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Utilization of Aur-Aur Grass as A Natural Hand Sanitizer in Order To Prevent The Spread of The Covid-19 Virus

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Abstract

Indonesia is currently amid a Covid-19 virus pandemic. One of the efforts that can be done to prevent the spread of the Covid-19 virus is to wash your hands with soap, or you can use a hand sanitizer. However, hand sanitizers are mostly made of chemicals, many people feel side effects including dry skin, dermatitis, and irritation. This research aims to make hand sanitizer products made from natural ingredients, namely from extracts of aur-aur grass (Commelina diffusa Burm F.). Phytochemical tests showed that aur-aur grass contained 5,188.73 ppm flavonoid compounds, 8,673.60 ppm total phenol (tannin), and 466.30 ppm alkaloids. The manufacture of hand sanitizers was carried out in four variations with each sample having aur-aur extract levels of 5%, 10%, 15%, and 20%. Of the existing hand sanitizer products, all of them have a pH of ±5 and get good responses from satisfaction values above 80%. Hand sanitizer products also can inhibit bacterial growth. The increase in extract levels in the hand sanitizer is directly proportional to the ability to inhibit bacteria, as shown by sample D which has an average inhibition zone of 9.77 mm.

Keywords: Covid-19, hand sanitizer, aur-aur grass, flavonoid, tannin, alkaloids.

INTRODUCTION

Virus Covid-19 was first discovered in December 2019 in Wuhan, the capital of Hubei, China, which is thought to have originated from bats (Yuliana, 2020). This virus spread so fast that it became a worldwide pandemic, including in Indonesia. This virus was first detected in Indonesia on March 2, (Sukur & Kurniadi, 2020). Various efforts have been made by the government to break the chain of the spread of Covid-19. One of the most effective ways to prevent the spread of Covid-19 is to cultivate 5M habits (wearing masks, washing hands with soap and running water, maintaining distance, staying away from crowds, and limiting mobilization and interaction). Washing hands using soap and running water is an effective way to clean dirt and bacteria that stick to the surface of the skin. However, washing hands is a hassle because, in the current new normal, many places do not provide proper handwashing facilities.

One of the innovations in cleaning products that are used without the need for running water is hand sanitizer. Hand sanitizer is a type of cleaning fluid that can kill microorganisms on hands, made from alcohol-based ingredients with use without rinsing water. According to the Center for Disease Control (2009), hand sanitizers are divided into two types, namely hand sanitizers that contain alcohol and do not contain alcohol. Alcohol-based hand sanitizers have an antimicrobial effect 60-95% better than non-alcoholic hand sanitizers.

The use of hand sanitizers has several side effects such as dry skin, dermatitis (burning sensation and peeling skin), and irritation caused by chemical contact with the skin (Wicaksono & Zuhri, 2020). To overcome the side effects of using these chemicals, natural ingredients can be used. One type of plant that can be used as an alternative in overcoming the side effects of using chemicals is Aur-aur grass (Commelinadiffusa BurmF.). *Commelina diffusa Burm* F. is a creeping plant, round and soft, the leaves are light green and long, the roots and shoots are branched, and the tips of the stems are curved with a height of 5-60 cm. This plant lives mainly in humid areas, with an altitude of 1-2000 m above sea level, and is mostly found in ditches, landfills, and under bamboo trees, especially on clay-rich in humus.

The leaves of the aur-aur plant can be used to treat wounds, fever, headaches, and laxative sweat

(Widhyastini, Yuliani, & Nurilmala, 2017). Based on the results of phytochemical tests conducted by (Mensah, Mireku, Oppong-Damoah, & Amponsah, 2014) and (Suganya & Jothi, 2014) showed that aur-aur leaves contain several compounds such as alkaloids, flavonoids, triterpenoids, tannins, and phytosterols. These secondary metabolites have biological activity as antimicrobial substances. , antioxidant, anticancer, and antiallergic (Mere, Bintang, & Safithri, 2021).

Alkaloids are found in plant and animal tissues and are the most abundant secondary metabolite compounds containing nitrogen. Alkaloids in aur-aur plants can be found in flowers, seeds, twigs, leaf roots, and bark. These compounds are efficacious as antidiarrheal, antidiabetic, antimicrobial, and antimalarial (Supriningrum, Fatimah, & Purwanti, 2019). In addition, alkaloids also have benefits that can stimulate the nervous system, raise low blood pressure, reduce pain, as a sedative and heart disease medication.

According to (Wang et al., 2016), flavonoid compounds are secondary metabolites of polyphenols and have various bioactive effects including antibacterial, antiviral, and anti-inflammatory. Flavonoids play a role in reducing immunity in target organisms through protein denaturation in organism cells (Nur, Mu'nisa, & Hala, 2019). Potentially medicinal plants containing flavonoids generally have antioxidant, anti-inflammatory, anti-allergic, antibacterial, antiviral, and anticancer activities. Meanwhile, tannins are active compounds of secondary metabolites that are efficacious as antibacterial, astringent, antidiarrheal, and biological antioxidants (Malangngi, Sangi, & Paendong, 2012). Tannins can inhibit and prevent the perfect formation of bacterial cell walls so that bacterial cells will die (Sapara, 2016).

Based on the three compounds contained in aur-aur grass, it can be said that this plant has the potential to be used as raw material for hand sanitizers, especially when viewed from its antibacterial and antiviral benefits. Flavonoids, alkaloids, and tannins can be obtained by extraction through the maceration method. Maceration is an extraction process by immersing the sample using a compound solvent at room temperature. This process is very beneficial in taking compounds from natural ingredients because immersion of plant samples can break cell membranes due to pressure differences on the inside and outside of the cell so that the compounds to be extracted will be dissolved in organic solvents. The choice of the type of extractor (solvent) for the maceration process will provide high effectiveness by paying attention to the level of solubility of the compound from the extracted natural ingredients (Yulianingtyas & Kusmartono, 2016) .The advantage of the maceration method is that it is easy and does not require heating so the material is less likely to be damaged. The old maceration method will cause a lot of compounds to be extracted so that compounding is more effective (Susanty & Bachmid, 2016) .

Previous research on aur-aur grass has existed, but is only limited to its use as an analgesic or pain reliever. Meanwhile, other studies that use natural ingredients for hand sanitizers exist, for example: (Triyani, Pengestuti, Khotijah, Fajarwati, & Ujilestari, 2021) who made hand sanitizers from betel leaf and lime leaf extracts, (Lestari, Suci, & Latief, 2020) from Jeruju leaves (Achantusilicifolious) and (Noviardi, Himawan, & Anggraeni, 2018) from sweet fragrant mango seed extract. Considerations in the selection of natural ingredients are also based on the presence of alkaloids, flavonoids, and tannins in them. In this study, the manufacture of hand sanitizers is made from natural ingredients of aur-aur leaf extract. In addition to increasing the use value of this weed plant, its use is also expected to overcome the side effects of using chemicals that are commonly used in hand sanitizers that exist today.

METHODOLOGY

Materials and Instrumentals

The equipment used in this study were: knife, cutting board, digital kitchen scale, dark amber bottle, beaker, filter, distillation set, universal pH, petri dish, test tube, Erlenmeyer, Whatman filter paper, cotton bud, caliper, ose, Bunsen, cotton, and tweezers. The materials used in this study were an aur-aur leaf, 96% technical ethanol, 96% antiseptic ethanol, glycerol, distilled water, Nutrien Agar (NA), Mc. Farland 0.5, and 0.9% NaCl. The test bacteria used were *Staphylococcus aureus, Bacillus subtilis, and Escherichia coli.*

Methods

The study began with the extraction of aur-aur leaves. Aur-aur leaves are cleaned by washing and draining, then chopped. Samples weighing 250 g were macerated with 96% technical ethanol solvent in a ratio (1:6). Maceration was carried out for 3x24 hours, shaking once every 1 day. The results of the maceration are filtered to separate the solids from the liquid. Then distillation was carried out to separate the solvent from the aur-aur leaf extract. Aur-aur leaf extract was sampled for phytochemical test using UV-Vis Spectrophotometry method.

The manufacture of hand sanitizers begins by mixing 178.5 mL of 96% antiseptic ethanol, 10 mL of glycerol, aur-aur leaf extract with various extracts of 5%, 10%, 15%, and 20% of the 255 mL hand sanitizer. Then, distilled water was added to a volume of 255 mL and stirred until homogeneous. After that, it is packed in spray bottles with a volume of 15 mL per bottle.

Data Analysis

Analysis of the quality of hand sanitizers includes organoleptic tests, pH tests, and antibacterial activity tests. The organoleptic test was carried out with the experimental method of using hand sanitizer products on the palms of the hands. An organoleptic test was carried out by spraying hand sanitizer on samples A, B, C, and D which had extract concentrations of 5%, 10%, 15%, and 20%. The test was conducted on 15 respondents to determine the effects of using hand sanitizer products. Then test the pH, which is carried out using universal pH paper.

The antibacterial activity test was carried out using the paper disc method or the Kirby Bauer method, namely inoculation of bacteria from slanted media into a test tube containing 0.9% NaCl using the standard Mc. Farland 0.5 to produce bacterial inoculum with the amount of 1.5x108 bacteria/mL. then inoculate the bacterial inoculum in 0.9% NaCl into a petri dish containing NA using a sterile cotton bud and then incubate for 15 minutes. The filter paper that had been given the sample was placed on top of the inoculum in a petri dish, then incubated for 24 hours. The diameter of the zone of inhibition of bacterial growth around the paper disc was measured. The best results have the largest inhibition zone diameter.

RESULTS AND DISCUSSION

Phytochemical Test

Aur-aur plants are weeds that are commonly found in rice fields. This plant is not widely known let alone used, but behind all that this plant contains several compounds that are very useful for humans, including flavonoid compounds, tannins, and alkaloids. From the results of quantitative tests carried out on aur-aur leaf extract using the UV-Vis spectrophotometric method, it is known that the phytochemical content in the aur-aur grass extract is as shown in Table 1. With the content possessed, this plant can be used as one of the natural ingredients for the good of humans. One of the products that can be produced is a hand sanitizer product to prevent the spread of the Covid-19 virus.

Table 1. Phytochemical testing result of aur-aur extracts

Parameter	Content (ppm)
Flavonoids	5188.73
Tannins	8673.60
Alkaloids	466.30

Even the content of flavonoid compounds, tannins, and alkaloids in aur-aur is greater than that of mangrove leaves which only contain 1,195.00 ppm flavonoids, 576.70 ppm tannins, and 123.77 ppm alkaloids (Kasitowati, Yamindago, & Safitri, 2017). In addition, high levels of tannins and flavonoids in the aur-aur extract also increase antioxidant activity. As stated by (Mahardika & Roanisca, 2018) which states that there is a relationship between increased antioxidant activity and increased tannin and flavonoid compounds. Natural antioxidants can protect the human body from damage caused by free radicals, so it is very beneficial if Aur-Aur extract is used as a raw material for hand sanitizers because, in addition to functioning as antibacterial and antiviral, it can also prevent cancer due to its high antioxidant capacity.

Hand Sanitizer Production

Making hand sanitizer is done by mixing each ingredient in a glass beaker and stirring until homogeneous. Hand sanitizer is made with 4 variations of aura extract levels, namely 5%, 10%, 15%, and 20%. Physically, the hand sanitizer product produced is clear yellow in color and has a distinctive smell with an increasing color and odor in line with the increasing extract content. The resulting hand sanitizer product was then subjected to a feasibility test which included a pH test, organoleptic test, and antibacterial activity test.

pH Test

The pH or acidity test of hand sanitizers is carried out using universal indicators. In each sample, the test resulted in a pH reading of 5-6. This indicates that the aur-aur extract does not have a major influence on the acidity of the solution. These results, it shows that the pH of the sample has met the requirements of SNI 06-2588:2017 regarding the quality requirements of liquid soap.

Organoleptic Test

An organoleptic test is a test that aims to determine the most comfortable hand sanitizer sample to use. This was done by testing hand sanitizer products on 15 respondents to try to use the samples that had been prepared, starting from samples A, B, C, and D.

After using them, each respondent was given several questions to find out which sample was the most comfortable to use. From the organoleptic test, the results are as shown in Table 2.

Table 2. Organoleptic Test Result

Effect on skin	Results (%)			
	A	B	C	D
Not Itchy	80.0	80.0	86.7	80.0
Not Hot	86.7	80.0	86.7	80.0
Not Dry	86.7	86.7	93.3	100.0
No smell	73.3	60.0	53.3	26.7
No sticking	66.7	66.7	53,3	53.3
Colorless	100.0	100.0	100.0	100.0
No rash	100.0	100.0	93.3	100.0
Not peeling off	100.0	93.0	100.0	100.0
Average	86.7	83.3	83.3	80.0

The significant difference from the questionnaire is in several question points, namely, it does not cause dryness, does not leave an odor, and does not leave a sticky residue. From these three points, it is known that sample A has the highest percentage, so it can be seen that sample A is the best sample among the four samples tested in the organoleptic test which is assessed from the side of the convenience of use and positive response to the absence of side effects caused by the use of hand sanitizer products.

Antibacterial Activity Test

The antibacterial activity test was carried out using the Kirby Bauer method to determine how much ability each hand sanitizer sample had in inhibiting bacterial growth.

Table 3. Antibacterial activity test results

Sample	*E.Coli*	*B.Subtilis*	*S. Aureus*
A (5%)	3.6 mm	5.3 mm	7.1 mm
B (10%)	6.6 mm	8.6 mm	7.5 mm
C (15%)	7.45 mm	15.6 mm	5.1 mm
D (20%)	9.3 mm	11.3 mm	8.7 mm
K-	0 mm	0 mm	0 mm
K+	9.96 mm	13.5 mm	9.3 mm
Ketanol	5.8 mm	12.3 mm	6.6 mm

This test is carried out by giving the sample to the media that has been overgrown with bacteria. Table 3 shows that the negative control in the form of blank filter paper (K-) did not produce an inhibition zone. In *Escherichia coli* bacteria, the higher the concentration of the extract, the greater the inhibition zone produced. This is following this research (Idrus, Kurniawan, Mustapa, & Wibowo, 2021) which also showed the same thing, namely increasing the concentration of extracts with high antibacterial content will cause an increase in the diameter of the inhibition zone for microorganisms. Meanwhile, Bacillus subtilis showed that sample C gave a large inhibition zone, but samples A, B, and D also showed an increase in direct proportion to the concentration of the extract. For *Staphylococcus aureus*, the resulting inhibition zone was greater in samples A, B, and D but decreased in sample C.

Thus, the ability to inhibit antibacterial activity is directly proportional to the extracted content contained in the hand sanitizer. This means that the more aur-aur extract is added, the better the antibacterial effectiveness against *Staphylococcus aureus*, *Bacillus subtilis*, and *Escherichia coli*. From all the samples tested, it can be concluded that sample D with 20% aur-aur extract had the greatest antibacterial power compared to other samples, as indicated by the average diameter of the inhibition zone of 9.77 mm.

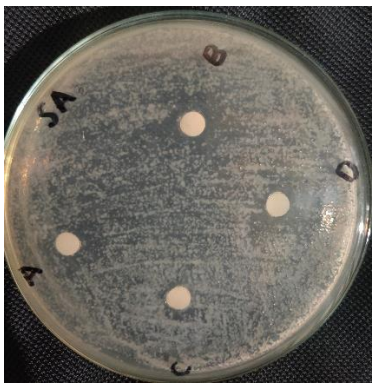

Figure 1. Bacterial inhibition growth zone

Figure 1 shows the area of inhibition of the sample against bacterial growth. Inhibition of bacteria can be due to the presence of flavonoid compounds, tannins, and alkaloids that can damage cells in bacteria. Flavonoids are able to form complex compounds with bacterial cell proteins through hydrogen bonds, resulting in the bacterial cell membrane becoming unstable and eventually cell lysis (rupture) (Ainurrochmah, Ratnasari, & Lisdiana, 2013). Tannins also have antibacterial activity through protein deposition, inactivating enzymes, and inactivating genes, while alkaloids have the ability as antibacterial through disruption of peptidoglycan in bacterial cells, so that the cell wall layer cannot be formed completely and eventually causes cell death (Ernawati & Sari, 2015). With the proof of this antibacterial activity test,

it is hoped that this product can be useful in the community, and it is not impossible that the community can produce their own hand sanitizer from this aura. Moreover, this product, apart from being able to reduce spending during a difficult time of the pandemic, is also safer for health.

CONCLUSION

From the research that has been done, it can be seen that aur-aur grass contains flavonoid compounds, tannins, and alkaloids. As for the hand sanitizer sample, it is known that the pH value is following the standard, which is in the range of 5-6. The results of the skin irritation test show that sample A with a level of 5% is the sample with the best response when used by respondents. The antibacterial activity test showed that sample D with an extract content of 20% was the sample with the greatest ability to inhibit bacterial growth as indicated by the average diameter of the inhibition zone of 9.77 mm, so it can be concluded that the hand sanitizer product from aur-aur grass is effective. in inhibiting the growth of bacteria of the type *Escherichia coli*, Bacillus subtilis, and *Staphylococcus aureus*.

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