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COMBINATION OF MANGO LEAVES (MANGIFERA INDICA L.), SOURSOP LEAVES (ANNONA MURICATA L.) AND CORIANDER LEAVES (CORIANDRUM SATIVUM L.) FOR CARBONATED "TUNG FONG" HERBAL DRINKS

Abstrak

Penelitian ini menggunakan minuman berkarbonasi dengan produk bernama Tung Fong. Berdasarkan hasil wawancara dengan penjual mengenai asal usul Tung Fong, pemilihan Tung Fong sebagai minuman berkarbonasi yang menjadi pilihan utama dalam upaya menciptakan pilihan yang lebih sehat bagi konsumen merupakan langkah yang sangat positif dan menggembirakan. Pembuatan minuman herbal berkarbonasi ini melalui proses penyiapan bahan, pemisahan bahan dari ampasnya, pencucian bahan, penirisan bahan, penimbangan bahan, perebusan bahan, pengemasan bahan minuman herbal berkarbonasi. Pada penelitian ini dilakukan 3 kali pengulangan untuk mencapai komposisi yang tepat. Setelah melakukan 3 kali pengulangan, berdasarkan uji hedonik, teh yang paling diminati adalah Teh Formula 2 dengan komposisi Daun Mangga 20%, Daun Sirsak 20%, dan Daun Ketumbar 40% serta nilai persentase wangi 84,00%, warna 86,67%, dan rasa 88,00%. Minuman herbal berkarbonasi ini juga telah lolos uji seperti uji antioksidan, uji organoleptik uji flavonoid total, uji pH, dan uji hedonik. Kesimpulan penelitian ini juga mempunyai hasil antioksidan kuat yaitu pada formula 2 sebesar 9,688% dan formula ketiga sebesar 8,870% sedangkan pada formula ketiga sebesar 12,452% mempunyai antioksidan lemah. Pada hasil pengujian kandungan total flavonoid pada formula pertama 23,910%; rumus kedua 23,385%; dan formula ketiga 24,010% yang diketahui bernilai positif mengandung flavonoid dengan menggunakan uji spektrofotometri UV-Vis.
Kata Kunci: Daun Mangga, Daun Sirsak, Daun Ketumbar, Antioksidan, Flavonoid

Abstract

This research uses carbonated drinks with a product called Tung Fong. Based on the results of interviews with sellers regarding the origins of Tung Fong, choosing Tung Fong as a carbonated drink which is the main choice in an effort to create healthier choices for consumers is a very positive and encouraging step. The making of this carbonated herbal drinks goes through the process of preparing the ingredients, separating the ingredients from the waste, washing the ingredients, draining the ingredients, weighing of ingredients, boiling of ingredients, packaging of ingredients carbonated herbal drinks. In this study, 3 repetitions were carried out to achieve the right composition. After conducting 3 repetitions, based on the hedonic test, the most popular tea is Formula 2 with the composition of Mango Leaves 20%, Soursop Leaves 20%, and Coriander Leaves 40% and the percentage value for fragrance 84.00%, color 86.67%, and taste 88.00%. This carbonated herbal drinks also passed tests such as antioxidant test, total flavonoid test organoleptic test, pH test, and hedonic test. The conclusion of this study also has strong antioxidant results, namely in formula 2 of 9.688% and the third formula of 8.870% while the third formula, 12.452%, has weak antioxidants. In the test results of total flavonoid content in the first formula 23.910%; second formula 23.385%; and third formula 24.010% which can be seen to have a positive value containing flavonoids using UV-Vis spectrophotometric test.
Keywords: Mango Leaves, Soursop Leaves, Coriander Leaves, Antioxidants, Flavonoid.

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INTRODUCTION

The World Health Organization (WHO) encourages governments around the world to implement various control measures, in order to prevent public health problems related to the consumption of unhealthy foods and drinks. The WHO even recommends the exertion of taxes on carbonated drinks as an effort to reduce their consumption. Apart from that, non-fiscal approaches are also emphasized by the WHO, such as to increase the availability and access to healthy food and drinks. This can be achieved through policies that support promotion and education related to healthy eating patterns, as well as providing incentives for people to choose to consume healthy foods and beverages. Governments are also expected to implement regulations and policies in order to build a society based on a healthy lifestyle. Thus, cooperation between the governments, the private food production sector and the consumer society is the key to achieving optimal results in efforts to improve public health through the consumption of healthy foods and drinks (Mutaqin, 2018).

Carbonated soft drinks are soft drinks made by absorbing carbon dioxide into drinking water, containing CO_2 gas which dissolves in water to function as an antibacterial to preserve drinks naturally. In the last two decades there has been an increase in consumption of carbonated drinks in the world. Studies show that excessive consumption of carbonated drinks can lead to several human health problems. This is associated with an increased risk of developing diabetes, and even worsening the disease. Because carbonated drinks usually contain large amounts of additional sweeteners which can trigger blood sugar levels to increase quickly (Astuti et al., 2014).

In addition, carbonated drinks contain high levels of phosphoric acid, where this phosphoric acid can dissolve calcium in bones, causing loss of bone density and the risk of bones becoming brittle easily. Apart from that, the caffeine content in carbonated drinks causes an increase in heart rate, increased blood pressure, increased blood sugar, increased stomach acidity, increased hormones in the blood which can sometimes cause inflammation and injury to the stomach and intestines(Fitriani, 2016). Therefore, this research uses carbonated drinks with a product called Tung Fong. Based on the results of interviews with sellers regarding the origins of Tung Fong, choosing Tung Fong as a carbonated drink which is the main choice in an effort to create healthier choices for consumers is a very positive and encouraging step. Through its presence in the capital city of Jakarta and its existence since the 90s, Tung Fong has effectively contributed to advancing the trend of carbonated drinks which not only provide a delicious taste but also support health.

Tung Fong carbonated drinks have characteristics such as low glucose content, low calorie content and moderate carbon dioxide content, as well as detailed health content such as saturated fat, sugar, sodium, protein, carbohydrates, citric acid, sodium bicarbonate and CO_2 gas. This information is the basis for consumers to make wise decisions regarding the consumption of carbonated drinks. This research aims to create innovative carbonated drinks that contain herbal ingredients by using mango leaves, soursop leaves and coriander leaves to produce carbonated herbal drinks that taste delicious, delicious and nutritious. Mangifera indica L. or commonly known as mango is a typical plant from a tropical country, India. In 2008, Indonesia, as a country with a tropical climate, was ranked the fifth largest mango producing country in the world. Mango plant leaf extract can be used as an alternative herbal medicine for various diseases.

In several studies that have been conducted, mango leaf extract has been reported to have pharmacological activity, including antidiabetic activity. Apart from that, mango leaf extract has also been proven to have other pharmacological activities such as anti-tetanus, antibacterial and heart protective (Dacilia Harsanti & Musfiroh, 2019). Mango leaves (Mangifera indica L.) can not only be used as a useful herbal drink ingredient, but also have potential as a food flavouring ingredient. Utilizing mango leaves as herbal tea can provide a variety of unique flavors and provide consumers with a healthier and more effective choice.

Soursop leaves or also known as Annona muricata L. are fruit plants originating from the Caribbean, Central America and South America. This plant has many benefits, especially soursop leaves because it is believed to cure cancer, especially colorectal, lung, pancreatic and prostate cancer. Another benefit of soursop leaves is that they are antioxidants and can improve the immune system so that they become a supplement for health, and contain various active

compounds including acetogenin, anomuricin A, goniothalamine, flavonoids, anno exocin, annonacin, annomuricin, niacin, essential oils and reticulin. The flavonoid compounds in soursop leaves are antipathogenic, capable of killing various types of bacteria and viruses, and are considered to have the ability to cure various diseases such as asthma, coughs, fever, influenza, infections and digestive disorders. The antioxidants in soursop leaves can also increase the body's immunity so that they can have the effect of reducing coughs and colds in children and adults (Hermawan & Laksono, 2013). Apart from that, soursop leaves contain various other beneficial substances, such as vitamin C, anti-inflammatory, calcium, phosphorus, phytosterols, niacin, calcium oxalate, and alkaloids (Bunardi, 2016).

The next herbal plant that can be used is coriander (Coriandrum sativum L.) because it has antibacterial potential. One part that can be used is the leaves. Coriander leaves are widely available, easy to cultivate, abundant in yield, and economical. Coriander leaves are no less competitive with the seeds in terms of functional properties because coriander leaves also have several functional properties, including anti-diabetic, anti-cholesterol, anti-microbial, anti-inflammatory and analgesic. The nutritional content of coriander water is very diverse and is beneficial for body health. Contains calcium, phosphorus, potassium, magnesium, iron, folate, as well as vitamin A, vitamin B, vitamin C, vitamin E, and vitamin K (Hijriah et al., 2022) (Amelia, 2023)

Apart from that, coriander and coriander water also contain antioxidant compounds such as tocopherols, carotenoids, flavonoids, tannins, anthocyanins, lutein, zeaxanthin, and quercetin. The benefits of all these nutrients and antioxidant compounds make coriander a good choice to support overall body health. The active components in coriander are sabinene, myrcene, alpha-terpinene, ocimene, linalool, geraniol, decanal, desylaldehyde, trantridecene, petroselinic acid, octadasenic acid, d-mannite, scopoletin, p-cimene, camphene, and felandrene. These components are what cause coriander to have a good effect as a medicinal component. From a review of the effectiveness of the coriander plant, it was found that flavonoid compounds are thought to have the potential to reduce cholesterol(Larasati, 2023).

Not many people know that mango leaves, soursop leaves and coriander leaves can be processed into various products, such as carbonated herbal drinks. Based on these problems, researchers are interested in conducting research on the use of Mango Leaves (Mangifera indica L.), Soursop Leaves (Annona muricata L.), and Coriandrum Leaves (Coriandrum sativum L.) for Tong Fong Carbonated Herbal Drinks.

METHODE

1. Tools and Materials

Materials used in Tung Fong carbonated beverages include mango leaves, soursop leaves, coriander leaves, honey, lime and water. Tools used in this research include scissors, gram scales, stirrers, filters, tissue dryers, pans, stoves, spatulas, soda bottle openers, spoons, and glassware.

2. Manufacturing Procedure

a. Preparation of carbonated water

The procedure for making carbonated water from mango leaves, soursop leaves, coriander leaves is as follows.

Material Preparation

Prepare coriander leaves, mango leaves, soursop leaves and lime for the next process.

Separation between Materials and Waste.

Prepare a plate for the container then separate the leaf bones, and lime with seeds.

Material Washing

The material that has been separated is then washed thoroughly until the sap that coats it is reduced and then rinsed several times with clean water to remove all impurities in the leaves.

Draining the Material

Draining is done to reduce water in the washed material, carried out using a tissue dryer until the material is completely dry and ready for the material weighing stage.

Weighing of ingredients

Leaves that have been drained with drying tissue are cut into medium sizes, each leaf weighs about 1.5 grams. This is done so that it is easier when boiled to release the substances and content in the leaves.

Boiling Coriander Leaves, Mango Leaves, Soursop Leaves

All leaves that have been weighed use Teflon gram scales to measure the dose. Boiling time is about 5 minutes in boiling water, boil the leaves one by one with the dose that has been prepared.

Packaging of Ingredients

Once all the ingredients are ready, the next process is to mix all the ingredients. The ready ingredients are placed on the table. For carbonated water, measure 150 ml and add liquid Coriander leaves, Mango leaves, Soursop leaves 50 ml until 1 glass has a dose of 200 ml. If the ingredients have been added like the appropriate ingredient composition formulation, then take the lime juice to form soda froth and honey to sweeten this carbonated water.

Preservation of Ingredients

The prepared ingredients can be stored at room temperature for 30 minutes, if closed 3 hours. If at a cold temperature of 3 degrees Celsius-6 degrees Celsius, it lasts for 6 hours, doubled for the packaging process. Preservation is done so that this carbonated water can be drunk again.

3. Formulation of Preparation of Carbonated Herbal Drinks

Each formula that has been boiled is mixed into carbonated water. Carbonated water in each formula with a dose of 50 ml of hot water with liquid Coriander leaves, mango leaves, Soursop leaves at a temperature of 90° C and 150 ml carbonated water formula. The two liquids were mixed and lime juice was added. Formulation of carbonated water preparations from coriander leaves, mango leaves, and soursop leaves can be seen in **Table 1.**

Table 1. Formulation of carbonated water preparation

Ingredients	Weight of ingredients in formulation		
	Formula 1	Formula 2	Formula 3
Coriander Leaf	20%	60%	30%
Mango Leaf	40%	20%	40%
Soursop Leaf	40%	20%	30%

4. DPPH Antioxidant Test Analysis Procedure and Total Flavonoid Content Test

The analysis of antioxidant and flavonoid content in this study was carried out in the quality testing service laboratory (PPM) of the Faculty of Pharmacy, University of Indonesia with the procedure that the product samples of formula 1, formula 2, and formula 3 were brought to the laboratory using a Cool Box which was given dry ice to keep the temperature in the Cool Box cool, then the UV-Vis spectrophotometric test was immediately carried out.

5. Evaluation of Physical Properties of Preparations

Testing is done by testing colour, fragrance, taste, and texture. Samples were stored for 24 hours and then viewed from colour, fragrance, taste, and texture.

Hedonic Test

This test was conducted on 30 respondents and then the respondents were given a questionnaire to fill in their identity and level of preference. The assessment was carried out on the level of liking in the form of ratings of very like, like, somewhat like, dislike, and very dislike.

pH test

The pH test is carried out using a pH meter. The pH meter is inserted in a solution of herbal carbonated beverage preparation that has been dyed or dissolved and then checked the pH of the solution on the pH meter.

RESULT AND DISCUSSION

1. Composition Analysis

In the composition analysis, 3 repetitions were carried out on different compositions. In each formula there is 150 ml carbonated water and 50 ml water. In each formula there is also the addition of honey and lime in the same amount as well, namely honey 11.4 ml and lime 1.8 ml. For the first composition, herbal carbonated water with a composition of 40% Soursop Leaf, 40% Mango Leaf, and 20% Coriander Leaf was tested. The results obtained are the fragrance that respondents like because it has a little coriander leaf fragrance in this formula and also the soda produced is only a little.

For the second composition, testing was carried out with a composition of 20% Soursop Leaves, 20% Mango Leaves, and 60% Coriander Leaves. The results obtained were a taste that was not much different from the first formula and still felt the fragrance of cilantro because it had a larger composition than the others and had more soda. For the third composition, testing was carried out with a composition of 30% Soursop Leaves, 40% Mango Leaves, and 30% Coriander Leaves. The typical taste of this carbonated water has a slight sweet and sour taste, a lot of fragrance from soursop leaves and coriander leaves.

2. Antioxidant DPPH Analysis Test

The antioxidant activity test uses the DPPH method because it is a simple, easy, fast method, and requires only a few samples. The DPPH antioxidant test is an assay used to determine the presence and, if the result is positive, the concentration and/or percentage of antioxidants in a given sample. This test measures antioxidant activity with organic radicals and compared to other similar methods, it is considered simpler and more economical.

Table 2. DPPH Antioxidant Test Results

	Formula 1	Formula 2	Formula 3
Antioxidant Level (IC_{50} mg/l)	124.52	96.88	88.70

Based on the research results obtained in **Table 2**, the antioxidant concentration levels are moderate in the first formula (20% Coriander, 40% Soursop, 40% Mango) compared to strong antioxidants in the second formula (60% Coriander, 20% Soursop, 20% Mango), and the third formula (30% Coriander, 40% Soursop, 30% Mango). According to Molyneux (2004), a substance is categorized as an antioxidant substance when the IC_{50} value is less than 200 ppm (Molyneux, 2004). Based on its IC_{50} value measured in ppm (parts per million) or µg/mL (microgram per millilitre), using the DPPH (1,1-diphenyl-2-picrylhydrazyl) method as a free radical. Specifically, the compound is considered a very potent antioxidant if its IC_{50} value is less than 50 µg/mL. A compound is classified as a strong antioxidant if its IC_{50} value is within the range of 50-100 µg/mL, and it is categorized as a moderate antioxidant if its IC_{50} value is within the range of 101-150 µg/mL. Meanwhile, if the IC_{50} value of the compound is in the range of 151-200 µg/mL, the compound is considered to have weak antioxidant activity (Mardawati et al., 2008). Based on the above description, the second formula of 9.688% and the third formula of 8.870% have strong antioxidants compared to the first formula of 12.452%.

3. Total Flavonoid Analysis Test

Total flavonoid content is operationally the content in the sample expressed as quercetin equivalent (QE). Total flavonoid content is obtained through the calculation of the total flavonoid formula. This identification uses UV-VIS spectrophotometry to determine the spectrum of flavonoid compounds from samples with formula 1, formula 2 and formula 3.

Table 3. Total Flavonoid Level Test Results

	Formula 1	Formula 2	Formula 3
Total Flavonoid Level (QE mg/l)	239.10	233.85	240.10

Based on the laboratory test results in **Table 3**, the total flavonoid content of the first formula is 23.910%, the second formula is 23.385% and the third formula is 24.010% so it can be concluded that this study obtained the results that herbal carbonated drinks positively contain flavonoids using UV-VIS spectrophotometry.

4. Evaluation of Physical Properties of Preparations

a. Organoleptic Testing Results

Organoleptic test results are presented in **Table 4.**

Table 4. Organoleptic Test Results of Carbonated Herbal Drinks

Organoleptic Test Results				
Formula	**Fragrance**	**Color**	**Taste**	**Texture**
Formula 1	Very slight aroma of coriander and soursop	Light brown	Sweet and sour	A little soda foam
Formula 2	Slight aroma of coriander and soursop	Light brown	Sweet and sour	Lots of soda
Formula 3	Lots of coriander and soursop aromas	Light brown	Slightly sweet and sour	Lots of soda

Description:
Formula 1: Formula 1 with 40% Soursop Leaf, 40% Mango Leaf, and 20% Coriander Leaf.
Formula 2: Formula 2 with 20% Soursop Leaf, 20% Mango Leaf, and 60% Coriander Leaf.
Formula 3: Formula 3 with the composition of 30% Soursop Leaf, 40% Mango Leaf, and 30% Coriander Leaf.

b. Hedonic Test

The hedonic test results are presented in **Table 5**.

Table 5. Hedonic Test Results

Formula	Fragrance	%	Color	%	Taste	%	Order
Formula 1	128	85,33%	120	80,00%	128	85,33%	2
Formula 2	126	84,00%	130	86,67%	132	88,00%	1
Formula 3	118	78,67%	128	85,33%	125	83,33%	3

This test is done by observing the fragrance, taste, and colour using the five senses. Based on the table, it is obtained that Formula 2 has a higher level of liking in terms of colour and taste than other formulas. According to the respondents, the colour and taste have the best value, but the fragrance still has a slight fragrance of coriander leaves and soursop leaves.

c. pH test

The pH test was carried out on each formula and carbonated beverage preparation. The pH test results for all preparations meet the pH requirements (3-8). The pH test results on the mango leaf sample were 5, soursop leaf 6, coriander leaf 6, and the pH result of the tea preparation was 6. The pH test is very important because the pH value is related to the shelf life of the product and affects the content of microorganisms..

CONCLUSION

Based on the results of the research conducted, it can be concluded that of the 3 formulas, the most preferred by respondents is formula 2. This study also has strong antioxidant results, namely in formula 2 of 9.688% and the third formula of 8.870% while the third formula, 12.452%, has weak antioxidants. In the test results of total flavonoid content in the first formula 23.910%; second formula 23.385%; and third formula 24.010% which can be seen to have a positive value containing flavonoids.

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