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The Influence of Operation Conditions of Gedi Leaf Drying Process (*Abelmoschus Manihot. L*) On Antioxidant Activity

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ABSTRACT

Gedi leaf (*Abelmoschus manihot L*) is a type of plant that is categorized in a group of medicinal plants / herbal plants and grows mostly in North Sulawesi and is a tropical plant of the Malvacea family, gedi leaves contain flavonoids, tannins, alkaloids, anthraquinone saponins and anthocyanins which have antioxidant activity. Antioxidants are important compounds in maintaining a healthy body. Because it functions as a free radical scavenger. In this study, examined the use of gedi leaf drying as an alternative source of antioxidants to be applied for face masks. Gedi leaf powder sample was tested by Proximate testing to determine the characteristics of gedi leaf powder and gedi leaf powder used as a powder mask preparation. The method used to obtain dry gedi leaves is the oven with a temperature variation used 40; 50; 60 ° C and 5 time variations; 6; 7 hours. The results showed that the best yield of drying gedi leaf powder against time to temperature was 5 hours with a temperature of 70°C, from the best yield it was processed into masks divided into 3 formulas, namely 10; 20; 30% dried gedi leaves in a 40gr formula with rice flour as an added ingredient. From the results of making 3 dry gedi leaf mask formulas tested proximate with the help of 20 panelists, the results of the panelists' assessment of formula 2 with 20% gedi leaves are preferred and get a value of 20% higher. Measurement of the 3 formulas obtained pH values of gedi leaf masks of 5.63, 5.68, and 5.72.

INTRODUCTION

Plants have many benefits for humans including as a source of food and a source of plant compounds that are used to cure a disease, so that the use of medicinal plants as medicine tends to increase. Plants are the main source of medicinal compounds, and more than 1000 species of plants are used as medicinal raw materials. Plants are the main source of medicinal compounds, and more than 1000 species of plants are used as medicinal raw materials. Indonesia has a large biodiversity potential to obtain new medicinal compounds, one of which is red gedi leaf (*Abelmoschus manihot L.*) [1-8].

Gedi leaf (*Abelmoschus manihot L*) is a tropical plant of the Malvaceae family, long known in North Sulawesi as a vegetable plant, and the community also uses it as a traditional medicine [9] Abelmoschus is a group of shrubs with fast growth, plant height up to 2 meters, long leaves 20-40 cm long, with 3-7 leaves [10].

According to [11], Gedi plant (Abelmoschus manihot) is a plant that has the potential as a source of antioxidants. Flavonoids are one of the natural antioxidants needed by the body. According to [6], the results of the study (Pine et al. 2010) indicated that the leaves of gedi (*Abelmoschus manihot L.)* contained high levels of flavonoids (23-41%) and had the potential to be a source of antioxidants. The antioxidant activity of the gedi leaf ethanol extract increased in line with the increase in the total concentration of flavonoids, and the highest activity was found in the 96% ethanol extract with an IC50 value of 0.575 mg g-1.

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The use of antioxidant compounds is growing, both for food and in the world of beauty, because the use of antioxidants is very good for creating healthy skin and repairing the tissue of cells on dead skin. Gedi leaves also have a high water content that allows decay damage or allows enzyme activity to occur. This causes gedi leaves not to be utilized optimally. Even though gedi leaves contain high levels of antioxidants and flavonoids and can be used as an alternative medicine. Base result of study [12], the gedi leaf extract tested with Wilstater reagent showed that there were many flavonoids, which when reacted a yellow solution formed. The color change occurs because the concentrated Mg and HCl metals contained in the Wilstaterme reagent reduce the benzopyrone core in the flavonoid structure and a color change occurs. To prevent damage from gedi leaves, one method that can be used is the drying method. This drying method is an effective method and can increase the shelf life. To inhibit the growth of these microorganisms, it can be done by reducing the water content through the drying process. In this study, the characteristics of how much the antioxidant content of gedi leaves will be tested, with the drying method at variations in temperature and drying time. The drying media used in this research process used an oven and tested the characteristics of gedi leaf powder such as protein, carbohydrates, ash content using the proximate test, and tested the antioxidant activity.

The use of natural ingredients as raw materials for face masks has been widely used, such as face masks made from guava leaf powder [13], moringa leaf masks from research [14] and making masks from papaya leaf powder by [15]. However, the use of gedi leaves as natural face masks has not been carried out, and the use of gedi leaves as natural masks is very potential to be carried out so this research will use gedi leaves with their characteristics as natural gedi leaf masks followed by organoleptic tests and mask characteristics tests such as pH of gedi leaf masks.

EXPERIMENTAL METHOD

Tools and Materials

The tools used are oven, hotplate, digital scale, thermometer, oven thermometer, saucer, blender, 40 mesh sieve. The materials used are gedi leaves, rice flour, water, and aquades.

Method

By drying the fresh gedi leaves using an electric oven with a temperature of 50°C for 5.6 and 7 hours then again drying with 60°C for 5, 6, 7 hours and 70°C for 5.6 and 7 hours, after drying then mashed using a blender then sieved with a size of 40 mesh to produce gedi leaf powder. Then tested the water content, testing the moisture content was carried out by the gravimetric method, namely weighing the sample then put it in an oven and then cooled then weighed until a constant weight was obtained, water content analysis was carried out three times to obtain data accuracy, then making masks with gedi leaf powder and additional Rice flour as an adhesive in gedi leaf mask preparation, was carried out with a proximate test and pH test for the gedi leaf mask.

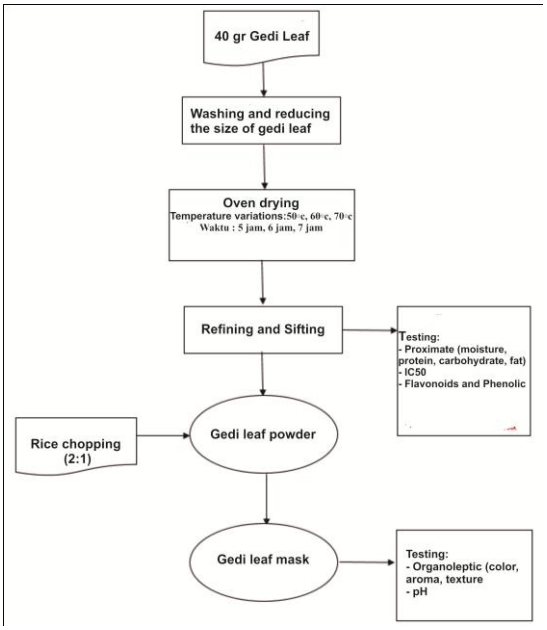

Fig. 1. Process of Drying

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RESULTS AND DISCUSSION

Gedi Leaf Drying

This section describes the Gedi Leaf drying system with an oven. As well as knowing the effect of temperature and time used on the product, namely gedi leaf flour. The time used is 5, 6, 7 hours and temperatures of 50°C, 60°C, 70°C. In the experiment, the characteristic test of gedi leaf water content used came from farmers in Depok as much as 40 grams and was carried out 3 times. Determination of the water content of gedi leaves is carried out to find out what% the water content is in the dried sample. This water content test is carried out by the oven method, which is based on the evaporation of water in the material by heating, then weighing it until the weight is constant. In determining the water content, the weight of the plate used was Wo = 45.7 grams and the initial weight of Gedi Leaf nata (Ws-Wo) = 40 grams. The following are the results obtained:

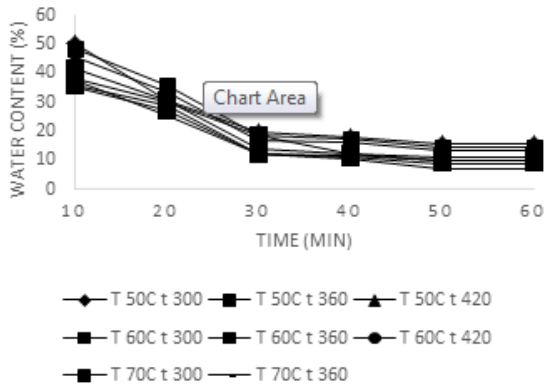

Fig. 2. Gedi Leaf Drying Curve

Figure 2 states that the drying process is the process of taking or decreasing water content to a certain extent so that it can slow down the rate of material damage due to biological and chemical activities before the material is processed (used). One of the parameters that affect the drying time is the initial moisture content and dry matter content based on the results of the experiment, the water content test of the gedi leaf sample with a weight of 40 grams is obtained after the process with variations in time and temperature is tested again for 1 hour in the second minute. 30 and 40 gedi leaf sample weights have started to be constant or there is no weight loss. At this constant weight, it can only be taken as a value to determine the weight of gedi leaf powder. Figure 3 shows that the moisture content of the product obtained decreases with increasing temperature used. The basis of the drying process is the evaporation of material water into the air due to the difference in water vapor content between the air and the dried material. In order for a material to be dry, the air must have a moisture or moisture content lower than the material to be dried [17]. In the picture above, it can be seen that the greater the temperature of the dryer used and the longer the drying time has an effect on the decrease in water content, the greater the percent reduction in water content of gedi leaves. if the drying temperature is high, the heat required for water evaporation on gedi leaves is reduced. The greater the difference between the temperature of the heating medium in this case in the form of hot air and dried gedi leaves, the greater the speed of heat transfer into the gedi leaves, so that the evaporation of water from the gedi leaves will be more and faster. After experiencing the drying process, the percent moisture content with a temperature of 50°C was obtained, 39.18% in 5 hours, 35.82% in 6 hours and 33.75% with 7 hours, meanwhile with a temperature of 60°C, the results were obtained. 27.45% with a time of 5 hours, 24.45 with a time of 6 hours, and 22.50% with a time of 7 hours and with a temperature of 70°C, the results were 33.73% with a time of 5 hours, 24.03% with a time of 6 hours and 18, 03% with 7 hours.

Effect of Drying Rate Conditions on Water Content

From the drying rate equation it can also be seen that the drying rate constant (k) increases with increasing drying time given to the drying process. The greater k value with increasing drying temperature indicates the faster drying rate occurs. Similar results were obtained [18]. The k parameter increases with increasing kiwi drying air temperature for the entire temperature range carried out in the experiment. The higher the temperature of the drying air, the greater the k value because the heat is given higher and the evaporation of water occurs faster. Seen in curve 4.2, the temperature of 60°C with 7 hours, 70°C with 6 hours and 7 hours has increased, this proves

that the greater the temperature, the more the drying rate (k) is obtained.

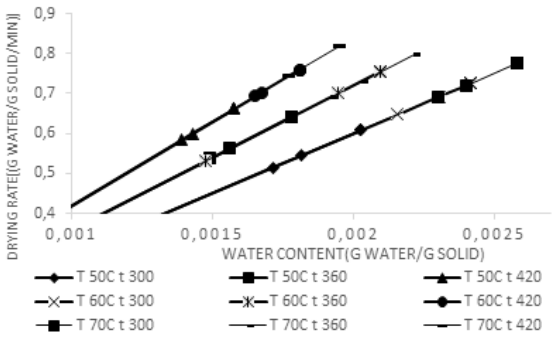

Fig. 3. Gedi leaf drying rate curve against moisture content at temperatures of 50 °C, 60 °C, and 70 °C

The drying rate of gedi leaves occurs faster at lower drying air speeds with the same temperature setting because the actual temperature in the drying air is higher. At the same air velocity and different temperature settings, the effect of temperature on the drying rate of gedi leaves is very clear on the drying curve, drying at high temperatures causes a higher drying rate because the capacity of the dryer air to hold water becomes larger [19].

The yield of drying gedi leaves into dried gedi leaf powder

The drying process is the process of taking or decreasing water content to a certain extent so that it can slow down the rate of material damage due to biological and chemical activities before the material is processed (used). One of the parameters that affect the drying time is the initial moisture content and dry matter content based on the results of the experiment, the water content test of the gedi leaf sample with a weight of 40 grams is obtained after the process with variations in time and temperature is tested again for 1 hour in the second minute. 30 and 40 gedi leaf sample weights have started to be constant or there is no weight loss. At the constant weight, it can only be taken as a value for determining the moisture content of Gedi leaves.

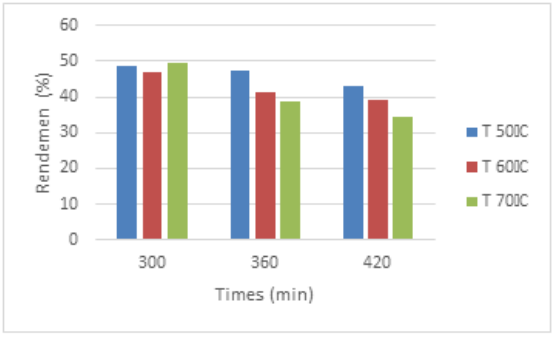

Fig. 4. Graph of Gedi Leaf Powder Yield

In the picture above, it can be seen that the greater the drying temperature used and the longer the drying time has an effect on decreasing the yield of gedi leaves, the greater the percentage reduction in gedi leaf yield. if the drying temperature is high, the heat required for water evaporation on gedi leaves is reduced. The greater the difference between the temperature of the heating medium in this case in the form of hot air and dried gedi leaves, the greater the speed of heat transfer into the gedi leaves, so that the evaporation of water from the gedi leaves will be more and faster. After experiencing the drying process, the% yield of the yield at a temperature of 50°C was obtained 48.6% in 5 hours, 47% with 6 hours and 49.6% with 7 hours, meanwhile with a temperature of 60°C the results were 47, 2% with a time of 5 hours, 41.2% with a time of 6 hours, and 38.6% with a time of 7 hours and a temperature of 70°C, the results were 43.2% with a time of 5 hours, 39.2% with a time of 6 hours. and 34.3% over 7 hours. From these data, it was obtained that the largest% yield was at 49.6% with a drying temperature of 70°C for 5 hours.

Results of Proximate Testing Analysis of Dried Gedi Leaf Powder

In the proximate analysis test of dry gedi leaf powder that has been dried at 70 °C and the results of gedi leaf extract, the results are:

Table 1. Proximate Test Results for Dried Gedi Leaf Powder

Parameter	Unit	Test Results
Protein	%	27.135
Carbohydrate	%	41.675

Total energy	kcal.100 g	329.5
Water content	%	11.235
Total fat	%	6.095
Energy & fat	kcal.100 g	54.5
Ash content	%	13.83

The results of the Proximate test above were carried out using gedi leaves which had been dried at a temperature of 70 °C for 5 hours. The large protein yield was obtained in this test. The high protein content in gedi leaf powder has the potential to lighten the skin, this was shown in Monica Hartini's research, 2019.

Organoleptic Test Results for Gedi Leaf Powder Mask

Organoleptic tests for powder mask products were carried out using the hedonic test method. The preference test aims to determine the acceptance of the likes or dislikes of a product. The preference test is carried out using human senses such as sight, smell, and touch as the main means of measuring, assessing, or testing a product [8]. The organoleptic test will involve 20 panelists in providing an assessment of the level of liking and dislike of powder mask products without comparing products on a scale of like to very dislike (1-5). This test is subjective and the panelists conducting the test are untrained panelists. The parameters tested were color, aroma, texture, homogeneity, and general preference.

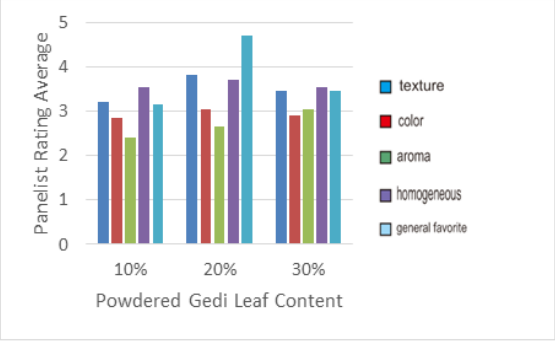

Fig. 5. Powdered Gedi Leaf Content

The preference test is an assessment of the overall mask formula based on the color, aroma, viscosity, and texture parameters that are in the gedi leaf mask. Based on the results of the preference test that has been carried out, it is obtained in formula 2 with a score of 4.2. Formula 2 got the highest score on the color test, texture test and homogeneous test with 20% gedi leaves, light green color, and the distinctive smell of gedi leaves which was not too thick which many panelists liked. In the gedi leaf powder mask formulation, the best formula is 20% gedi leaf powder with 40gr rice flour and get a pH of 5.86.

pH Analysis

Analytical testing refers to SNI (Indonesian National Standard) 16-4399-1996 regarding the quality of sunscreen preparations and 16-6070-1999 regarding the quality of mask preparations carried out on mask products.

Tabel 2. Testing the pH of the powdered gedi leaf mask formula

Sample	pH
F1 (10%)	5.63
F2 (20%)	5.68
F3 (30%)	5.72

Gedi leaf mask shows that the pH of the preparation is 5.62-5.72. This means that the pH of the preparation is good because it does not exceed the provisions of SNI 16-4399-1996, the required pH value of cosmetic products is in the range of 4.5-8.0 because a pH that is too low or too high outside the skin pH range will cause skin irritation. The pH of this preparation is due to the fact that the ingredients used in the formulation are generally neutral or slightly acidic.

CONCLUSION

The conclusions in this study are:

1. The best yield in the drying process of gedi leaves is 70°C for 5 hours.
2. The test results of dry gedi leaves with the proximate method obtained 27.135% protein, 41.675% carbohydrates, 329.5 kcal.100g total energy, 11.235% water content, 6.095% total fat, 54.5% energy and fat and 13 ash content , 83%.
3. From organoleptic testing involving the assessment of 20 panelists, the results of the 2nd formula with 20%

gedi leaf content were more popular with panelists with an average number of 4.7.

4. The pH obtained from the gedi leaf mask ranges from 5.6 - 5.7 pH values are in accordance with SNI standards.

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