CHAPTER I

INTRODUCTION

1.1 Background

Aromatic plants secondary metabolites are commercially used in perfumery, flavoring, and pharmaceutical compounds. Aromatic plants possess odorous volatile substances which are essential oil, balsa, oleoresin, green exudate in one or more parts such as root, wood, stem, foliage, flower, and fruit. They are volatile as they evaporate when exposed to air at room temperatures or easily evaporated during processing. Aromatic plants include cinnamon (bark), marigold (flower), tea, *kenikir* and *kemangi* (leaves), sandalwood (wood) and rosemary (herbage) (Skaria, 2007). Aromatic plant contained antioxidants and numerous health benefits such as anti-aging agent, improve blood by the presence of food antioxidants components that protects the human body from free radicals (Wilson *et al*., 2017).

Free radicals are molecules with an unpaired electron. The presence of an unpaired electron causes oxidative stress which can eventually damage the cells in human body. Life style changes leads to changes in human diet consumption, where fast food and instant food with preservative are now preferable over traditional food. Preservatives and dyes that are contained in those kind of foods can trigger the formation of free radicals. Although the body has a defense mechanism against free radicals, such as antioxidant enzymes (primary antioxidant) which includes superoxide dismutase (SOD), gluthione peroxidase (GPx) and glutathione

reductase (GR), the body can not fend off by itself. Thus, a supply of secondary antioxidant are needed to help the body to fend off the free radicals (Adhani, 2017).

Synthetic antioxidant such as butyl hydroxy toluene, butyl anisol are widely used for food processing industry, but there are some side effects on human health. Thus, there is a rise in the need of natural antioxidant to replace synthetic antioxidant. One of the vegetables that has a potential as a natural antioxidant is *kemangi.* According to Erviana *et al. (*2016), *kemangi* leaf contain tannins (4.6%), flavonoids, steroid/triterpenoid, essential oil (2%). The flavonoids contained in *kemangi* are catagorized as flavones where it can be used to eliminate free radicals (Adhani, 2017).

Kemangi (Ocimum basilicum L.*)* or Thai basil is an aromatic annual plant with white, greenish, or purplish flowers and green, ovate leaves. It has a lemony taste with a fruity aroma. Basil are a source of antioxidants where it is attributed to the flavonoids content. There are many types of basil leaf around the world, such as holy basil (*Ocimum tenuiflorum)* and lemon basil (*Ocimum x africanum)*. These types of basil are not as common as Thai basil or common basil (*Ocimum basilicum* L.) in Indonesia. Thus, the latter are chosen for this study as it is the most common herbs consumed as spice (Zlotek, 2016).

Kemangi is a versatile vegetable where it can be eaten raw as *lalapan* or cooked together with other dishes as a flavor enhancer due to its aromatic characteristic (Charles, 2013). By cooking it together, it may alter *kemangi* radical scavenging activity as heat is introduced. Thus, to mimic actual cooking, blanching is used in this study as a pre-treatment to *kemangi* leaf before extraction. Blanching

itself is a preliminary step before processing to inactivate unwanted enzymes that can cause browning, and unwanted enzymatic reactions. According to Patras *et al.* (2011), blanching may cause in changes of physical characteristics such as texture, color and chemical composition of the vegetables. It can also increase the radical scavenging activity of the vegetables such as Nigerian green leafy vegetables, due to the inactvation of enzymes that causes enzymatic oxidation (Bamidele *et al.*, 2017).

According to Saetan *et al. (*2016), hot water blanching increases total phenolic content, total flavonoid content extractibility and antioxidant activities due to easier extraction because of the bigger pore size in leaves microstructure, thus hot water blanching is used in this research. However, aromatic compound are known to be sensitive toward heat treatment, therefore in this research the effect of blanching toward the functional propertie of the aromatic leaf is observed.

Other factor that can affect radical scavenging activity in *kemangi* is the type of solvent used. Differences in phenolic compound structures determine the solubility in solvents of different polarity (Zlotek, 2016). Therefore, by using different types of solvent with different polarity can determine which polarity is appropriate for *kemangi* extraction. In this study, ethanol 70%, ethanol 99.8% and ethyl acetate is used as solvents for *kemangi* extraction to determine its radical scavenging activity.

1.2 Research Problem

Blanching can increase the ability to retain radical scavenging activity and prevent the reduction of radical scavenging activity of several vegetables such as green beans, carrots and broccoli. It can also retain radical scavenging activity of Indian green leafy vegetables and *Cinnamomum porrectum* (Saranya *et al*., 2017). Blanching can increase functional activity on leaves due to the heat that expanded pore size of dried leaves and increase yield extractability, maintain color value and chlorophylls (Saetan *et al*., 2016). However, *kemangi* are an aromatic leaves, thus they contained volatile components that are prone to evaporation due to heat processing.Thus, in this research fresh and blanched leaves are used to know the effect of blanching on the radical scavenging activity of *kemangi* leaves. To obtain a more complete profile of the phytochemical changes after blanching, extraction using ethanol 70%, ethanol and ethyl acetate, which is a polar and semi-polar solvent respectively is used to know the extraction efficiency towards radical scavenging activity of *kemangi* leaves.

1.3.1 Objectives

1.3.1. General Objectives

The objective of this research is to study the effect of blanching treatment and different solvent extraction on the radical scavenging activity and phytochemical properties of *kemangi (Ocimum basilicum L*) leaves.

1.3.2. Specific Objectives

The specific objectives of this research are:

1. To determine the effect of blanched and fresh leaves on the phenolic, flavonoid, and radical scavenging activity of *kemangi (Ocimum basilicum L.)* leaves.
2. To determine the effect of using different solvent with different polarity; polar and semi-polar on the phenolic, flavonoid, radical scavenging activity of *kemangi (Ocimum basilicum L.)* leaves.
3. To determine the correlation between total phenolic content, total flavonoid content, and radical scavenging activity of *kemangi (Ocimum basilicum L.)* leaves.