Utilization of Natural Ingredients Red Betel (Piper Crocatum) Extract and White Galangal (Alpinia Galanga) Extract as Raw Ingredients Hand Sanitizer (Research Phase I)

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Abstract. WHO will announce the end of the Covid-19 pandemic, but the use of hand sanitizer is likely to become a positive new habit. Frequent use of hand sanitizers can cause effects, including dry hands, and even some people experience allergies to the skin of their hands due to the high alcohol content. It is necessary to look for alternative natural ingredients that do not have side effects but still have effective benefits. The research method begins with the manufacture of ethanol extract and aqueous extract of Piper crocatum and Alpinia galanga. All extracts were made into 5%, 10%, 15%, 25%, and 50% and then into a liquid soaking carp meat pieces that had been put into a test tube. Positive control used alcohol and sterile aqua. The ethanol extract of Piper crocatum 50% and 25% and the ethanol extract of Alpinia galanga 50% and 25% which had the best antimicrobial ability on day 19. The phytochemical test results showed that the ethanol extract of Piper crocatum contained alkaloids, tannins, steroids, and titerpenoids. Phytochemical test of ethanol extract of Alpinia galanga contained flavonoids, tannins, steroids, and titerpenoids. In conclusion, the ethanolic extract of Piper crocatum 50% and then 25% had the best antimicrobial ability, followed by the ethanolic extract of Alpinia galanga 50% and 25%. In the next stage, the best ethanol extract will be tested for microbes in a petri dish, before being used as a raw ingredient for hand sanitizer.

Keywords: Piper crocatum, Alpinia galanga, extract, hand sanitizer

1 Introduction

The COVID-19 outbreak has hit the world, including Indonesia. Even though Covid-19 cases are starting to decrease, the recommendation to use masks in a closed room and continue to use hand sanitizers is still the recommendation of the Indonesian government. Everyone should bring their own hand sanitizer in their bag.

However, the use of hand sanitizer is not arbitrary. Lecturer of Chemistry FMIPA University of Indonesia and Member of Indonesian Young Scientists (ALMI) Dr. Yuni K. Krisnandi reminded that the use of hand sanitizers can be used if soap and water are not

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available. We can't overuse hand sanitizer. The content of flammable chemicals in hand sanitizers is something that needs to be considered when used, so it reminds that when using it not to get close to the fire. In addition, using it too much will cause problems for sensitive skin, such as skin irritation. The majority of hand sanitizers on the market are made of alcohol with a fairly high percentage, one of the effects is that the hands become dry due to frequent use, some people experience allergies to the skin of their hands [1]. The most terrible effect is because alcohol is flammable, causing a case of a woman in Texas caught fire from lighting a candle after using hand sanitizer. At first the fire burned his hands then spread to burn his face and whole body within 5 seconds and the bottle of hand sanitizer that was next to the candle exploded when the fire grabbed his body. As a result, he suffered severe burns [2]. A boy in Bekasi, Indonesia caught fire because he played cooking next to his house, it is suspected that he used hand sanitizer to light a fire and grabbed his body [3]. Of course this is very dangerous. Based on some of the effects of using hand sanitizers made from alcohol, it is necessary to think about using hand sanitizers from natural ingredients or natural ingredients but still effective in killing germs.

Several studies have found that some plants contain antioxidants, antibiotics, antifungals, and even antivirals. One of them is red betel. Piper crocatum extract or red betel leaf extract is one of the traditional ingredients that has long been used empirically to treat various diseases, including diabetes mellitus, hemorrhoids, inflammation, cancer, increased uric acid levels, hypertension, hepatitis, and gratitis. Red betel leaf has twice the antiseptic power of green betel leaf [4]. Piper crocatum contains flavonoid and polyphenolic compounds which are antioxidant, antidiabetic, anticancer, antiseptic and anti-inflammatory [5]. The chemical constituents of red betel extract include essential oils, hydroxykavikol, kavikol, cavibetol, allylprokatekol, carvakrol, eugenol, p-cymene, cineole, cariofelen, cadmium estragol, terpenes, and phenyl propada. Carvakrol is a disinfectant and antifungal so it is used as an antiseptic medicine for bad breath and vaginal discharge [4].

Another plant, namely white galangal, also has antioxidant, antifungal, antibacterial substances such as red betel leaf and is even used for drugs to kill HIV/AIDS. Galangal is a tuber plant that consists of 2 types, namely galangal with white tubers (Alpinia ganggala) which is commonly used for cooking spices and galangal with red tubers (Alpinia purpura) which is commonly used for medicine. Research conducted by Lestari RP, Tendelilin R, and Handajani J at the Microbiology Laboratory of the Faculty of Medicine UGM in 2005 showed that at a concentration of 15% galangal, it was able to produce antibacterial inhibition with a diameter of 2,879 mm, while the control group that was given 5% alcohol concentration did not form a zone of inhibition. The results of this study indicate that white galangal essential oil has antibacterial properties against Staphylococcus aureus 302 which is resistant to the antibiotics ampicillin, amoxicillin, penicillin G, kanamycin, mecilinam and keftazidime [6]. Research conducted by Salni, et al in the Biology laboratory of the Sriwijaya University Palembang in 2013 showed that Alpinia galanga has antifungal compounds including phenolic compounds, in the form of yellowish white crystals. The compound is an antifungal compound Candida albicans [7].

Based on the description above, the researcher is interested in conducting a research "Utilization of Natural Ingredients Red Betel (Piper Crocatum) Extract and White Galangal (Alpinia Galanga) Extract as Raw Ingredients Hand Sanitizer". The research phase I research objective was to determine "Comparison of the Effectiveness of Piper crocatum Extract and Alpinia galanga Extract in Preserving Carp Flesh. This research is the basis for the next stage of research.

2 Method

The implementation of the research began with the manufacture of Piper crocatum Extract and Alpinia galanga Extract. The manufacturing process can be seen in the flow chart below:

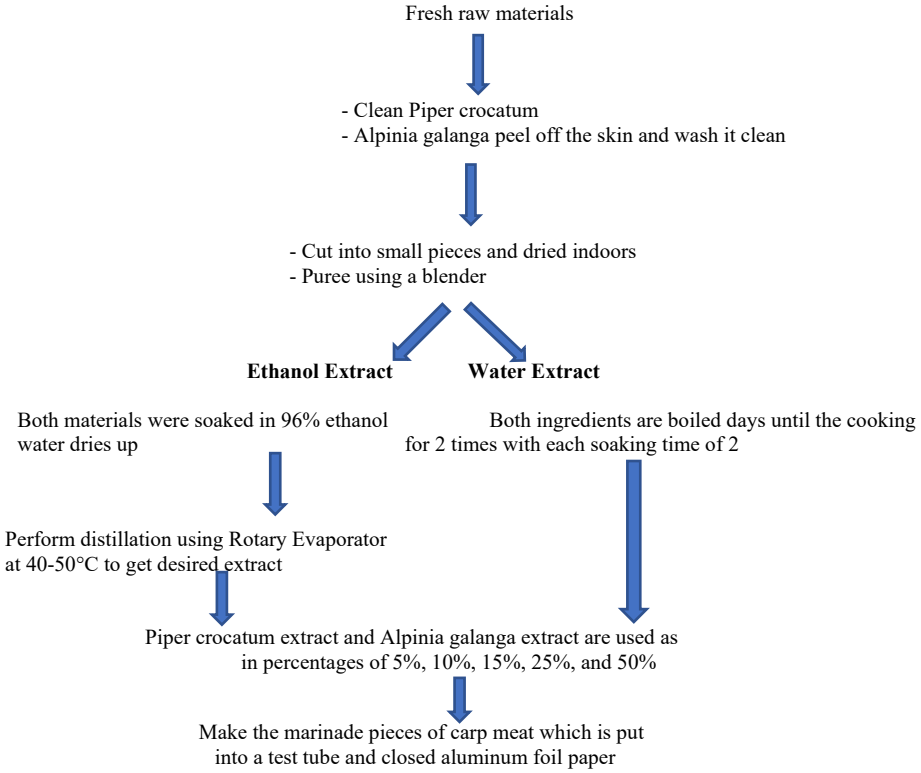


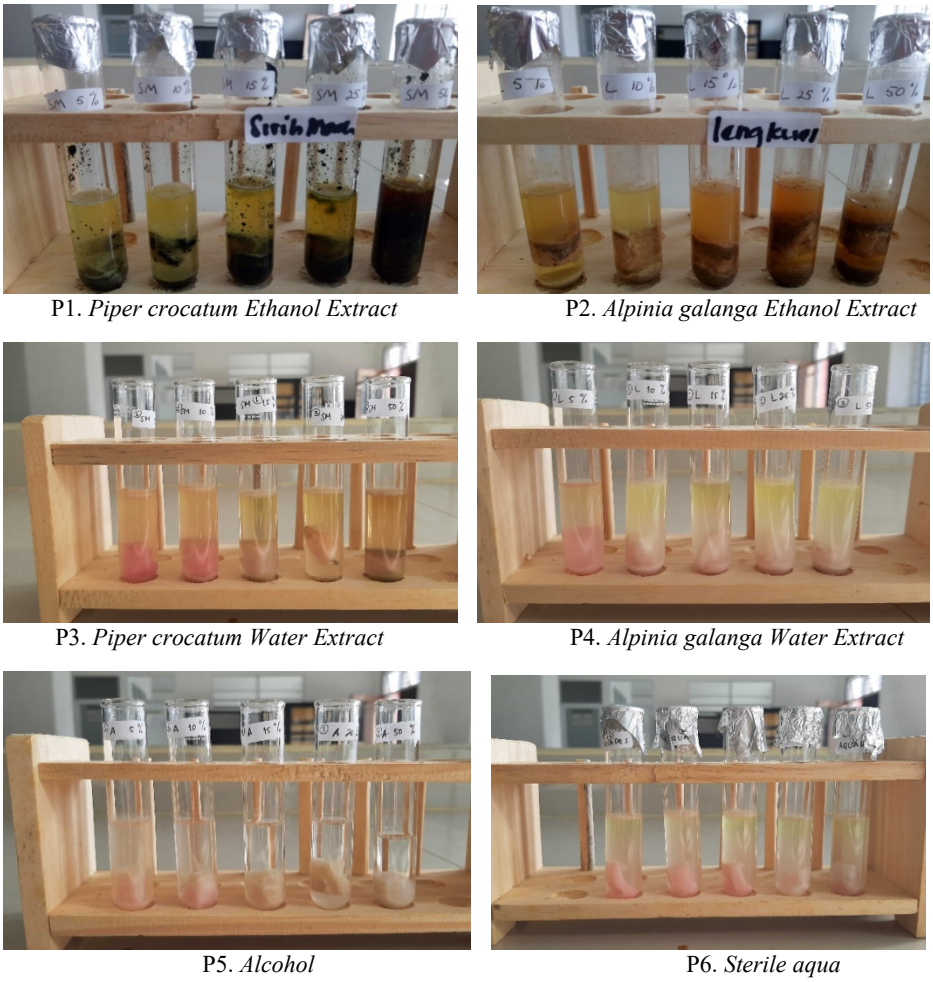
Fig. 1. Flowchart of Extract Making Process for Bath

The use of 96% ethanol solution is used because the raw material conditions are rather humid, without drying by heating or at high temperatures, for example by microwave. This is in accordance with research conducted by Tirta Yasa IG, et al in 2019 which stated that ethanol concentration had a very significant effect on yield, total phenol, total flavonoid, and antioxidant activity (IC50). The 90% ethanol concentration was the best treatment [8]. Differences in ethanol concentration can cause changes in the polarity of the solvent so that it affects the solubility of bioactive compounds. Widarta and Arnata reported that the concentration of ethanol affects the bioactive components, the higher the concentration of ethanol, the higher the bioactive components produced [9]. This research uses maceration or digestion technique for the separation process of ethanol and piper crocatum to get piper crocatum ethanol extract. According to Dewi SR, et all, one method that can be used is the extraction method by digestion, which is like maceration (soaking plant powder in a solvent) at a temperature of around 40-50^{0}C. The solvent will penetrate the cell wall and enter the cell cavity containing the active substance, so that the active substance will dissolve and will be pulled out together with the solvent [10].

The carp meat used is fresh fish meat that is brought alive to the laboratory and then cut into small pieces with a size of ± 1 cm x 1 cm x 1 cm so that it can be put into a test tube. The fish meat used is the white part of the meat. The assessment was carried out on the 3rd, 5th, 7th, 10th, 14th, 17th, and 19th days. The assessment was carried out by looking at the condition of the carp meat in the marinade of each solution with different percentages. Comparison of marinated carp meat pieces with Piper crocatum ethanol extract, Alpinia galanga ethanol extract, Piper crocatum water extract, Alpinia galanga water extract, alcohol as a positive control with each 5%, 10%, 15%, 25%, and 50% respectively, and 100% sterile aqua was also a control.

3 Result And Discussion

Below is the appearance of carp meat pieces on day 10.



P1. *Piper crocatum Ethanol Extract*

P2. *Alpinia galanga Ethanol Extract*

P3. *Piper crocatum Water Extract*

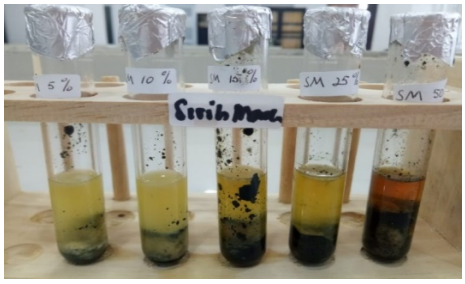
P4. *Alpinia galanga Water Extract*

P5. *Alcohol*

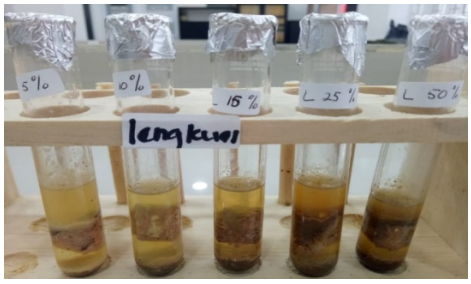
P6. *Sterile aqua*

Fig. 2. The Appearance of Carp Meat in the Marinade on the 10th Day

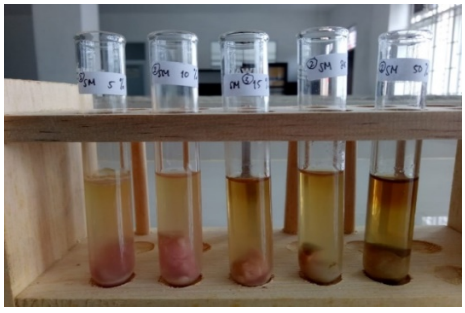
The picture below is the condition of the fish meat on day 17.



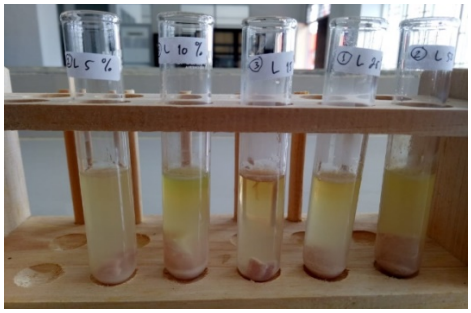
P1. *Piper crocatum Ethanol Extract*



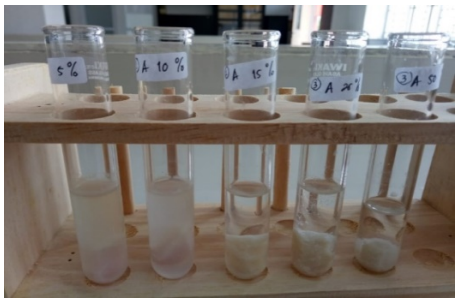
P2. *Alpinia galanga Ethanol Extract*



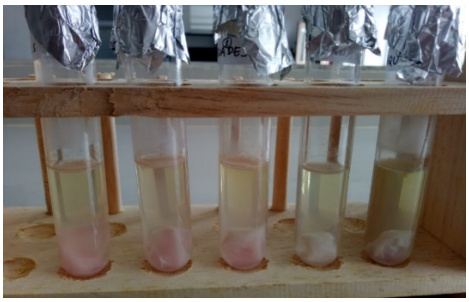
P3. *Piper crocatum Water Extract*



P4. *Alpinia galanga Water Extract*



P5. *Alcohol*

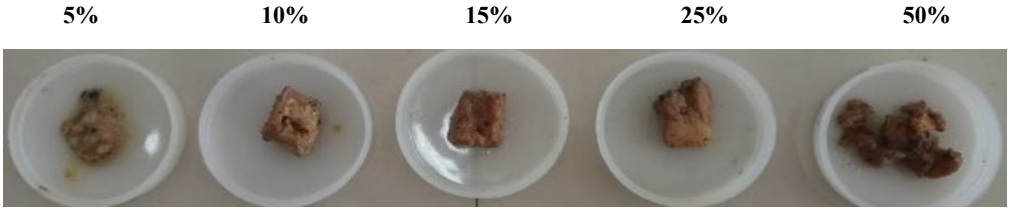


P6. *Sterile aqua*

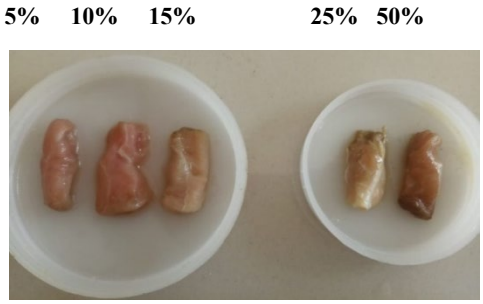
Fig. 3. Appearance of Carp Meat in Marinade on Day 17

It was found that carp meat soaked with 50% Piper crocatum ethanol extract was the best result, followed by 50% Alpinia galanga ethanol extract, 25% Piper crocatum ethanol extract, and 25% Alpinia galanga ethanol extract. This is in accordance with research conducted by Mustika Tonahi JM, et al in 2014, the higher the concentration of red betel leaf extract, the higher the percentage of antioxidant activity of red betel leaf extract [11]. In this study, the percentage concentration of red betel extract used was 50% and the Piper crocatum ethanol extract 50% of carp meat on day 19 had the best condition. Pictures of carp meat cuts on the last day, which is the 19th day, can be seen in Figure 3 below:

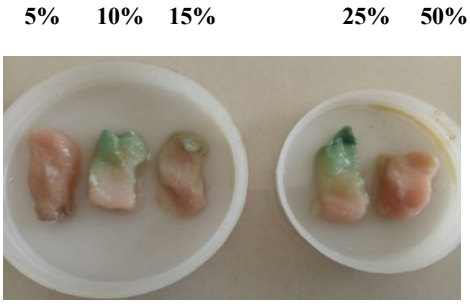
P1. *Piper crocatum Ethanol Extract*



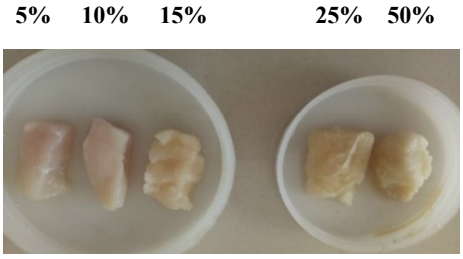
P2. P2. *Alpinia galanga Ethanol Extract*



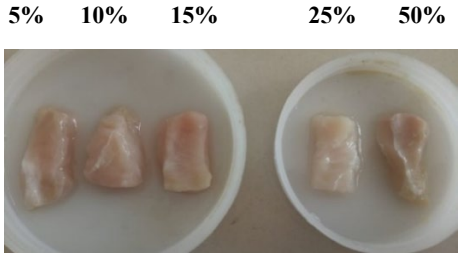
P3. *Piper crocatum Water Extract*



P4. *Alpinia galanga Water Extract*



P5. *Alcohol*



P6. *Sterile aqua*

Fig. 4. The Appearance of Carp Meat in the Marinade on the 19th Day

Alasalvar et all, (2001) conveyed that an assessment of the freshness of fish can be based on organoleptic [12]. The assessment of fish meat is in accordance with the organoleptic test of fresh fish according to SNI 2346:2011. In this study, organoleptic measurements were

limited to mucus, meat, and texture [13]. The odor test could not be carried out because on the 17th and 19th days it was difficult to distinguish the smell, especially the Piper crocatum water extract and Alpinia galanga water extract, all fish flesh had a foul smell accompanied by a crumbled texture. The color test was not carried out because red betel and white galangal give their own color due to the process of soaking the fish meat so that the assessment results can be biased.

In Figure 3 it is clearly seen that Piper crocatum ethanol extract and Alpinia galanga ethanol extract has a better appearance. The best percentage is the extract percentage of 50% on Piper crocatum and 50% on Alpinia galanga, then 25% on Piper crocatum and 25% on Alpinia galanga. Alcohol soaking in fish meat will also produce meat that is still good on the 19th day, because alcohol is indeed a substance that is used as a preservative. Meanwhile, fish meat immersion using sterile aqua looks less good than alcohol immersion, Piper crocatum ethanol extract, and white galangal ethanol extract. The appearance of meat with sterile aqua bath is almost the same as fish meat soaked with Piper crocatum water extract and Alpinia galanga water extract, which has a slightly thick layer of mucus and almost changes color, some even has mucus that is slightly lumpy and discolored. Dull cutlets, meat tissue is not strong and has a slightly soft texture.

After carrying out phytochemical tests on the ethanolic extract of Piper crocatum and ethanolic extract of Alpinia galanga, the results showed that the Piper crocatum ethanol extract contains alkaloids, tannins, steroids, and titerpenoids. These results are in accordance with the results of a study conducted by Pangesti RD, et al with the research title Comparison of Antibacterial Power of Piper betle L. Extract and Oil against Streptococcus mutans bacteria. The results showed that the phytochemical screening results in piper crocatum extract were positive for flavonoids, saponins, tannins, terpenoids and phenols [14]. According to the results of research by Mustika Tonahi JM, et all, the results of Piper crocatum leaf extract have an IC50 value of 47.45 ppm and are included in the group of very strong antioxidants [11].

The results showed that piper crocatum leaf extract has good antioxidants because it can preserve fish even on the 19th day. Research conducted by Candrasari A, et all showed that the ethanol extract of red betel leaf (Piper crocatum Ruiz & Pav.) had an inhibitory effect on growth of Staphylococcus aureus ATCC 6538 at concentrations of 10%, 20%, 40%, 80% and 100% [15]. According to Fitri Kusuma SA, et all, the results of testing the antitrichomonas activity of Piper crocatum ethanol extract showed that the greater the concentration of the extract used, the higher the number of dead T. vaginalis cells [16]. From several research results on these bacteria, it shows that piper crocatum extract can kill germs and this supports the ultimate goal of this research to make piper crocatum extract as a basic ingredient for making hand sanitizers.

Meanwhile, the Alpinia galanga ethanol extract contains flavonoids, tannins, steroids, and titerpenoids. These results are almost the same as the results of research conducted by Melanathuru V, et al, phytochemical screening of water extracts of Alpinia calcarata and Alpinia galanga has revealed the presence of flavonoids, terpenoids, phenols, carbohydrates and proteins [17].

The ethanol extract of Alpinia galanga based on the observations of Rao K, et all, can fight pathogens, including; Bacillus subtilis MTCC 2391, Enterobacter aerogene, Enterobacter cloacae, Enterococcus faecalis, Escherichia coli MTCC 1563, Klebsiella pneumoniae, Pseudomonas aeruginosa MTCC 6642, Salmonella typhimurium, Staphylococcus aureus and Streptococcus epidermis. The conclusion of this study is that Alpinia galanga) can be used as a source of new generation drugs. Galangal has a strong antimicrobial in the development of

natural medicine, all parts of the galangal plant can be used [18]. Research conducted by Joseph S and Mathew B in 2014 showed that nanoparticles of white galangal (Alpinia galanga) were evaluated for antimicrobial activity by the diffusion method both against S. aureus, B. subtilis, V. cholera, S. paratyphi, and A. niger, was highly toxic to all tested pathogenic strains [19] [20]. Melanathuru V, et all showed that white galangal (Alpinia galanga) extract showed the highest antioxidant activity in all tests than galangal (Alpinia calcarata). Alpinia galanga is rich in phenols and flavonoids which can be useful for the development of protein anticancer drugs [17].

4 Conclussions And Suggestion

The conclusions in this study include; Piper crocatum ethanol extract has the best antimicrobial ability with a percentage of 50%, followed by a percentage of 25%. Alpinia galanga ethanol extract has the best antimicrobial ability with a percentage of 50% followed by a percentage of 25%. The higher the percentage of Piper crocatum ethanol extract and Alpinia galanga ethanol extract the higher the antimicrobial content. Piper crocatum ethanol extract contains alkaloids, tannins, steroids, and titerpenoids, whereas Alpinia galanga ethanol extract contains flavonoids, tannins, steroids, and titerpenoids. Based on the results of this study, it can be recommended that Piper crocatum ethanol extract 50% and 25%, Alpinia galanga ethanol extract 50% and 25% will be tested for microbes in a petri dish, before being used as a raw ingredient for hand sanitizer.

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