This research was aimed to achieve two kinds of objectives, which includes general objective and specific objective.

1.3.1 General Objective

The general objective of this research was to study the physicochemical and sensory characteristics of chili sauce as the effect of processing time and temperature, also concentration of thickening agents that was processed in a selected cooking method.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To determine effect of cooking time and temperature processed by two different cooking methods on physicochemical characteristics of chili sauce, and to select two best treatments in a selected cooking method.
2. To determine effect of corn starch and modified starch concentrations processed in the selected best treatments and a selected cooking method on physicochemical and sensory characteristics of chili sauce, also to observe the proximate content of the selected chili sauce in contrast to a commercial chili sauce.

