

CHAPTER I

INTRODUCTION

1.1 Background

Many aromatic plant leaves are known to possess several functional properties that are beneficial for human health. *Kenikir* (*Cosmos caudatus*) is an Indonesian aromatic herbal plant that are widely consumed as salad and commonly used as traditional medicinal herbs. *Kenikir* is known to possess several beneficial functional properties, such as antioxidant, anti-diabetic, antihypertensive, anti-inflammatory, bone-protective, antimicrobial, and antifungal properties. These functional properties are contributed by high content of bioactive compounds such as flavonoids and phenolic compounds in *kenikir* leaves (Cheng *et al.*, 2015). All these bioactive compounds in *kenikir* leaves are known to have many functionality benefits such as antioxidant properties and antidiabetic properties. Several researches have been done to observe the functionality benefits of *kenikir* leaves. Research done by Lutpiatina *et al.* (2017) and Dwiyantri *et al.* (2014) show that *kenikir* leaves could inhibit the growth of *Staphylococcus aureus* and *Bacillus cereus*. Moreover, research done by Tandi *et al.* (2018), Irwan *et al.* (2017), and Sahid (2016) show that *kenikir* leaves could also reduce blood glucose level and regenerate pancreatic tissue.

Antioxidant is a compound that could bound to free radicals and inhibit their formation by giving hydrogen atoms. Free radicals are highly reactive compounds that have one or more unpaired electron due to giving and receiving electron from another molecule (Perez and Aguilar, 2013). Natural antioxidant is an antioxidant that

occurs naturally and mostly contained in plant, such as phenolic acids, flavonoids, carotenoids, catechin, and tocopherol (Pokorny *et al.*, 2001). α -glucosidase enzyme is an enzyme that converts carbohydrates into glucose which would result in an increase of blood glucose level. α -glucosidase inhibitors (AGI) are anti-diabetic substances that could inhibit the activity of α -glucosidase enzyme by preventing the conversion of carbohydrate into glucose (Goldstein and Mueller-Wieland, 2007).

In this research, *kenikir* leaves would be subjected with soak blanching as heat treatment. Blanching is one of the commonly used pre-treatments to inactivate enzyme in vegetables by soaking vegetables in hot water at 75-95°C for 1-10 minutes (Patras *et al.*, 2010). Blanching by soaking vegetables in hot water has better thermal exchange compared to other blanching method which would result in more uniform heat treatment (Reyes de Corcuera *et al.*, 2004). Study by Nartnampong *et al.* (2016) shows that blanching could increase the total phenolic content and antioxidant activity in parsley, sweet basil, and coriander. However, another study by Patel *et al.* (2016) and Patras *et al.* (2010) shows that blanching could cause loss of vitamins, phenolic compounds, and ascorbic acids in spinach, fenugreek, and amaranth leaves.

Different solvent would be used in the extraction process to obtain the phytochemical compound of the leaves. Extraction is a process to separate the desirable compound from plants with the usage of solvent (Raaman, 2006). The most suitable solvent in aromatic compound extraction are polar and semi-polar solvents. In this research, ethanol, and ethyl acetate, which were two different polar and semi-polar solvents, were used in the aromatic compound extraction of *kenikir* leaves. The

effect of blanching and different extraction solvents toward the physicochemical changes and functional activity of *kenikir* leaves would then be observed.

1.2 Research Problem

Volatile compounds in aromatic plants contribute to the functional properties of the plants. Blanching is known to stabilize the phytochemical compound and enhance the antioxidant activity of the aromatic plants. However, the volatile compounds in the aromatic plants could be easily evaporated throughout the blanching process. Moreover, extracted volatile compounds would be retained in different amount in solvent with different polarity. Therefore, in this research, the effect of blanching and different extraction solvent towards the volatile compounds in aromatic plants would be observed.

1.3 Objectives

1.3.1 General Objectives

The general objective of this research was to determine the effect of pre-treatment and extraction using different polarity solvents towards the phytochemical and functional properties of *kenikir* (*Cosmos caudatus*) leaves.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To determine the effect of blanching and without blanching towards the phytochemical and functional properties of *kenikir* (*Cosmos caudatus*) leaves.
2. To determine the effect of extraction using polar (ethanol 70%, ethanol 96%) and semi-polar (ethyl acetate) solvents towards the phytochemical and functional properties of *kenikir* (*Cosmos caudatus*) leaves.