

CHAPTER I

INTRODUCTION

1.1 Research Background

Vernonia amygdalina Del. is a plant commonly known as bitter leaf or African bitter leaf and called Daun Afrika in Indonesia. It is originally found along rivers and lakes in the African tropics and other parts of Africa, particularly, Zimbabwe, Nigeria and Cameroon. African bitter leaf is a tropical shrub grows from two to ten-meter height, with six mm diameter of petiolate leaves (Farombi and Owoeye, 2011). The suitable environment for *V. amygdalina* Del. to grow is humid, full sunlight and humus-rich soils which makes it suitable to grow on the landside of Indonesia. More than 500 of *Vernonia* plants have been distributed in Africa and Asia (Githiori and Gathumbi, 2010).

Application of African bitter leaves as medicinal properties have been done by many people in Africa. Many traditional medicine practitioners use different parts of the plants to treat various diseases. Different extracts of African bitter leaves have been proven to have antioxidant properties. The antioxidant activity of African bitter leaf has been associated with the presence of flavonoids which are luteolin 7-O- β -glucuronoside, and luteolin 7-O- β -glucoside. Three isolated flavones have been revealed it can transverse the blood brain barrier (Farombi and Owoeye, 2011), and luteolin has the greatest activity and it's a flavonoid known to have anti-cancer properties (Lin, *et al.*, 2008).

Antioxidants are constituent that delay autoxidation by preventing formation of free radicals or by interrupting propagation of free radicals by one or more several mechanisms (Brewer, 2011). Free radicals which were produced as a consequence of ATP production by mitochondria, is now believed to be a major causes number of human cardiovascular, neurologic and other diseases, since it induced oxidative stress. Antioxidant plays a vital role in human's life since it is crucial for sustaining optimum health and wellbeing (Chakraborty, 2011). It has the ability to inhibit the possibility of degenerative diseases, such as heart disease, inflammation, cancer and aging process (Siviero, *et al.*, 2015). Therefore, antioxidants are needed for the reduction of free radical and improve antioxidant status, which proven to be beneficial to recover normal function and treatment of such diseases (Sen and Chakraborty, 2011). An example of leaf with potent antioxidant activity is *Vernonia amygdalina* Del. or African bitter leaf.

Tea is a beverage commonly consumed by people in parts of the world due to their various active compounds associated with antioxidant activity. Types of tea commonly known to be consumed are green tea, black tea and oolong tea. Green tea is a non-fermented tea with minimal processing. Black tea is a fully fermented tea where the leafs are fully oxidized after wilting. While oolong tea is a traditional Chinese tea, which the leafs are partially oxidized after wilting to varying degrees from eight to 85%. Polyphenols in tea are known to be associated with antioxidant activity. Result of oxidative stress of free radicals may lead to chronic diseases and inflammatory conditions such as heart diseases, several types of cancer diseases and diseases associated with aging (Thaslema, 2013).

1.2 Research Problem

Vernonia amygdalina Del. is plant that is abundantly found in Africa, Asia particularly Singapore and Malaysia, many of African bitter leaves today can also be found in Indonesia. However, the benefit of African bitter leaf to prevent several types of cancer are not widely spread throughout the society. *V. amygdalina*. leaves are often extracted and consumed as vegetable and tonics against many diseases, especially its antioxidant properties in inhibiting the possibility of degenerative diseases, such as cancer. The application of *V. amygdalina*. plant as tea will encourage people to consume it while reducing the risk of cancer, since tea has the highest interest types of beverage among people. However, study related to antioxidant properties known to reduce risk of diseases such as cancer, diabetes, and cardiovascular in *V. amygdalina*. tea is limited.

Thus, further evaluation and research regarding antioxidant characteristics of tea prepared from African bitter leaves were needed. This research was focused on determining characteristics of antioxidant from different types of tea which were green tea (nonfermented), oolong tea (partially fermented) and black tea (fully fermented) and to determine optimum steeping temperature and time of tea beverages prepared from African bitter leaves.

1.3 Objectives

1.3.1 General Objectives

The objective of this research was to study antioxidant characteristics of *V. amygdalina*. prepared as tea beverage.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To determine the antioxidant characteristic profiles of different types of tea beverages prepared with African bitter leaves.
2. To determine effect of temperature and time of steeping on antioxidant characteristics of African bitter leaf tea and to select the best temperature and time of steeping on antioxidant characteristics of African bitter leaf tea.
3. To determine effect of sugar addition to antioxidant characteristics of African bitter leaf tea.

