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Organoleptic Evaluation and Consumer Preferences for Singkil Tea and Kombucha Products (*Premna corymbose* Rottl. Et Willd)

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Abstract

Background: *Changes in tea consumption trends present opportunities for the tea industry, especially as alternative raw materials have been tested in recent years to develop tea and kombucha with distinct organoleptic and functional properties. This study evaluates the organoleptic characteristics and consumer preferences for Singkil tea and Singkil kombucha.* **Methodology:** *A sensory evaluation was conducted with 30 untrained panelists to assess color, aroma, taste, texture, and overall acceptability using a hedonic scale. Additionally, the alcohol content was measured.* **Findings:** *The results of the hedonic test indicated that all treatments fell into category 3 "slightly liked", suggesting an acceptable level of consumer preference. On average, both Singkil tea and Singkil kombucha received an acceptance score of 3, indicating that they were "slightly liked." This suggests their potential as alternative beverages suitable for commercialization. Furthermore, the safety of the product was confirmed, as it contains 0% alcohol, meets halal standards.* **Contribution:** *This study concludes that Singkil kombucha has the potential to be a viable alternative beverage for the market, and that it is safe for consumption due to its 0% alcohol content, which complies with halal standards*

Keywords: *Kombucha; Organoleptic; Premna corymbosa; Singkil Tea*

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INTRODUCTION

Tea has been one of the most popular and widely consumed beverages in the world since ancient times. Based on the type of product, tea can be classified into several categories, namely leaf tea, such as green tea, black tea, and oolong tea; CTC tea (crush, tear, curl); and other variants, including herbal tea and tea with additional aromas (Prasetia et al., 2020). Over time, the culture of drinking in society has undergone quite significant changes. The emergence of various beverage variants, including alternative and substitute drinks, has influenced the development of the tea industry in Indonesia. However, tea-based products or those with a tea flavor have a positive impact on this industry. This is reflected in the increase in productivity which indicates the continued growth of the tea industry (Manumono & Listiyani, 2023).

Changes in tea consumption patterns in modern society show increasingly diverse and complex trends. Today's consumers are not only looking for traditional tea drinks with classic flavors, but are also more interested in products that offer a variety of flavors, aromas, and additional health benefits. This has encouraged the tea industry to innovate by creating various product variants that not only prioritize taste, but also functional aspects and added value. In recent years, the development of alternative raw materials has become a major focus to meet these needs. Manufacturers have begun to explore herbal ingredients, plant extracts, and various natural mixtures as basic ingredients for making tea. This innovation aims to create products with unique organoleptic characteristics and bioactive compound content that enhance health benefits. This development is also seen in fermented drinks such as kombucha which use various alternative raw materials, thus opening up new opportunities for diversification of tea products that are more adaptive to changing consumer preferences (Morales et al., 2023; Prasetia et al., 2020).

The study Rindiani & Suryani (2023) hows that kombucha tea made from cipluan leaves has a positive acceptance, where the panelists chose to like it. In addition, other organoleptic test studies were conducted Kamelia et al., (2023) on various types of kombucha tea showed differences in the level of panelists' preferences for the sensory parameters assessed. Based on the aroma assessment, kombucha tea using white tea as the base ingredient received the highest score, indicating that the aroma of white tea was most preferred by panelists compared to other types of tea. Meanwhile, for the color parameter, green tea ranked highest in terms of visual preference, meaning that the color of green tea was more attractive and more preferred overall. As for the taste aspect, green tea was again the favorite choice, indicating that the taste produced from the fermentation of green tea was considered the most delicious and well received by panelists.

Singkil leaves (*Premna corymbosa* Rottl. et Willd) have been known to have various health benefits due to their high content of flavonoids and other bioactive compounds. Research shows that singkil leaf extract has significant antioxidant activity, which can help protect the body from oxidative damage and various chronic diseases (Dewi et al., 2024; Primasari et al., 2022). In addition, singkil leaves have also been used in traditional medicine to relieve inflammation and digestive disorders, strengthening the phytopharmaceutical potential of this plant (Suprinigrum et al., 2018). Through these functional properties, singkil leaves have

great potential to be developed into various modern health products, including herbal teas that not only offer unique flavors but also therapeutic benefits. Tea made from singkil leaves can be an alternative healthy drink that supports a functional lifestyle and is an innovation in the diversification of tea products, especially in the fermented beverage market such as kombucha (Priamsari & Danti, 2022).

Research on the content of singkil leaf extract has been conducted to support its use in innovative tea products.According to Pribadi et al. (2024) Singkil leaf extract contains flavonoids of 248.46 mg Qe/g, which is twice as high as the soaking method containing 156.48 mg Qe/g, the antioxidant activity test using the DPPH method shows that the IC50 value in singkil leaf simplicia is 225.37 ppm which has moderate intensity, the IC50 value in singkil leaf extract of 43.37 ppm indicates a very active intensity. The results of this study indicate differences in bioactive characteristics between leaf extract and soaking, but both contribute to health. DSingkil leaves are known to contain relatively high levels of flavonoids and have significant antioxidant activity. Based on these characteristics, singkil leaves have great potential to be developed as raw materials in various alternative processed products. One of the products that has the potential to be developed is kombucha, where the use of singkil leaf extract can increase the added value as well as the health benefits of the product.

Kombucha is a traditional drink made using tea leaves, generally using black or green tea and sugar, through fermentation activity by a mixture of various bacteria and yeasts, known as SCOBY (Symbiotic Consortium of Bacteria and Yeasts). SCOBY generally consists of lactic acid bacteria (LAB), such as *Lactobacillus* and *Oenococcus* spp.; acetic acid bacteria (BAA), such as *Acetobacter, Gluconobacter*, and *Komagataeibacter* spp.; and various types of yeast, such as *Saccharomyces, Debaryomyces*, and *Kluyveromyces* spp. (Coton et al., 2017; Gaggìa et al., 2019). Kombucha has seen tremendous growth in the past decade. However, the drink is thought to have been around for over 2,200 years and is geographically associated with northeastern China, specifically the region of Manchuria (Bishop et al., 2022; Kapp & Sumner, 2019). The composition of kombucha plays a role in determining the ideal fermentation time, which generally lasts between 7 to 10 days. In addition, this composition also affects the nutritional profile and bioactive compound content in the resulting kombucha (Torán-Pereg et al., 2021). Molecularly, tea-based kombucha contains various substances, such as sugar, organic acids, minerals, vitamins, proteins, low ethanol content, phenolic compounds such as flavonoids, and certain functional bioactive compounds, including *D-saccharic acid-1,4-lactone* (DSL) (Morales et al., 2023). Due to these chemical characteristics and composition, sensory assessment or organoleptic testing becomes an important aspect to evaluate the quality and consumer preference for kombucha.

Sensory testing or organoleptic testing has long been used to assess the quality and safety of food or beverages through the five senses. Organoleptic testing is a test that uses human senses to recognize and assess the sensory properties of a product (Moazzem, 2023). Sensory analysis is important in the food industry because products with poor taste tend to be less consumed, so their nutritional value is not optimal. In addition, organoleptic tests also help detect signs of damage such as rot and decline in product quality (Arziyah et al., 2022).

The development of the tea-based beverage industry, especially with new variants such as singkil tea and singkil kombucha, shows great potential in meeting market needs for healthy and innovative functional products. However, in-depth understanding of the organoleptic characteristics of these two products is still limited, even though sensory aspects greatly determine consumer acceptance and product success in the market. Therefore, pThis study aims to analyze the organoleptic characteristics of processed singkil tea and singkil kombucha, determine the level of consumer preference for both products, evaluate the potential for product development as fermented drinks, provide recommendations for the best formulation to increase the acceptability and market value of singkil tea-based products. This study is expected to provide scientific information on the sensory quality of singkil tea and singkil kombucha, assist producers in developing innovative products that suit consumer tastes, and support the diversification of singkil tea as a functional beverage with added value. The results of this study can also be a reference for business actors and academics in the development and marketing of singkil tea-based products.

METHOD

This research was conducted for 3 months, namely January-March 2025, implemented in the biology education laboratory, faculty of teacher training and education, Mulawarman University. The tools used in this study include: knives, aluminum foil, cutting boards, analytical digital scalestype FA2004E, Alcoholmeter 0-100 Allafrance Hydrometer, gloves, cloth, mask, Vivo cellphone camera (documentation tool), paper and stationery. The materials used in this study include: simplisia singkil (*Premna corymbose* Rottl. Et Willd), singkil tea, scoby, kombucha drink, stevia, granulated sugar, and water.

Research Procedures

Making singkil tea

Making singkil tea starts with, fresh singkil leaves are washed clean and separated from the leaf stalks, the singkil leaves are air-dried (not exposed to direct sunlight), the singkil leaves are sliced finely/small and air-dried while rolled using the hands until wilted (this method makes it easier to oxidize the singkil leaves), the leaf oxidization technique is carried out for approximately 2 days until the singkil leaves change color to brown and are lighter than fresh leaves, the wilted singkil leaves are roasted for approximately 5-8 minutes until dry and can becrushed using a blender. After that, brewed using warm water and added 100 grams of granulated sugar, then separated the tea from the singkil tea dregs.

Making kombucha singkil

In making kombucha, researchers refer to research conducted by (Rinihapsari & Richter, 2023), as follows;

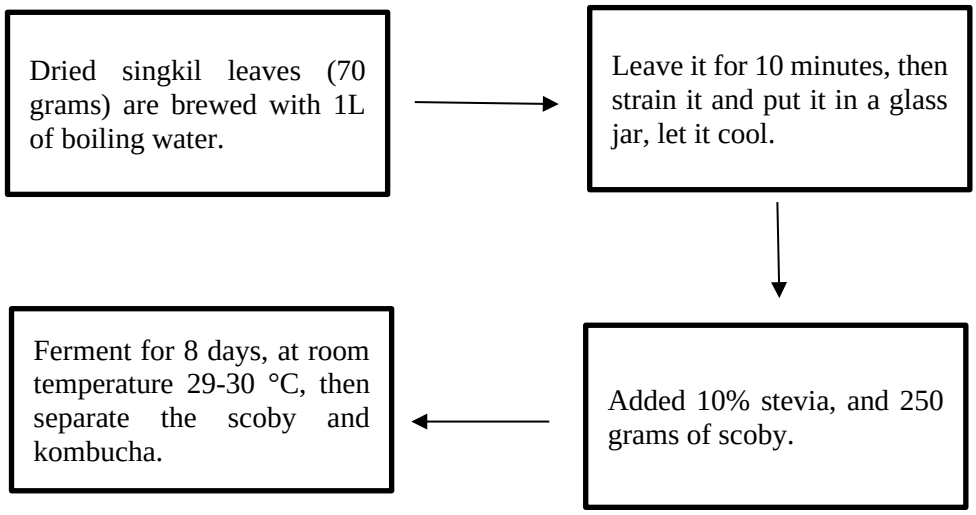

Figure 1. Making Kombucha

Organoleptic Test

Organoleptic testing is the result of testing the formulation of drinks or food using the five senses. The organoleptic test assessment is in the form of color, aroma, texture and taste (Dewi & Lestari, 2016). This organoleptic test involved 30 untrained panelists aged 21 years. There are 3 schemes in this test, namely the organoleptic test of singkil tea (P1), singkil kombucha tea (P2), and regular kombucha drink as a control (P3). Each sample is placed in a glass. Each sample is served in a different glass that is coded with different numbers for the sample. The panelists conduct sensory testing which is determined based on a numerical scale, namely. 1; really dislike, 2; dislike, 3; somewhat like, 4; like, 5; really like. The assessment includes aroma, taste, viscosity, color, and overall acceptance.

Alcohol Content Test

The alcohol content test is carried out to determine the alcohol content in kombucha singkil tea drinks using an alcohol meter, this test refers to Regulation of the Minister of Health of the Republic of Indonesia Number 861977 about drinks containing alcohol and latest MUI Fatwa No. 10 of 2018, regarding the tolerance of alcohol/ethanol levels in the final product of fermented drinks with levels of less than 0.5%.

Data collection technique

The organoleptic test results data were analyzed descriptively, namely by describing the level of panellist preference for each parameter (aroma, taste, viscosity, color, and overall acceptability) based on the percentage of choices or the average score given.

RESULT AND DISCUSSION

Organoleptic Test

Organoleptic tests were carried out onSingkil leaf tea, Singkil kombucha tea, and kombucha include hedonic test assessments and hedonic quality tests. The hedonic test is a preference test of the level of preference in the form of the results of a choice of product quality statements tested on panelists (Agustina et al., 2021). The results of the hedonic test based on the level of preference are in the form of a numeric scale, while the results of the hedonic quality test are in the form of a descriptive analysis of the product being tested. The results of the descriptive analysis of the hedonic quality test are useful for providing a detailed description in the form of sensory specifications of the product from the panelists (Lawless & Heymann., 2010). Organoleptic characteristics in this studyincludes hedonic tests and hedonic quality tests on color, aroma, taste, viscosity, and overall acceptance/acceptability. The results of the organoleptic hedonic test are shown in Figure 1.

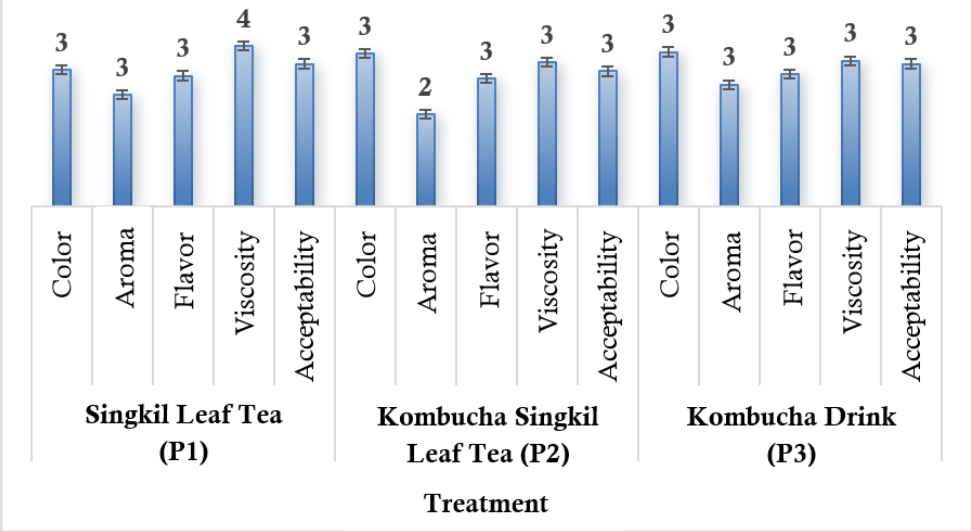

Figure 2. Histogram of Average Results of Organoleptic Hedonic Test

The results of the organoleptic hedonic quality test are shown in table 1 as follows,

Table 1. Results of Organoleptic Hedonic Quality Tests of Singkil Leaf Tea and Kombucha

P	Hedonic Quality Test				
	Color	Aroma	Flavor	Viscosity	Acceptance Power
1	Dark and slightly concentrated chocolate	Stinging, typical of singkil leaves	Bitter and Astringent	Quite thick	Kinda like it
2	Yellowish orange and clear	Pungent, typical fermentation	Sour, Tart, and Sweet	Not thick	Kinda like it
3	Yellow	No Stinging	Sour and Sweet	Not thick	Kinda like it

Notes:
Q: Treatment
P1: Singkil Leaf Tea
P2: Kombucha Singkil Leaf Tea
P3: Kombucha Drink

Color

Color is a key visual indicator that influences product appeal and consumer taste expectations. Color on packaging or products serves to attract attention, differentiate products from competitors, and create brand identity. This study confirms that color has a significant influence on visual appeal and consumer purchasing decisions (Pramesti et al., 2023). In processed tea and kombucha products, color variations such as dark brown (P1), yellowish orange (P2), and yellow (P3) reflect differences in processing and raw materials. The dark color of singkil leaf tea (P1) is associated with the strength of flavor and ripeness, while the bright color of kombucha (P3) indicates freshness or acidity. This is in line with the study Larasati et al., (2024) stated that color has a significant effect on the initial attraction of consumers before tasting the product.

The dark and dense brown color of P1 is produced from the oxidation process that occurs during leaf drying. This process involves the conversion of polyphenolic compounds, such as catechins, into theaflavin and thearubigin pigments, Theaflavins have golden yellow pigments and play a role in creating bright colors and fresh flavors in tea, while thearubigins contribute to darker and more complex colors, thus making a significant contribution to the intensity of the dark color in tea (Primasari et al., 2022). The yellowish orange and clear color of P2 is caused by the fermentation process of kombucha. Acetic acid bacteria such as Komagataeibacter xylinus and yeast such as Saccharomyces cerevisiae work together in the SCOBY (Symbiotic Culture of Bacteria and Yeast) to convert sugars into organic acids, such as acetic acid (Hanum et al., 2021). The interaction between tea components and the SCOBY culture also plays an important role in color changes. The SCOBY culture can break down complex compounds in tea into simpler compounds, resulting in brighter and more stable colors. This process not only increases the acidity of the kombucha but also affects the color and clarity of the drink (Hamida et al., 2022). The yellow color in P3 indicates a difference in the proportion of ingredients or a longer fermentation duration compared to P2. The yellow pigment may come from chlorophyll degradation or the synthesis of compounds such as riboflavin during fermentation. Study Lalong et al., (2022) showed that the longer the fermentation time, the brighter the color of kombucha and the lower its pH. This is due to the production of organic acids such as acetic acid and gluconic acid by bacteria and yeast during fermentation, which not only changes the color but also lowers the pH of kombucha. In addition, the study Agustina et al., (2021) showed that the fermentation period had a significant effect on the physicochemical and organoleptic characteristics of kombucha, including increasing antioxidant activity and total acid, as well as changing the color to yellow.

The results of the panelist's assessment of the processed singkil tea through a color test showed that the treatment had an acceptability in category 3 (rather like). Based on the color variations of the three samples, it can be predicted that consumer preferences will vary depending on market segmentation. Dark colors (P1) may be more in demand by groups who like traditional tea, while bright colors (P2 and P3) have the potential to attract the younger generation who tend to choose innovative and visually appealing products. However, it is necessary Further hedonic tests to validate this hypothesis and identify other factors such as aroma and texture that influence

consumer decisions. This test will help better understand how consumer preferences for color impact product acceptance.

Aroma

Aroma is the smell of a food and beverage product (Nabillah et al., 2021). Aroma is one of the important factors in determining the quality of food and beverage ingredients. Testing aroma in the food industry is considered important because it can quickly provide an assessment of the results of the product, whether the product is liked or not by consumers. Aroma also plays a very important role in determining the degree of assessment and quality of an ingredient for someone who tries a new food. So besides shape, color, and smell, aroma will be the main concern, where after the smell is received, the next determination is the taste in addition to its texture (Julyasih et al., 2023).

The results of the panelist's assessment of the processed singkil tea through the aroma test showed that the treatment had an acceptability in category 3 (rather like). Meanwhile, the results of the organoleptic hedonic quality testshows the typical aroma of singkil leaves (P1), a pungent aroma typical of fermentation (P2), and a non-pungent aroma (P3). The difference in aroma is influenced by the time and fermentation process. Most aromatic compounds are formed during fermentation which are synthesized through metabolic pathways. Tea aroma is formed chemically during the infusion process, and is bound to precursors, such as sugar (a carbon substrate available from yeast activity) with optimal temperature conditions below 30 °C (Suffys et al., 2023). The results of the organoleptic test showed that in treatment 1, namely the singkil leaf tea drink, it had a distinctive pungent aroma of singkil leaves. The singkil plant has a distinctive odor that comes from phenol compounds. Phenolic compounds are compounds that have one or more hydroxyl groups attached to an aromatic ring. Phenolic compound derivatives are the largest secondary metabolites produced by plants (Primasari et al., 2022).

The results of the organoleptic test showed that in treatment 2, namely the kombucha singkil leaf tea drink, it had a distinctive pungent fermentation aroma. The distinctive fermentation aroma indicates that the fermented drink that has been made has been successful (Susanti et al., 2023). There are two stages that occur during the fermentation process, namely the formation of alcohol and lactic acid. This happens because the yeast in the symbiotic culture of kombucha will break down sugar into alcohol, while the alcohol that has been formed will be oxidized by lactic acid bacteria or acetic acid into acetic acid (Firdaus et al., 2020). The length of fermentation time makes a difference to the aroma of kombucha. The longer the fermentation, the stronger the sour aroma of kombucha will be, as will the aroma of alcohol produced. The increase in alcohol content is also caused by the activity of yeast which produces the enzyme alcohol dehydrogenase which will break down sugar into alcohol (Gumanti et al., 2023).

The distinctive pungent aroma of fermentation in treatment 2 is also influenced by stevia sugar added to the kombucha singkil leaf tea before the SCOBY is inserted, before the fermentation process takes place. The addition of stevia sugar is used as a nutrient supply for the SCOBY during the fermentation process. Stevia sugar itself does not have a distinctive aroma (Susanti et al., 2023), so that the concentration of added

stevia sugar given will not affect the aroma of the drink (Sundari et al., 2023). The results of the organoleptic test showed that in treatment 3, namely kombucha drinks had a non-pungent aroma, but there was also a slightly sour or sour aroma. This is due to the length of the fermentation process that continues to run so that more compounds are hydrolyzed and more organic acids such as acetic acid, gluconic acid, and glucuronic acid are formed, which causes the aroma of kombucha to become more sour (Putri et al., 2023).

Flavor

In processed products of tea leaves and kombucha, taste is an important indicator because of the potential content of bioactive compounds that can affect the bitter or astringent and sour taste of kombucha. The influence of the content is a determining factor in determining the acceptability of a product to panelists.The taste contained in a product will affect the acceptability of the panel, which is assessed when it is served and the taste when consumed (Palijama, 2024; Nathaniel et al., 2020).Taste evaluation through organoleptic tests on processed singkil leaf tea and kombucha drinks is an important stage in developing products based on consumer preferences. From the research resultsThe results of the panelists' assessment of the processed singkil tea through a taste test showed that the treatment had an acceptability in category 3 (quite like it). The results of the hedonic quality test showed that the taste of the singkil leaf tea drink was bitter and astringent, while the singkil leaf kombucha tea had a sour, tart, and sweet taste, and the taste of the kombucha drink was sour and sweet. The results of the organoleptic test were influenced by the treatment given to the product, so that the resulting taste was different, and the singkil leaf kombucha tea produced a new taste that was still unfamiliar to the panelists.

The results of the organoleptic test showed that in treatment 1, namely the singkil leaf tea drink, it had a dominant bitter and astringent taste. The bitter taste in tea is generally caused by the presence of polyphenol compounds, especially tannins, which are extracted during the brewing process (Balentine et al., 1997). Meanwhile, the astringent taste comes from the interaction of tannins with salivary proteins in the mouth, which creates a drying and wrinkling sensation (Lee et al., 2015). The bitter and astringent taste is probably caused by the high content of tannins and other phenolic compounds in the leaves.

Singkil leaf tea kombucha drink shows sour, tart, and sweet tastes in organoleptic test results. This is because the processed tea drink comes from a mixture of singkil leaf tea and kombucha, each of which has a different taste, resulting in a new taste. The formulation of herbal tea flavors is significantly influenced by the proportion of raw materials and processing methods applied (Gustiani & Yuliarti, 2022). Study Dewata et al., (2017) showed that temperature and fermentation duration affect the activity of polyphenol oxidase and peroxidase enzymes, which play a role in the formation of theaflavins and thearubigins. compounds that contribute to the taste of tea because high temperatures or too long brewing times can cause excessive release of tannins, making the tea taste more bitter and astringent.

Kombucha is a fermented tea drink known for its probiotic properties. The results of organoleptic tests showed that in treatment 3, kombucha drinks had a dominant sour and sweet taste. The taste of kombucha drinks is the result of complex

interactions between organic acids, sugars, and volatile compounds produced during fermentation (Laureys et al., 2020). Sensory assessment of kombucha includes taste assessment which greatly determines the quality and consumer preference for kombucha products (Gaggia et al., 2019). The sour and sweet taste of kombucha drinks, as well as the presence of volatile compounds such as ethanol and acetic acid, greatly influence consumer acceptance (Villarreal-Soto et al., 2018).

Viscosity

Viscosity plays an important role in shaping taste preferences and sensory experiences. It can be influenced by appetitive conditions and interacts with taste in shaping multisensory preferences (Colbert et al., 2022). Study Rizqiyah et al., (2023) evaluated the viscosity of enteral formula and found that appropriate viscosity can improve consumer acceptability. Hanum et al., (2021) shows that consumers often associate thickness with nutritional content, with thick textures perceived as more "natural" and of higher nutritional value.

The viscosity level of P1 is quite thick, influenced by the content of natural polymer compounds such as polyphenols, tannins, and high water-soluble fiber in singkil leaves. Processing processes such as wilting and oxidation strengthen the formation of these compounds, thereby increasing the viscosity (Supriningrum et al., 2018). The fairly thick Singkil tea is influenced by the content of natural polymer compounds such as flavonoids and high phenolics in singkil leaves. Research shows that singkil leaves contain flavonoids of 248.46 mg Qe/g, which contribute to the thickness and texture of the product (Pribadi et al., 2024). Study Supriningrum et al., (2018) that processing such as withering and oxidation strengthen the formation of these compounds, thereby increasing viscosity. In addition, the interaction between tannins and proteins during brewing also contributes to the characteristic texture of traditional tea. Other secondary metabolites such as alkaloids, saponins, and steroids are also present in singkil leaves, which can affect the physical and sensory properties of the product.

The lower viscosity of P2 compared to P1 is due to enzymatic activity during kombucha fermentation. Acetic acid bacteria (such as Acetobacter) and yeast in the SCOBY degrade the polysaccharide and protein compounds that cause viscosity, resulting in a more liquid texture. In addition, the production of organic acids (such as acetic acid) during fermentation reduces the viscosity of the solution (Sulistiawaty & Solihat, 2022). Findings Nyhan et al., (2022) reinforces that fermentation duration is inversely proportional to the final viscosity of the product.

In P3, the absence of singkil leaf tea components in the formulation resulted in lower viscosity compared to P2. The more intensive fermentation process in P3 resulted in complete hydrolysis of the natural thickening compound, thus creating a juice-like texture. Fermentation can affect the physical and chemical properties of the product, including viscosity, depending on the type of microorganisms involved and the fermentation conditions that impact the texture and quality of the final product (Sobowale et al., 2025). This is in accordance with research Mefleh et al., (2024) which shows that fermentation can change viscosity through the degradation of complex compounds into simpler ones, as found in a study on the effect of fermentation on the viscosity of microbiological broth.

The results of the panelists' assessment of the processed singkil tea through a viscosity test showed that the treatment had an acceptability in category 3 (quite like). The variation in viscosity between products reflects different market segments. P1 may be more attractive to the adult age group who value "authentic" taste, while P2 and P3 have the potential to attract the younger generation who prioritize practicality and freshness. This study examines consumer acceptance of low-viscosity fermented beverages.

Acceptance Power

Organoleptic tests on processed singkil tea and singkil kombucha were conducted involving 30 untrained panelists with three treatments, namely, (P1) singkil leaf tea, (P2) singkil leaf tea kombucha and (P3) kombucha drink as a control. Acceptability is the level of panelist preference for the product being tested (Manzalina et al., 2019). Color, aroma, taste, and viscosity are factors in the overall acceptability of processed singkil tea by panelists in this study. Overall acceptability is the result of combining the assessment of color, aroma, taste and viscosity. This aims to see the results of the overall acceptability of the panelists (Palijama, 2024). The results of the panelist's assessment of the processed singkil tea through a preference test (Hedonic) showed that all treatments had an acceptability in category 3 (rather like) (figure 1). In addition, on averagethat Singkil tea and Singkil kombucha have an average acceptance rate of 3- "somewhat preferred"). This indicates its potential as a marketable alternative beverage. The bitter and astringent taste of non-fermented Singkil tea is a limiting factor in its appeal. Consumers' main preference lies in the balanced sour-sweet taste of Singkil kombucha which is preferred over the bitter taste of regular tea, its lighter liquid texture. However,The level of liking or disliking varies for each panelist and is relative, depending on the panelist's preference for each different tea processing treatment (Aryadi et al., 2017).

Alcohol Content Test

Alcohol is a clear liquid obtained through the fermentation of carbohydrates with the help of microorganisms. Alcohol is volatile and can be mixed with water, ether, chloroform, and other substances. In addition, alcohol is a fermentation process of sugar, honey, fruit juice or tubers (Aryasa et al., 2020). According to the Regulation of the Minister of Health of the Republic of Indonesia Number 86 of 1977 concerning alcoholic beverages, alcoholic beverages are defined as all types of beverages containing alcohol but not including drugs. These alcoholic beverages are categorized into three groups based on their ethanol content, namely group A with an ethanol content of between 1 - 5 %, group B with an ethanol content of 5 – 20 %, and group C with an ethanol content of 20 – 55 % (Kartika, 2022). Based on the latest MUI fatwa No. 10 of 2018, the alcohol/ethanol content in the final fermented beverage product is tolerated at ≤ 0.5 % (Sapitri et al., 2022).

Alcohol content testing in this study was only carried out on fermented drinks, namely kombucha singkil tea. Based on measurements using an alcohol meter, it was found that kombucha singkil tea has an alcohol content of 0 %. Kombucha Singkil Tea has an alcohol content of 0 % because the production process is strictly controlled, such as a fermentation time of no more than 8 days. The varying alcohol content is

influenced by the length of fermentation where the longer the fermentation, the higher the alcohol content. However, along with microbial activity, it will also trigger a decrease in alcohol content (Priyono & Riswanto, 2021). Besides that,Kombucha itself is a non-alcoholic drink that uses a symbiosis of bacteria and yeast or known as SCOBY (symbiotic culture of bacteria and yeast). The microbes that play a role in the fermentation of kombucha drinks will convert sucrose into glucose and fructose. These two types of sugar are converted into ethanol and CO2 compounds. Then because fermentation in kombucha is still ongoing, the ethanol compounds present will be converted into organic acid compounds such as acetic acid, gluconic acid, and glucuronic acid (Yanti et al., 2020; Sapitri et al., 2022).

CONCLUSION

Acceptance analysis shows thatprocessed singkil tea through a preference test (Hedonic) showed that all treatments had an acceptability in category 3- "rather like". In addition, on averagethat Singkil tea and Singkil kombucha have an average acceptance score of 3- "somewhat preferred". This indicates its potential as an alternative drink that is worthy of being marketed. as well as product safety because the alcohol content is 0% which meets halal standards. For future development, strategies are needed such as the use of additional flavors (eg fruit essence) to cover the bitter residue, optimization of fermentation duration to increase flavor complexity, and consumer education regarding the antioxidant benefits of Singkil leaves to encourage product adoption. The combination of these factors is expected to expand the market for locally-based functional beverages while answering consumer needs for innovative, healthy, and sustainable products.

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