

BAB I. INTRODUCTION

1.1. Background

Indonesia is rich in biodiversity, which makes it possible to develop drugs or medicinal raw materials that function as antioxidant substances with low cytotoxicity. One of them is a mistletoe plant. Mistletoe is a semi-parasitic plant, which means it is harmful to commercial crops. People usually consume mistletoe as a herbal drink to treat various diseases such as a cough medicine, cancer, diuretic, pain reliever and postnatal care (Fazriah *et al.*, 2007). Most research on the benefits of herbal medicines is carried out by extraction using organic solvents, while the traditional way of using herbs is by brewing or boiling with water.

One of the mistletoes that are widely distributed in tropical countries is *Scurrula ferruginea* (Jack) Danser, including members of the Loranthaceae tribe, has synonyms, namely *Loranthus ferrugineus* Jack, L. G., *Dendrophthoe ferrugineus*, *Dendrophthoe crisanthus* G. Don., etc (*Scurrula ferruginea* (Jack) Danser, 2003). This mistletoe can be found on several host plants, one of which is *Citrus sinensis*. Orange (*Citrus sinensis*) is a medicinal plant that contains antimicrobial compounds include flavonoids, essential oils, saponins, and terpenoids. Since the mistletoe is a semi-parasitic epiphytic plant, it is suspected that its bioactivity can also depend on the host plant. Mistletoe attached to this orange plant will be efficacious for treat influenza, malaria, tonsillitis, hemorrhoids, and shortness of breath (Selawati, 2019).

Phytochemicals are chemical compounds that occur naturally in plants and are responsible for color and other organoleptic properties. There are as many as

4,000 different phytochemicals that have the potential to influence diseases such as cancer, stroke or metabolic syndrome. Some of these phytochemicals are saponins, tannins, alkaloids, steroids, glycosides, carbohydrates, flavonoids, phlobatannins, and terpenoids (Bano, 2007). Terpenes are a type of organic hydrocarbon produced by various higher plants, conifers, citrus and eucalyptus in the leaves and fruit of plants. Terpenoids are known to have biological activities, such as cholesterol synthesis inhibitors, anticancer, antibacterial, anti-inflammatory, antiviral, and antimalarial agents (Zainuddin and Sul'ain, 2015).

Antimicrobials as chemical substances that have the property or ability to kill or inhibit the growth of germs, while the toxicity to humans is relatively small. Antimicrobial substances will interfere with the process of folic acid formation, resulting in non-functional folic acid and disruption of metabolism in microbial cells (Adrianto *et al.*, 2014). In this research, 3 test bacteria were used, namely *S. aureus*, *E. coli*, and *C. albicans*. *S. aureus* is one of the most common gram-positive bacteria causing poisoning in food products. *E. coli* is a gram-negative bacteria that causes diarrhea. *C. albicans* is a fungal pathogen that causes infections.

Currently, *Scurrula ferruginea* is one type of plant that is widely studied for its antioxidant activity and total phenol content. Antioxidants have the ability to capture free radicals and the DPPH method is used to determine the presence of antioxidants in a substance (Selawati, 2019). The characteristics of antioxidants derived from foodstuffs can be seen from the polyphenol content. Polyphenols are one of the most abundant groups in food crops, with more than 8000 phenolic structures known today (Chopipah *et al.*, 2021).

Based on research by Sembiring (2016), which stated that the antioxidant activity of methanol extract of the leaf of the orange mistletoe (*Scurrula fusca* G. Don), was obtained with IC₅₀ values of 9.383 g/ml and 8.713 g/ml, respectively. The antioxidant activity of these two isolates was classified as very strong because it had an IC₅₀ value smaller than the IC₅₀ value of ascorbic acid as a control (12.08 g/ml). The research conducted by Marvibaigi *et al.*, (2014) in Malaysia regarding that stem extract of *Scurrula ferruginea* mistletoe exhibited higher phenolic content (309.069±1.15) and antioxidant compare to other extracts. The lowest MIC values observed against *P. putida* (225 µL) while highest values were shown with *E. coli* (900 µL).

People usually add lime juice when consuming tea. The addition of lime juice into tea at least 0.2% can increase the antioxidant activity of tea steeping (Sudjatini, 2016). In this research, the lime used is *Citrus aurantifolia*. According to Raharjo (2004), citric acid acts as sequestrants/chelators, namely antioxidants that are able to bind metals that catalyze oxidation reactions. While ascorbic acid/vitamin C acts as an oxygen scavenger which functions to bind oxygen so that it does not support the oxidation reaction in the material.

So far, there has been no study that has reported a direct comparison of the extraction technique for the fresh extract and infusion of the orange mistletoe. Based on the things that have been mentioned above, the authors are interested in seeing the effects of several extraction techniques on the antimicrobials potency of mistletoe (*Scurrula ferruginea* (Roxb. ex Jack) Danser) extract from orange plant and its antioxidant activities.

1.2. Problem formulation

Based on the information that has been described in the research background, there are several problems formulation, as follows:

- a. How is the antimicrobial potency of orange mistletoe (*Scurrula ferruginea*) extract against the tested microbes?
- b. How are the Minimum Inhibitory Concentrations (MIC) and Minimum Lethal Concentrations (MLC) of the orange mistletoe (*Scurrula ferruginea*) extract?
- c. How is the antioxidant activity of *Scurrula ferruginea* extract?

1.3. Research objective

To answer the problems that have been stated, the objectives of this research are:

- a. To clarifying the antimicrobial potency of *Scurrula ferruginea* extract
- b. To determining the Minimum Inhibitory Concentration (MIC) and Minimum Lethal Concentration (MLC) of *Scurrula ferruginea* extract
- c. To determining the antioxidant activity of *Scurrula ferruginea* extract

1.4. Research benefits

The benefits of this research are expected to be a source of information and scientific strengthening regarding the antimicrobial potency and antioxidant activities of the orange mistletoe (*Scurrula ferruginea* (Roxb. ex Jack) Danser) for the scientific community and the general public and can be used as articles in print media.

