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Antioxidant and organoleptic test of Soursop (*Annona muricata* Linn.) leaf tea in herbal tea production process

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Abstracts

Soursop leaves (*Annona muricata* Linn.) contain antioxidant compounds. Antioxidants are useful for protecting body cells from damage caused by free radicals. The purpose of this study was to analyze the antioxidant and organoleptic activity of soursop leaf herbal tea (*Annona muricata* Linn.). The antioxidant activity test used the DPPH method (2,2-diphenyil-1-picrylhydrazyl), while the organoleptic test was performed using the scoring method. The results of the study stated that the highest taste value was obtained in the 150-minute drying time sample of 2.4 and the lowest value in the 60-minute drying time sample of 2.1. The highest color was obtained in the sample drying time of 60 minutes of 3.5, while the lowest value of the sample of drying time of 150 minutes was 1.8. The highest aroma value was obtained in the 60-minute drying time sample of 3.2 and the lowest aroma value in the 120-minute drying time sample of 2.2.

Keywords: soursop leaf, antioxidant and organoleptic properties

1. Introduction

Tea is a type of beverage that is widely consumed by the community [1]. People consume tea regularly as a therapy to treat disease [2]. According to Stephen in Nurmayanti (2008), tea contains minerals Zn, Se, Mo, Ge, Mg and Nitrogen (N). The mineral content in tea is essential elements needed by plants. Several chemical compounds in tea give the impression of color, taste and aroma that is satisfying to the audience [3].

One of the parts of tea that can be used in tea production is tea dregs. Tea dregs is the waste of a tea beverage factory. According to (Rodiana, 2007), from the results of research that has been carried out, it can be seen that tea dregs contain Organic Carbon, Copper (Cu) 20%, Magnesium (Mg) 10% and Calcium (Ca) 13%. Other studies on tea dregs include drinks [4], face masks [5] and sheep feed [6]. Tea dregs can also be used for plant growth. This is because tea dregs contain carbohydrates that play a role in the formation of chlorophyll in the leaves [7]. In addition to the dregs of the tea plant, other developments in the beverage sector include making herbal teas from fruit leaves. Along with the development of technology, more and more creations in tea making, such as making tea from soursop leaves.

Soursop is one of the plants that can live in tropical areas, such as Indonesia [8]. Soursop (*Annona muricata* Linn.) is a type of plant from the Annonaceae family that can be used for traditional medicine [9]. This plant is often used as a medicine for insomnia, coughs, diabetes, and is also believed to stop tumor and cancer activity [10]. The soursop plant (*Annona muricata* Linn.) comes from the Dutch language, namely zuurzak which means acid bag [11]. Soursop leaf (*Annona muricata* Linn.) is a plant that contains flavonoid compounds, phytosterols, tannins, alkaloids and calcium oxalate. Other soursop leaves contain calcium, phosphorus, carbohydrates, vitamin A, B vitamins, vitamin C, and murisine alkaloids [12].

Soursop leaf (*Annona muricata* Linn.) contains antioxidant compounds that correlate with secondary metabolism. This is supported by research from phytochemical screening where soursop leaf extract contains alkaloids, saponins, terpenoids, flavonoids, coumarins, lactones, anthraquinones, phenols, and phytosterols [13]. Antioxidants are compounds that play an important role in maintaining a healthy body. Research by Santhoskumar Muthu and Brindha Durairaj from the Department of Biochemistry, PSG College of Arts and Science, Coimbatore stated that hydroalcoholic extract from soursop leaves could be considered as a source of antioxidants to prevent various types of human diseases [14]. Antioxidants can capture free radical molecules, thereby inhibiting oxidative reactions in the body [15]. According to the research results of Artini (2012), soursop leaves contain active isolates that are antioxidants. Based on the results of the antioxidant activity test, it was stated that the extracts of petroleum ether, chloroform, n-butanol and water were active as antioxidants. The n-butanol extract had the highest attenuation percentage at the 60th minute of 97.9% [16].

Indonesian people use soursop leaves by boiling them. The habit of consuming boiled water soursop leaves has long been done. However, boiling soursop leaves with water is less efficient for today's society, where people tend to choose practicality. Therefore, tea beverage companies develop soursop leaf tea products. So, to support the production of herbal teas, further studies are needed. This study aims to determine the antioxidant activity and organoleptic properties of soursop leaf tea (*Annona muricata* Linn.).

2. Experiments Procedure

Tool and Materials

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Figure 1. Soursop Leaf

Soursop Leaf Powder Making Process

Soursop leaves that have been dried are crushed using a blender until they turn into powder. Then, soursop leaf powder is mashed by filtering it using a sieve. After that, the soursop leaf powder was weighed using a digital scale and put into a tea bag as much as 2 grams each. Soursop leaf tea is ready to be packaged and consumed. The results of packaging soursop leaf tea powder can be seen in Figure 2.

Figure 2. The results of packaging soursop leaf tea powder

Soursop Leaf Tea Making

Soursop leaf powder 2 g in a tea bag brewed with 200 ml of hot water.

Soursop Leaf Moisture Analysis

Empty crucibles were heated in an oven at 1000C for 10 minutes and cooled for 25 minutes. Soursop leaf powder (*Annona muricata* Linn.) approximately 2 grams is dried in an oven at 1000 – 1050C for 30 minutes. The water content can be calculated using the formula [19]:

$$\text{Water Content (\%)} = \frac{(b-c)}{b-a} \text{ x } 100\% \qquad (1)$$

where a is weight of empty cup, b is weight of the cup + sample before drying, and c is weight of the cup + sample after drying

Antioxidant Activity Test

Qualitative Test of Phenolic Compound

5 ml of soursop leaf tea drink was put into a test tube, then 1% FeCl3 solution was added and shaken. This experiment shows that the solution is positive for phenolic compounds, because it produces a blue-black solution.

Qualitative Test of Flavonoid Compound

Soursop leaf tea bags are dissolved in 5 ml of water, so that it turns into a tea drink. After that, the soursop leaf tea drink was put into a test tube and added with 1 ml of Mg powder, Amyl alcohol, and concentrated HCL, then shaken. A positive test for flavonoids is indicated by the resulting color, namely red,

yellow or orange on the amyl alcohol layer [20]. From this experiment, the result is an orange color. This indicates that the solution contains flavonoids.

Antioxidant Quantitative Test

Quantitative test of antioxidant compounds using the DPPH Radical Attenuation Method (2,2-diphenyil-1-picrylhydrazyl) [21]. Antioxidant activity can be determined by inserting 4.0 mL of 0.07 mM DPPH solution and 50 L of soursop leaf tea test solution which has been homogenized by vortex into a test tube. This solution was measured with a UV-VIS spectrophotometer at a wavelength of 517 nm.

Organoleptic Properties Test

The organoleptic test is a test method using the human senses as the main tool for measuring the receptivity of a product. The senses used are the senses of smell, taste, sight and touch [22]. In this study, a product preference test was conducted. Organoleptic test was carried out by scoring method. In this test, an assessment of the sensory quality is given at a quality level. It aims to provide a certain assessment or score against a characteristic [23]. Organoleptic test parameters include taste, color, and aroma. Panelists gave an assessment in the form of a score on the organoleptic test blank of soursop leaf tea. The data obtained from the measurement of antioxidant activity were analyzed by the effect test using Anova (Analysis Of Varian), and the data from the organoleptic test results were tabulated and analyzed using the Friedman test.

3. Result and Discussion

Water content

The fresh soursop (*Annona muricata* Linn.) leaves used as research samples were taken from the Mijen area of Semarang City, Central Java. Soursop leaves used are leaves with a location starting from the fourth sheet after the shoot and dark green in color. Determination of water content aims to determine the content of substances in plants and is also related to the size of the resistance of a material in storage. A good moisture content is worth less than 10%. The results of the analysis of the moisture content of soursop leaves based on the shape and size of the leaves are presented in Table 1. Table 1 shows that the amount of water content after drying is between 6.0 - 7.0%. This is in accordance with the requirements of the material that has been dried, which is <10%.

Table 1. Soursop leaf water content value

Leaf Size Shape	Water Content (%)
Before drying	32.0
After drying (Whole)	6.0
After drying (flakes)	6.4
After drying (Powder)	7.0

Antioxidant Level

Antioxidants are substances that can fight the harmful effects of free radicals, which are formed as a result of oxidative metabolism [24]. Antioxidants function to neutralize free radicals by donating one electron to free radicals, so that they become non-radicals. The results of research on soursop leaf formulation tea products contain high antioxidant activity. Soursop leaves contain tannins that are resistant to heat, so the antioxidant activity of this tea is not damaged when heated. The tests carried out on the soursop leaf tea products included tests of antioxidant activity and organoleptic properties.

Antioxidant Activity Test

Qualitative Test of Phenolic Compound

Phenolic compounds are compounds from natural materials that have been widely used today [25]. This compound functions as an antioxidant for the treatment of degenerative diseases, cancer, premature aging and immune system disorders. According to research by Sudjaji and Rohman (2004), FeCl3 reacts with phenolic groups to form green, purple to black colored complexes. The test results of soursop

leaf tea samples with variations in drying time can be seen in Table 2.

Table 2. Results of Qualitative Test of Soursop Leaf Tea Phenolic Compounds

No.	Drying time (Minute)	Phenolic Compound
1.	60	+
2.	90	+
3.	120	+
4.	150	+

Note: the "+" sign indicates that the soursop leaf tea sample is positive for phenolic compounds.

Qualitative Test of Flavonoid Compound

Flavonoid compounds can be found in all parts of plants, such as fruit, roots, leaves and outer bark of stems. Several medicinal plants containing flavonoids have been reported to have antioxidant, antibacterial, antiviral, anti-inflammatory, anti-allergic, and anticancer activities [26]. Analysis of flavonoid content was carried out to determine how much flavonoid content contained in soursop leaf tea [27]. According to Robinson (1995), flavonoid compounds react with magnesium powder and concentrated HCl to produce green to orange flavonoid groups. The test results can be declared positive, if it produces an orange color from magnesium flavonoids. The results of this test can be seen in Table 3.

Table 3. Qualitative Test Results of Soursop Leaf Tea Flavonoid Compounds

No.	Drying time (Minute)	Phenolic Compound
1.	60	+
2.	90	+
3.	120	+
4.	150	+

Note: the "+" sign indicates that the soursop leaf tea sample is positive for flavonoid compounds.

Antioxidant Quantitative Test

Antioxidant quantitative test of soursop leaf tea using the DPPH method. The results of the antioxidant analysis of soursop leaf tea stated that the drying time affected the level of antioxidant activity of soursop leaf tea. The highest antioxidant activity was found in soursop leaf tea samples with a drying time of 150 minutes, which was 70.05% and the lowest at a drying time of 60 minutes at 50.18%. Based on the ANOVA test, it is known that the p-value is 0.00 where the value is <0.01, so it can be concluded that the drying time affects the antioxidant activity.

Test the Organoleptic Properties of Soursop Leaf Tea

Flavor

According to the standard of SNI 01-3143-1992, a good taste for soursop leaf tea is sepet [28]. The bitter and astringent taste of steeping soursop leaf drink is a distinctive taste of soursop leaves. Catechins are tannins that do not have tanning properties and agglomerate proteins, resulting in a sour taste [29]. The results of the panelists' assessment of the taste of soursop leaf tea can be seen in Figure 3.

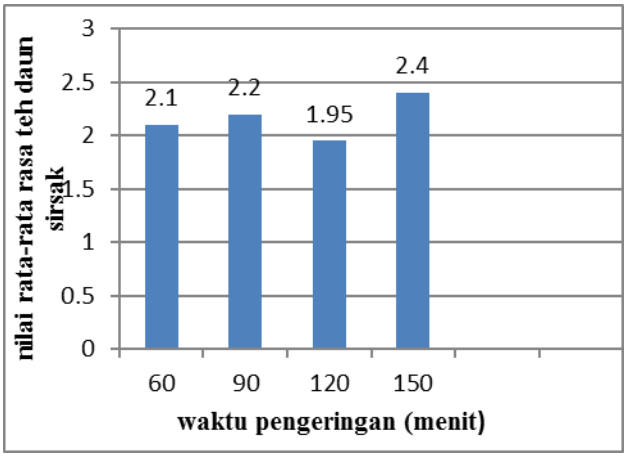

Figure 3. Results of Soursop Leaf Tea Taste Assessment

Based on the figure, it can be seen that the highest taste value was obtained in the 150 minute drying time sample of 2.4 and the lowest value in the 60 minute drying time sample of 2.1.

Aroma

The aroma of a product can be determined by the sense of smell, namely the nose, through smell or aroma. Aroma is one of the important factors to determine the quality of a food product [18]. According to the standard of SNI 01-3143-1992, the aroma of a good soursop leaf tea drink is the distinctive aroma of tea. The results of the panelists' average assessment of the aroma of soursop leaf tea are shown in Figure 4.

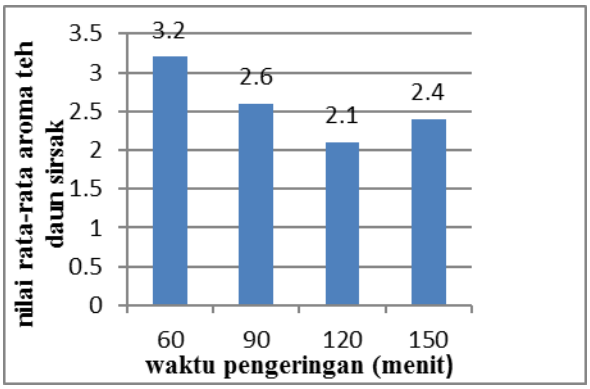

Figure 4. Results of the Soursop Leaf Aroma Assessment

The highest aroma value of tea drinks was obtained in the 60 minute drying time sample of 3.2 and the lowest aroma value in the 120 minute drying time sample of 2.2. Friedman test results stated p-value 0.00 (p-value <0.01), so it can be seen that the drying time affects the aroma of soursop leaf tea drink.

Color

According to SNI 03-3836-2012 standard, a good tea color is brownish green. The drying process causes the leaves to oxidize, so the leaf color turns brown. Color is one of the physical parameters of a food ingredient. The color of a food material is influenced by the light that is absorbed or reflected, and is also determined by dimensional factors, namely product color, brightness, and product color clarity. Color gives an impression of whether the product will be liked or not [30]. In food products, color has an important role for attractiveness, identification, and quality attributes. The results of the panelists' assessment of the color of soursop leaf tea can be seen in Figure 5.

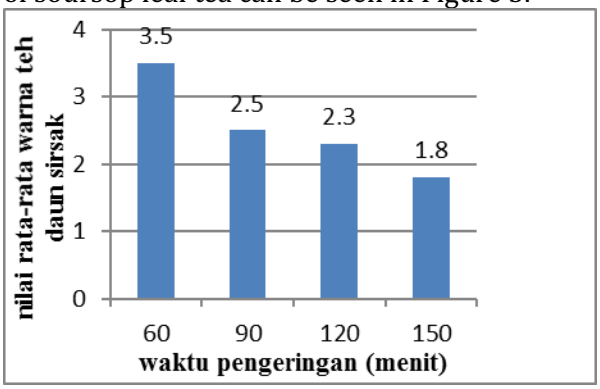

Figure 5. Results of Soursop Leaf Tea Color Assessment

Soursop leaf

Based on Figure 5, the highest color value is found in the sample drying time of 60 minutes at 3.5. Meanwhile, the lowest value in the 150 minute drying time sample was 1.8. Friedman test results obtained p-value 0.00 where the value <0.01 so that it can be seen that the drying time has a major effect on the color of soursop leaf tea.

4. Conclusion

Based on the results of the research that has been done, it is known that the highest antioxidant activity value occurs at a drying time of 150 minutes. Meanwhile, from the organoleptic test, soursop leaf tea is known to have a low organoleptic value for taste.

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