Journal of Saintech Transfer (JST) Vol. 4, No. 1, 2021 | 55-64

JST
Journal of Saintech Transfer

Production of natural hand sanitizers from *Aloe vera*, Rambutan (*Nephelium lappaceum L.*) and Lime (*Citrus aurantiifolia*) barks, Betel (*Piper betle*) and *Eucalyptus grandis* leaves in Kotamatsum IV sub district, Medan City

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Abstract. The utilization of plant parts that are not used is very important in order to minimize organic waste. Rambutan (*Nephelium lappaceum L.*) rind has antibacterial properties which can be used as raw material. The same goes for the Aloe vera, Rambutan (*Nephelium lappaceum L.*) and Lime (*Citrus aurantiifolia*) barks, Betel (*Piper betle*) and *Eucalyptus grandis* leaves. *Eucalyptus grandis* is a product that is not harvested in Industrial Plantation Forests which are grown by the community and green Industry in North Sumatra. The part used is the plant stem which is used as a material for making pulping. The extraction process was carried out used steam distillation. In this work, the analysis of active compound used GCMS instrument. The result of the analysis showed that there was 1.8 Sineol as much as 52%. This compound was used as an antiseptic and give a fragrant aroma. This work aims to produce of natural hand sanitizers used *Eucalyptus grandis* as an odorant and antiseptic agent which used to prevent the transmission of Covid-19 in Kotamatsum IV sub district, Medan City. The resulting product was a hand sanitizer that is safe to use and friendly to the environment. The natural hand sanitizer products can be used by the community in reducing the transmission of Covid-19 and can increase people's income.

Keywords: Hand sanitizer, Waste, Distillation, Analysis, *Eucalyptus*

Abstrak. *Pemanfaatan bagian tanaman yang sudah tidak terpakai sangat penting untuk meminimalisasi dampak negatif sampah organik. Kulit buah rambutan (Nephelium lappaceum L.) memiliki sifat antibakteri yang dapat digunakan sebagai bahan baku. Begitu pula dengan kulit kulit jeruk nipis (Citrus aurantiifolia), daun sirih (Piper betle), lidah buaya (Aloe vera) dan daun Eucalyptus grandis. Eucalyptus*

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grandis merupakan produk yang tidak ikut dipanen pada Hutan Tanaman Industri yang ditanam oleh masyarakat dan Industri hijau di Sumatera Utara. Bagian tanaman ini yang digunakan adalah batang tanaman sebagai bahan pembuatan pulp. Proses ekstraksi dilakukan menggunakan destilasi uap. Dalam penelitian ini, analisis senyawa aktif menggunakan instrumen GCMS. Hasil analisis menunjukkan terdapat 1,8 Sineol sebanyak 52%. Senyawa ini digunakan sebagai antiseptik dan memberikan aroma yang harum. Kegiatan ini bertujuan untuk menghasilkan hand sanitizer alami yang menggunakan Eucalyptus grandis sebagai bahan pengharum dan antiseptik yang digunakan untuk mencegah penularan Covid-19 di Kecamatan Kotamasum IV Kota Medan. Produk yang dihasilkan adalah hand sanitizer yang aman digunakan dan ramah lingkungan. Produk hand sanitizer alami tersebut dapat dimanfaatkan masyarakat dalam mengurangi penularan Covid-19 dan dapat meningkatkan pendapatan masyarakat.

***Kata Kunci**: Hand sanitizer, Limbah, Destilasi, Analisis, Eucalyptus*

Received 27 November 2020 | Revised 21 January 2021 | Accepted 21 February 2021

1. Introduction

Corona virus is a group of viruses that can cause disease in animals or humans [1]. Several types of corona viruses are known to cause respiratory tract infections in humans ranging from cold coughs to more serious ones such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS)[2]. A new type of coronavirus that was found to cause Covid-19 disease. Covid-19 is an infectious disease caused by a newly discovered type of corona virus [3]. This is a new virus and a previously unknown disease prior to the outbreak in Wuhan, China, in December 2019 [4].

The most common symptoms of Covid-19 are fever, feeling tired and dry cough [5]. Some patients may experience aches and pains, nasal congestion, runny nose and sore throat. The symptoms experienced are usually mild and appear gradually [6]. Some people who are infected do not show any symptoms and still feel well [4]. The vast majority (about 80%) of infected people recover without the need for special treatment. About 1 in 6 people who contract Covid-19 suffers from severe pain and difficulty breathing [6]. Elderly people and people with pre-existing medical conditions such as high blood pressure, heart problems or diabetes, are more likely to experience more serious illness [7]. Those who experience fever, cough and difficulty breathing should seek medical help [6].

People can catch Covid-19 from other people who are infected with this virus [8]. Covid-19 can spread from person to person through droplets from the nose or mouth that come out when a person with Covid-19 coughs or exhales [5]. These splashes then fall on objects and surfaces around them. People who touch these objects or surfaces and then touch their eyes, nose or mouth, can contract Covid-19. Covid-19 transmission can also occur if people breathe in the splashes that come out of a cough or breath from a person who has Covid-19. Therefore, it is important for us to maintain a distance of more than one meter from people who are sick [7]. Covid-19 is spread by contact with droplets from the respiratory tract and not through the air produced when coughing. The risk of transmitting Covid-19 from a person who has no symptoms at all is very low. However, many people who contract Covid-19 experience only mild symptoms, especially in the early stages. Therefore, Covid-19 can be transmitted from people who only have a light cough but feel well. The transmission of the Covid-19 virus can be prevented by washing hands using an antiseptic agent that can kill the Covid-19 virus [9].

Kotamatsum IV sub district is one of twelve sub district located in Medan Area District. The total population consists of 5,000 households whose main livelihood is trading. The Karang Taruna in this sub district is quite developed and has previously carried out activities, especially in terms of making clothes and shoes. After the Covid-19 Pandemic there were no youth activities considering the government's recommendation that all people should not leave the house. As of April 19, 2020, there were 4 People Under Monitoring and 2 Patient Under Supervision cases. This condition is likely to continue to develop if the community does not take preventive measures and self-isolate. The head office of Kotamatsum IV sub district is located on Amaliun street No. 83. The head office as shown in **Figure 1.1** below:

Figure 1.1 Urban Village Head Office Kotamatsum IV sub district, Medan City

Since the emergence of the Covid-19 Pandemic in North Sumatra, especially Medan City, people have started to panic. On average, residents who live close to areas prone to infection flock to buy masks and hand sanitizers. The stocks of masks and hand sanitizers at various pharmacies are out of stock, although the prices are available, they have gone up even up to twelve times. Many individuals took advantage of this national emergency situation to reap profits by creating masks and hand sanitizers which were then resold at a higher price. The use of masks cannot actually guarantee that individuals will not be infected because ordinary health masks are not able to prevent the entry of the Corona virus which is very small in size. So the most effective way to prevent Corona virus infection is to wash your hands frequently with soap and water or replace them with hand sanitizers [10].

Washing hands with clean water and soap helps a lot in preventing the transmission of the corona virus [9]. It's just that spraying natural hand sanitizers is very helpful in killing Covid-19 effectively. An antiseptic product for washing hands that is often on the market besides antiseptic soap is a hand sanitizer. Hand sanitizers are generally active ingredients of alcohol and phenol so that they have a working mechanism by denaturing and coagulating germ cell proteins [11]. Alcohol in certain levels causes protein coagulation and lyses the cell membrane. Alcohol can also change the permeability of germ cell membranes, causing leakage of essential cell constituents and causing germs to die [12]. Following the development of the modern world, people now prefer quick, simple, and efficient hand sanitizers to keep their hands clean compared to conventional hand washing. The use of hand sanitizers has been proven effective in reducing infections of gastrointestinal and respiratory diseases due to bacteria [13].

Production hand sanitizers must be able to kill bacteria and get rid of viruses [14]. Chemical raw materials for hand sanitizer are increasingly scarce in the market. This condition is used to find alternatives to the antiseptic ingredients used by utilizing natural ingredients that are environmentally friendly and safe to use (do not cause allergies to hands). The development of science and technology made researchers want to innovate hand sanitizers from rambutan rind, lime peel, betel leaf (*Piper betle*), Aloe vera and *Eucalyptus grandis*. Rambutan fruit peels contain anti-oxidant and anti-bacterial substances which can be used as an ingredient for making hand sanitizers [13]. Lime peel contains alcohol compounds that can fight the effects of premature skin aging and kill

viruses, betel leaf (*Piper betle*) contains carvacol compounds which have benefits as disinfectants and anti-fungi, and tannins as an antiseptic. Aloe vera contains all types of vitamins except Vitamin D and also acts as a thickener. Eucalyptus is a plant genus of the *Myrtaceae family* [15]. Eucalyptus is often used as a medicinal plant [16]. One of the species used as medicine is *Eucalyptus grandis*. This plant comes from Australia and Tasmania and is distributed in tropical and subtropical areas [15]. The essential oil obtained from the leaves of Eucalyptus grandis is used as a medicine for pulmonary tuberculosis, diabetes, cold medicine, antiseptic, asthma, disinfectant, malaria therapy, antibacterial, antifeedant, anti-fungal, insect repellent and anti-virus [17]. This activity aims to provide information about making natural hand sanitizers to the community in Kotamatsum IV sub district, Medan City.

2. Methods

2.1. Materials and instrumentations

The ingredients used are rambutan and lime peel, betel leaf (*Piper betle*), Aloe vera (*Aloe vera*) and *Eucalyptus grandis*. Additional materials used are alcohol, glycerin, and distilled water. The instrumentation was used a blender and the distillation set.

2.2. Location

This activity was carried out in Kotamatsum IV sub district, Medan District, Medan City Area can be seen in **Figure 2.2.** the following:

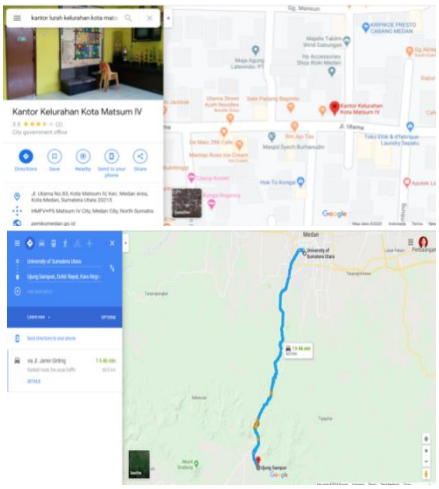

Figure 2.2 The location of activities

2.3. Preparation

Rambutan and lime peel each as much as 5 Kg were collected from the waste from Medan Area district. Betel leaf (*Piper betle*) (5 Kg), Aloe vera (*Aloe vera*) (5 Kg) and *Eucalyptus*

grandis leaves (5 Kg) were taken from the Padang Bulan area of Medan. Each rambutan fruit skin, lime peel, Aloe vera, betel leaf (Piper betle), *Eucalyptus grandis* leaves and then washed, and dried in the open air for 24 hours.

2.4. Extraction

Each of the raw materials, namely rambutan and lime peel, Aloe vera, betel leaf (*Piper betle*), Eucalyptus grandis leaves are extracted using a distillation tool (1.5 L capacity) which has been designed for 2 hours (its formation Extract in a distillate container). This distillate is then collected and used as raw material. Aloe vera (*Aloe vera*) is peeled then the inside is taken and aquadest, mashed and then collected as raw material.

2.5. Analysis of *Eucalyptus grandis*

The extracted eucalyptus grandis was analyzed using Gas Chromatography Mass Spectroscopy (GCMS).

2.6. Mixing

The mixing process is done manually by using a bucket and plastic mixer. To make a 1 liter natural hand sanitizer, mix the ingredients of rambutan peel extract (300 ml), lime peel (200 ml), betel leaf extract (Piper betle) (100 ml). Then slowly add 100 ml of aloe vera extract (Aloe vera) + glycerin (1: 1), add 1 ml of *Eucalyptus grandis* leaf extract and add 60% to 1 L of ethanol. All ingredients are stirred for 10 minutes.

2.7. Packaging

Natural Hand Sanitizer packaging was carried out using a 100 ml plastic bottle container as shown in **Figure 2.3.** the following:

Figure 2.3 The bottle of natural hand sanitizer

3. Results and Discussion

The COVID-19 pandemic has plagued Indonesia since March 2020, especially North Sumatra. Everyone is obliged to maintain cleanliness, including washing their hands regularly, to prevent the spread of the corona virus. Using a hand sanitizer or hand sanitizer is recommended if it is not possible to wash your hands with soap and water. Hand sanitizers have the advantage of being easier to carry when compared to carrying hand washing soap. Therefore, using a hand sanitizer is recommended to help and prevent the spread of Covid-19. At this time, many people have not used hand sanitizers properly. As per new research published in the journal Emerging Infectious Diseases by the Centers for Disease Control and Prevention (CDC), using a hand sanitizer for at least 30 seconds is effective in deactivating SARS-CoV-2, which is the virus behind the Covid-19 pandemic. Covid-19 can easily spread between humans even when there are no symptoms. Effective hand hygiene is essential to prevent it from spreading.

To use the hand sanitizer effectively, the hand sanitizer user will apply it to one hand and rub it together, then make sure to rub it evenly all over the fingers and hands until dry. Hands are cleaned using a hand sanitizer such as washing hands with soap and water. In this case, keep in mind that hand sanitizers cannot remove every type of germs and may not be effective when hands are dirty or oily. Several studies have reported that hand sanitizers are not sufficient to remove harmful chemicals (pesticides and heavy metals) from hands. Thus, washing your hands with soap and water is still the best way to help prevent the spread of germs. So if it is possible to wash your hands make sure to spend at least 20 seconds lathering each part of your hands with soap before rinsing them with water. However, under certain conditions and for economic principles, the use of hand sanitizers is a priority in eradicating Covid-19.

The use of natural hand sanitizers is an alternative in the context of utilizing materials that are not used or not consumed by humans. Rambutan *(Nephelium lappaceum L.*) rind contains anti-berry which can be used as a raw material. The same goes for the skin of lime peel (*Citrus aurantiifolia*), betel leaf *(Piper betle*), Aloe vera and Eucalyptus grandis leaves. The leaves of Eucalyptus grandis are a product of Industrial Plantation Forest that is bred by the community which are no longer used during harvesting because what is harvested is the stem used as raw material for pulping.

In this activity, steam distillation was developed to produce a purer distillate. Steam distillation is the separation of a liquid that is insoluble in water and has a high enough boiling point. Steam distillation can vaporize these compounds to temperatures

approaching 100 ° C under atmospheric pressure using steam or boiling water. The fundamental property of steam distillation is that it can distill a mixture of compounds below the boiling point of each compound. In addition, steam distillation can be used for mixtures that are not soluble in water at all temperatures but can be distilled with water. The working principle of steam distillation is to separate a mixture that has a high boiling point by flowing steam into it. Where compounds that have a high boiling point before reaching their boiling point are purified by using steam or boiling water. A mixture of insoluble substances reacts very differently in a homogeneous solution and the description of their properties requires different physical laws. The rule base can be used by considering the effect of increasing deviation in rault's law. One symptom of positive deviation is in the diagram the relationship between pressure and temperature. At the limit of the large positive deviation from rault's law, two components can dissolve and the component evaporates which mathematically gives the total pressure which is the total amount of each pressure.

Eucalyptus oil which has antiviral properties obtained through the distillation process was obtained with a yield value of 0.5%. Analysis of raw materials using the GCMS instrument obtained levels of 1.8 sineol by 52%. The extracted Eucalyptus oil is then mixed with all the ingredients and finally produces a Hand sanitizer which has antiseptic properties. Figure 3.1 shows the Hand sanitizer products obtained during community service activities.

Figure 3.1 Natural hand cleaning products

Natural hand sanitizers are a product that is needed by the community. This Community Service that is carried out is very useful in reducing the transmission of Covid-19 and can increase the family income of the community in the location.

4. Conclusions

Natural hand sanitizers can be made using rambutan (*Nephelium lappaceum L.*) rind, lime peel (*Citrus aurantiifolia*), betel leaf (*Piper betle*), aloe vera (*Aloe vera*) and *Eucalyptus grandis* leaves. In this work, 52% of the levels of 1.8 cineol contained in *Eucalyptus grandis* were analyzed. The natural hand sanitizer products produced can be utilized by the community in reducing the transmission of Covid19 and can increase community income in Kotamatsum IV Village, Medan Area, Medan City District.

Acknowledgements

The authors gratefully acknowledge Rector of Universitas Sumatera Utara for the financial support via Pengabdian Masyarakat Mono Tahun Reguler Project 2020.

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