

The Effect of Palm Sugar and Cane Sugar Addition toward the Characteristics of Honey Pineapple Fermented Drinks

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Abstract: The honey pineapple fruit (*Ananas comosus*(L) Merr) is a fruit that is produced by Indonesian farmers. The sweet flavour of the honey pineapple depends on the water content level in the honey pineapple. The honey pineapple is a fruit that spoils easily. The storage period of the pineapple is between 1-7 days with a temperature of under 22⁰C. The objective of this research is to identify the characteristics of probiotic fermented drinks made from the honey pineapple fruit, with the addition of spices such as ginger, cinnamon, and a percentage of palm sugar. There are two treatments in processing, based on the ratio of added ingredients, P₁ = 60%pineapple fruit; 20% cane sugar; 10% ginger; 10% cinnamon, P₂ = 60%pineapple fruit; 25% cane sugar; 10% ginger; 5% cinnamon. The observed variables are the pH of the drink and the temperature during the hour of observation. The measured test standard was adjusted to the SNI (Indonesian National Standard) 3719-2014 of produced fruit juice on the quality of fruit juice drinks, with the provision of having a distinct smell, flavour, and colour in normal conditions. The results organoleptically obtained result was that the percentage of palm sugar during the third and fifth measurement hour had a high score from 10 panellists, which was a level (4) strong smell with the duration of the ripening day. The pH level test did not differ much in P₁(20% palm sugar) and P₂(25% palm sugar) substituted in the pineapple fruit juice, which was 3.3 – 5.0.

Keywords: Honey pineapple, palm sugar, probiotic drinks, pH

I. INTRODUCTION

The honey pineapple fruit (*Ananas comosus*(L). Merr.) is cultivated at a height of above 500 mamsl with a rainfall of 500-2500 mm/year. The honey pineapple plant has a stem size of approximately 20-50 cm with short segments. The function of the honey pineapple plant stem is as the location where the root, flower leaf, stalk, and fruit attaches. The pineapple stem is almost not visible due to it being covered with leaves. The shape of the pineapple leaf is sharp and lengthy, spanning approximately 150 cm, with small spikes along the borders. The honey pineapple fruit can be harvested at an age of 12-18 months, however, this also depends on the seed type. The honey pineapple is included in the category of Queen pineapples, with a sweet flavour, orange colours, and fragrant smell [1]. The diameter of the pineapple fruit is small, approximately 10-16 cm, with an average wright of 300-600g. The ripeness level of the pineapple fruit is shown through its skin colour, ranging from a yellow to an orange colour. A pineapple with an orange colour shows a perfect ripeness level and a sweet taste, although its storage power becomes low. The sweet flavour of the pineapple is dependent on the water level content in the fruit [2]. If the water content level is high, then the sugar content in the fruit becomes low, and the flavour becomes slightly sour. Farmers will plant during the drought season, or close to the rain season, for the honey pineapple to always have a sweet flavour. The pineapplefruit is an easily perishable fruit. [3]. The storage period of the pineapple is between 1-7 days with a temperature of under 22⁰C. The pH level of a yellow pineapple fruit is approximately 5, showing the acidity of the pineapple fruit. The highest sugar content is in yellow pineapples, which is 11.23%.

An alternative in maintaining the commodity of pineapple fruit is by processing it into a by-product of fermented probiotic drinks. The SNI 3719-2014 (Indonesian National Standard) on the quality of fruit juice drinks, with the provision of a distinct smell, taste, and colour in normal conditions [4]. The quality test of the juice drink was done with a minimal pH of 0.2. Meanwhile, organoleptic tests were done on the attributes of aroma and flavour. Probiotic drinks

are the result of lactic acid fermentation which contain live lactic acid bacteria. The pineapple fruit has a carbohydrate content of 10.54%, while the pineapple fruit skin extract has a glucose content of 17%.

Probiotic products can block pathogen bacteria and could control lactose metabolism, and thus can help those who suffer from lactose intolerance. Several symptoms of digestive tract disease such as diarrhea, typhus, and dysentery could be surmounted with this probiotic drink. There are many probiotic drink products, such as kefir, kumis yogurt, which are expensive. In the current condition, Indonesians still in the Covid-19 pandemic period require health drinks made from alternative ingredients that can be found in their surrounding environment. Probiotic drinks made from pineapple fruit as the main ingredient, with the addition of natural spices such as ginger, cinnamon, and palm sugar, could become an alternative fermented probiotic drink product. This pineapple fruit drink is added with a natural preservative, which is palm sugar. The characteristic of palm sugar is as a preservative to the pineapple juice drink, with a high solubility rate. Moreover, palm sugar can decrease the relative humidity and water binding power. Palm sugar is known to Indonesians as a sweetener in food and drinks, due to it having a high fibre level. The characteristic of palm sugar when compared to other types of sugar, is that it is high in calories and fibre, and is therefore used to resist cholesterol. The methods to create this probiotic drink is through 2-3 days of fermentation to obtain food supplements from live beneficial microbes and balance the microflora of the intestine. This research was conducted through the controlling of the percentage of substitute variations of palm sugar towards the honey pineapple fruit juice drink mixture, which has an effect toward the pH level and temperature of the pineapple fruit juice which is fermented as a probiotic drink [5]. The spices in the pineapple drink were used to organoleptically test the aroma and flavour of the result of fermented drinks, with a degree measurement of 1 to 4

II. RESEARCH METHOD

2.1 Tools and Ingredients

The first ingredient used in this study is the honey pineapple fruit (*Ananas comosus(L).Merr*), palm sugar (*Arenga pinnata*), ginger (*Zingiber officinale*), and cinnamon (*Cinnamomum verum*) which were obtained from traditional markets in the city of Malang, Indonesia, as well as water. The tools used were cutting knives, a cutting board, funnel, water glass, stove, stainless steel pan with glass lid, plastic container, scale, digital portable pen type pH EC, water sieve, and digital scale.

III. RESEARCH METHODOLOGY

This research uses the quantitative experiment method. Two treatments of ingredient combinations were used:

P₁ = 60% pineapple fruit; 20% cane sugar; 10% ginger; 10% cinnamon

P₂ = 60% pineapple fruit; 25% cane sugar; 10% ginger; 5% cinnamon

This research was done in steps of pineapple fruit sorting, peeling and cleaning of the pineapple fruit, and other accompanying ingredients. Next was the cutting of the pineapple fruit into pieces with sizes of 1x2 cm. The palm sugar was cut into small pieces for it to easily break down when cooked. Meanwhile, 20 g of ginger was cut thinly, along with 250 g of palm sugar, 350 g of pineapple, 10 g of cinnamon, and 100 ml of water. For the second treatment, 350 g of pineapple, 20 g of ginger, 5 g of cinnamon, 300 g of palm sugar, and 1000 ml of water was used. All ingredients were placed into a stainless pan with glass lid and heated for 45 minutes. There were two pans for the different treatments, with the same heating time which was 45 minutes. Then, it was cooled and sieved into a glass with its surface covered and left for 2 days. After 2 days of ripening, a pH and temperature test was done every hour up to the eight hour. An organoleptic test was also done to 10 panellists to do a test of aroma and flavour. The block diagram of the creation of pineapple fruit juice and palm sugar drink is as follows:

The procedure of creating fermented pineapple drink was functionally observed through panellist opinion as an organoleptic test [7]. The organoleptic test result was taken from questionnaires from 10 panellists who state whether the drink can be consumed, from its flavour, aroma, and colour. The pineapple fruit juice with substitution by a percentage of palm sugar was tested for its pH level and temperature [6], which was initially measured by fermentation or incubation of approximately 23.4⁰C to 25⁰C in optimal temperature condition. The organoleptic test was taken from a fermentation period of 2-3 days which translates into 24 hours of testing. The results obtained based on the panellist opinions is that the longer the storage period, the stronger the smell of the drink from an average score of 1 with 4 being the highest.

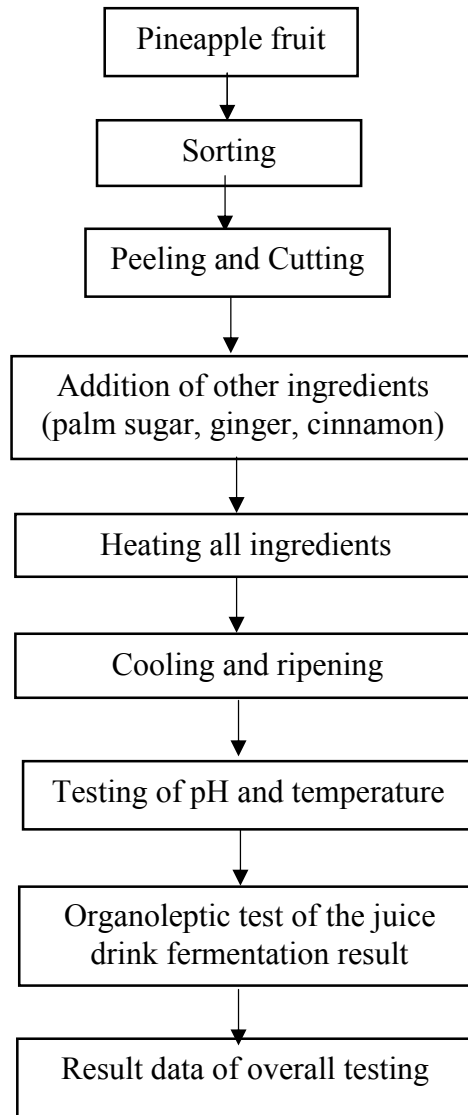


Fig. 1. Creation Process of Pineapple Fruit Juice and Palm Sugar Drink

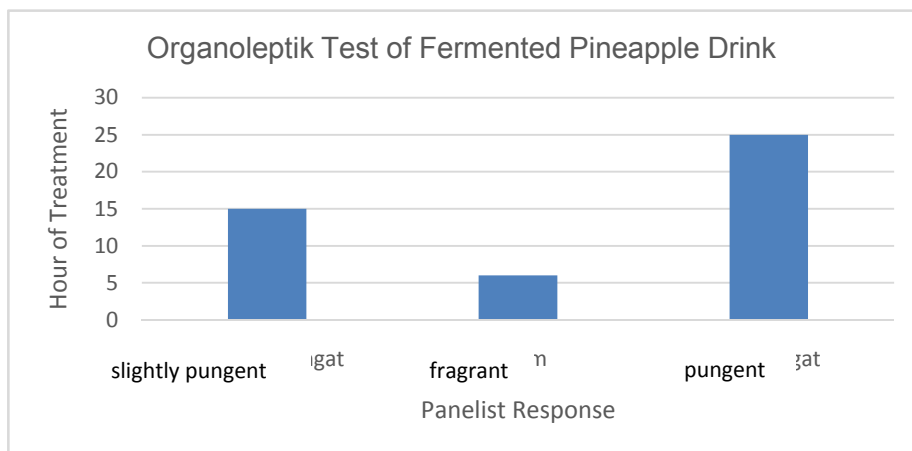


Fig. 2. Organoleptic Test of Fermented Pineapple Drink

The result of the aroma test toward the fermented drink is not independent from the function of sense of smell. The response of the nose in accepting smells will be responded by the brain, which is usually based on the mixture of four main smells which are: fragrant, sour, pungent, and burnt. In this study, the aroma received by the panellists' sense of smell is due to the addition of water content mixed in the fermented drink, causing the sour aroma to be high. The higher the addition of water, the lower the contribution of aroma from compounds such as acids and volatile compounds. Thus, the aroma score becomes pungent with the longer measurement hour of treatment. Aside from that, compounds were lost in the process of heating in the process of creating the drink. Meanwhile, test results of average pH with the addition of variations of palm sugar, ginger, and cinnamon to the fermented pineapple drink can be observed in Image 3.

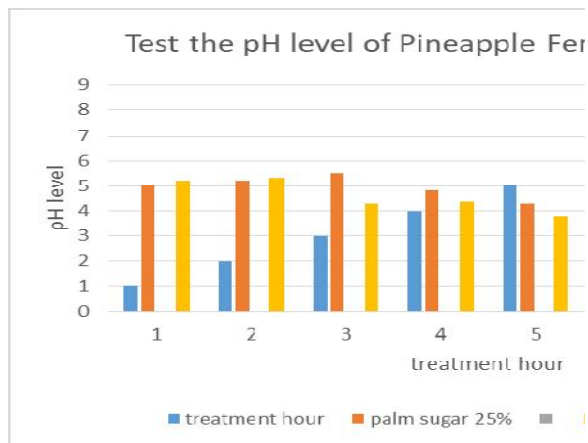


Fig. 3. Test of Fermented Pineapple Drink pH Level

Based on Image 3 that shows the pH test graph of the fermented pineapple drink, the addition of water with H⁺ ions originating from organic acids that form acid will decrease, and thus the pH resulted will increase. An acidic substance in which water is added to, causes the increase of hydrogen ions (H⁺) in the water, and the decrease of hydroxide ions (OH⁻), and thus the increase of hydrogen ions (H⁺) causes the decrease of a the pH of a substance. The more the amount of added acid to a mixture, the larger the parts of released H⁺ ions, which lowers the pH level. During the testing period, the measured pH ranged approximately 3.3-5.0 for the 25% palm sugar mixture, whereas the 20% palm sugar mixture had a pH of approximately 3.3-5.2. Palm sugar will be more optimally fermented by bacteria compared to other types of sugar. Thus, the ability for the microorganisms to produce acids is higher. The pH (power of hydrogen) score, or acidity rate, becomes an important quality factor in fermented drinks. The fermentation period based on the measurement hour factor did not vary much in the 3rd to 6th testing hour of the pH level.

IV. CONCLUSION

Based on the result of the study of the effect of application types of cane sugar and palm sugar in fermented pineapple drinks, the organoleptic test toward the aroma and flavor attributes shows an average score of 4 from a scale of 1 to 5 in which longer treatment hours result in more pungent smell and sour flavor. The pH level from the difference of optimal palm sugar addition was at a score of 3.6-4.0. Whereas for cane sugar, the tested pH was approximately 3.3-5.0. The pH level was lower because for palm sugar, the ability of microorganisms to produce acid becomes higher. The fermentation period realistically impacts the temperature and pH and organoleptically toward the aroma and flavor, according to SNI 3719-2014 (Indonesian National Standard).

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