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Physical and Preference Test Tepache of palm sugar, coconut sugar and their combination

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Abstract. The COVID-19 pandemic has impacted on the increasing need for immune-boosting food or drinks. One drink that can boost the immune system is a probiotic drink. Tepache is a probiotic drink made from pineapple peel waste. In the process of making this drink, sugar is needed as fuel in the fermentation process. The purpose of this study was to determine the physical test and test the preference of tepache made from palm sugar, coconut sugar and the combination of the two sugars. This research is an experimental research. The physical test consisted of organoleptic tests in the form of color, aroma and taste tests as well as pH tests, which were carried out with three replications for each treatment. The preference test was conducted on 30 respondents. The results showed that the tepache pH of palm sugar, brown sugar and their combination was 4.2 ; 4.5 and 4.0. Organoleptic test related to color, tepache from coconut sugar showed a more concentrated color than the other two formulas. The aroma test of the three tepaches showed almost the same aroma, which is typical of fermentation. In terms of taste, tepache from palm sugar tastes sour, tepache from coconut sugar is sweet, tepache from the combination of the two sugars tastes very sour. The preference test for 30 responses to color, taste and aroma showed that tepache from brown sugar was the most preferred both in terms of aroma, taste and color with an average result of 7.13; 7.33 and 7.03.

Introduction

The consumption of the Indonesian population for various products, including food and beverages, is increasing every year. Innovations in various types of beverages are increasingly being processed to meet the needs of these consumers. One of the drinks that is in demand in the era of the COVID-19 pandemic is probiotic drinks. This drink is a functional drink that can have a positive impact on health. Probiotics are live bacteria that can affect health by balancing the microflora in the gut and preventing and selecting non-functioning microbes [1].

The condition of the COVID-19 pandemic is appropriate when consuming probiotic drinks to boost the immune system. Hill, (2014) stated that probiotics can play a role in increasing the good bacteria in the colon (gut microbiota), digestive system health and the immune system [2]. O'hara, (2007) also stated that probiotics compete with pathogens at the time of attachment in the gastrointestinal tract so that they are able to prevent gastrointestinal infections and are also able to increase nutrient absorption, increase mucosal barrier integrity and immune modulation [3].

Probiotic drinks can be grown on certain foodstuffs such as pineapple skin. Pineapple skin that is not utilized will accumulate into waste, if left unattended it will pollute the environment. So far, people rarely know that pineapple peel can be made into processed products that have economic value. One of the probiotic drink products that can be made from pineapple skin is tepache. This drink is made by fermenting pineapple skin in sugar water. Pineapple skin contains carbohydrates that are high enough so that it has the potential to be used as a growth medium for probiotics. The carbohydrate content in pineapple peel in 100 g of material is 17.53 g [4]. Pineapple skin contains 81.72% water, 20.87% crude fiber, 17.53% carbohydrates, 4.41% protein and 13.65% reducing sugar.

In making this drink, sugar is needed in the fermentation process. Brown sugar or palm sugar is sugar produced from the processing of palm tree sap, namely aren (*Arenga pinnata* Merr), nipah (*Nypafruticans*), siwalan (*Borassia flabellifera* Linn) and coconut (*Cocos nucifera*). Linn) [5]. The types of brown sugar selected in this study were palm sugar and coconut brown sugar.

Palm sugar and coconut sugar have different compositions. Coconut sugar has a chemical composition of 10.92% water content, 68.35% sucrose, 6.58% reducing sugar [6]. In addition, coconut sugar also has 10% fat, 1.64% protein, 0.76% calcium and 0.37% phosphorus [7]. While palm sugar has a chemical composition of 9.16% water content, 84.31% sucrose, 0.53% reducing sugar, 0.11% fat, 2.28% protein, 3.66% total minerals, 1.35 calcium. % and 1.37% phosphorus [8].

The use of different types of sugar will produce different tepaches. In this study, the tepache made will use palm sugar, coconut brown sugar and a combination of the two types of sugar. The purpose of this study was to determine the physical test related to organoleptic, namely color, taste, aroma, pH and also a preference test for tepache from palm sugar, coconut sugar and their combination.

Research methods

1.1. Place and time

This research was conducted in the third laboratory of the DIII Pharmacy study program from October to November 2021.

1.2. Tools and materials

The tools used in this study were glass jars, beakers, measuring cups, analytical scales, pH meters, knives, brushes, filters, rags, gauze, basins, stoves, gas, pans, cups, stationery and label. The ingredients used in this study were pineapple peel, palm sugar, coconut sugar and water.

1.3. Research procedure

a. Sample preparation

The sample used to make tepache is honey pineapple skin obtained from a honey pineapple seller on the roadside. The skin of the honey pineapple before being cut from the fruit is brushed with a clean toothbrush under running water.

b. Tepache Creation

1) Tepache from palm sugar

In this study, the sample used was 500 grams of pineapple peel, then washed, then the pineapple skin was sliced and put into a glass jar, then weighed 400 grams of palm sugar, then boiled the palm sugar in 500 ml of water. After that, pour the palm sugar water into a glass jar. Add boiled water to 2 liters, make sure the pineapple skin is completely submerged. Cover the container using gauze, then wait for the soaking process for up to 2 days.

2) Tepache from coconut sugar

The method of making is almost the same as making tepache from palm sugar, except that the palm sugar is replaced with coconut sugar.

3) Tepache a combination of palm sugar and coconut sugar

The way of making is also the same as making a tepache as described above. The difference is that this tepache uses 200 grams of palm sugar mixed with 200 grams of coconut sugar dissolved in 500 mL of water.

c. Tepache Physical Test

1) Organoleptic test

Tepache evaluation is done by observing in terms of color, taste and aroma.

2) pH test

Measurement of pH is carried out using a pH meter that has been calibrated with an appropriate buffer solution. Then the electrode is dipped into the tepache to be measured, then record the pH listed on the screen.

d. Preference Test

In this study, the authors used a preference test which is part of the organoleptic test, on 30 respondents, namely where the 30 people were asked to give personal responses about their likes or dislikes and their levels. The level of preference used includes *very like, like, dislike and a little like*.

e. Data of Analysis

The best tepache was chosen from the number of respondents who liked the formula being tested

Result and Discussion

3.1 Organoleptic test

Table 3.1 Tepache organoleptic test results

Parameter	Palm sugar tepache	Coconut sugar tepache	Tepache Combination of palm sugar and coconut sugar
Aroma	pineapple scent	pineapple scent	pineapple scent
Flavor	slightly sour	sweet	Very sour
Colour	Light brown	Dark brown	Brown

The results of table 1 show that the difference between the use of sugar has a significant effect on taste and color. The addition of coconut sugar gives a more concentrated effect compared to palm sugar. Brown sugar has a distinctive taste and aroma. The presence of organic acids causes brown sugar to have a distinctive aroma, slightly sour and a caramel smell (there is a caramelization reaction due to heating during cooking). Caramelization also causes a brown colour in brown sugar [9]. Caramelization contributes to the aroma because in addition to producing a brown colour, it also produces maltol and isomaltol compounds which have a strong caramel aroma and sweet taste [10]. The sweet taste of tepache from coconut sugar is due to the lower sucrose content of coconut sugar compared to palm sugar. The more sucrose used in making tepache, the more sucrose is hydrolyzed to produce invert sugar (a mixture of glucose and fructose) which has a lower relative sweetness.

3.2 pH test

Table 3.2 Tepache pH Test results

Number.	Type of Tepache	pH
1.	Palm sugar tepache	4.2
2.	Coconut sugar tepache	4.5
3.	Tepache Combination of palm sugar and coconut sugar	4

From table 3.2, it can be seen that the addition of pH from palm sugar tends to give a more acidic tepache effect than the use of coconut sugar. The tepache that is the result of the combination of the two sugars gives a more acidic result than other tepaches. Palm sugar has higher sucrose sugar than coconut sugar. A certain amount of sugar is added to the tepache before fermentation is carried out to increase the viability of the lactic acid bacteria in it. The longer the fermentation and the more glucose is added, the more microorganisms multiply so that the ability of microbes to break down glucose produces primary metabolites (lactic acid) and secondary metabolites (more antibacterial activity and polyphenols). Living microorganisms generally use carbohydrates (sucrose, glucose, and lactose) as an energy source from carbon sources without exception of lactic acid bacteria, so that the more carbohydrates, the microbes are able to reproduce more and produce acid. lactate so that it has an effect on lowering the pH [11].

3.3 Preference test

Table 3.3. Tepache Preference Test

Type of Tepache	Aroma	flavor	Colour
Palm sugar tepache	6.76	7.16	6.93
Coconut sugar tepache	7.13	7.33	7.03
Tepache Combination of palm sugar and coconut sugar	6.50	6.36	6.70

Description: Test of liking to 30 respondents. The results above are averages that have been calculated as a whole.

Value Range : (8:really like), (7:like), (6:a little like), (5:do not like)

A number of sugars and sweeteners can be added in the fermentation process, so as to increase the viability of lactic acid bacteria. Sucrose is a carbon source for microorganisms which is easily hydrolyzed by the invertase enzyme into D-glucose and D-fructose. This event is often called an inverse reaction. The product of this reaction is called invert sugar or reducing sugar. Reducing sugars are a group of sugars

(carbohydrates) that can reduce electron-accepting compounds; All monosaccharides (glucose, fructose, galactose) and disaccharides (lactose, maltose), except for sucrose and starch (polysaccharides), are included as reducing sugars. The content of reducing sugar in coconut sugar is higher than palm sugar. This is what causes a more pronounced sweet taste. The impact of this content, people prefer coconut sugar.

Conclusion

The results showed that the organoleptic test related to color, tepache from coconut sugar showed a more concentrated color than the other two formulas. The aroma test of the three tepaches showed almost the same aroma, which is typical of fermented pineapple. In terms of taste, tepache from palm sugar tastes sour, tepache from coconut sugar is sweet, tepache from the combination of the two sugars tastes very sour. The pH of the tepache of palm sugar, brown sugar and their combination is 4.2 ; 4.5 and 4.0. The preference test for 30 responses to color, taste and aroma showed that tepache from brown sugar was the most preferred both in terms of aroma, taste and color with an average result of 7.13; 7.33 and 7.03.

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