



## FORMULATION AND QUALITY EVALUATION OF CORDIAL BASED ON MARKISA (PASSIFLORA EDULIS) COMMODITY IN BUKIT KOOR MALAYSIA

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### Abstract

*Passion fruit (Passiflora edulis) is a type of fruit that is grown in Malaysia. Yellow passion fruit is more prominent than purple passion fruit in terms of comparison to farmers and users. Some of the nutritional contents found in passion fruit are citric acid, ascorbic acid, niacin, riboflavin, thiamine, iron, carotene, phosphorus, minerals, calcium, fiber, energy, fat and protein. This study aims to evaluate the physichalmical and contrinatrium of passion fruit cordial drink with the addition of sugar, salt and pandan leaves. The analysis carried out is the analysis of pH, TSS (Brix), Color and Sensory Test. The results of the study showed that the passion fruit cordial drink with the treatment of basic passion fruit cordial, passion fruit cordial and salt, passion fruit cordial and pandan and passion fruit cordial with salt and pandan had pH, (2.2; 2.1; 1.8; 1;8), TSS (74%; 70%; 70%; 74%), color (29.6; 27.4; 26.6; 26.5), sensory test color, taste, and overall acceptance.*

*Keywords: Cordial, Passion Fruit, Pandan Leaves, Salt, Sugar*

### 1. Introduction

Bukit kor is an experimental land area of 600 hectares. This land is a gift from the Kingdom of Terengganu. Bukit Kor has an altitude of 32 meters above sea level and an average temperature of 26.7°C and relative humidity of 77.7%. The 250 hectares of Bukit Kor land that is still used for crop cultivation is covered by various types of plants, one of which is passion fruit.

Passion fruit (*Passiflora edulis*) is a type of fruit that is suitable for planting in Malaysia. Yellow passion fruit is more prominent than purple passion fruit in terms of comparison to farmers and users. The fruit is round or oblong in shape with its skin green in color and changes to a bright yellow color when ripe. The yellow passion fruit is larger than the purple passion fruit at 6 - 12 cm in length with a centerline of about 4 - 7 cm. This type has a thicker and stronger skin which allows it to last longer. The flavor is slightly less pleasant compared to purple passion fruit and is more acidic. The yield is high and suitable for processing into beverage juice or beverage cordial.

Passion fruit is a natural source of antioxidants, this can be seen from its orange flesh. Antioxidants protect the body from free radical contamination. Polyphenols, vitamin C, and carotenoids are antioxidants that are found in passion fruit<sup>1</sup>. The polyphenol content in passion fruit is 435 mg/L, while the carotenoid content in passion fruit is 9.32 mg/L which consists of  $\beta$ -carotene, lycopene,  $\alpha$ -carotene, and  $\beta$ -cryptoxanthin<sup>1</sup>.

Some of the nutritional content contained in passion fruit is citric acid, ascorbic acid, niacin, riboflavin, thiamine, iron, carotene, phosphorus, minerals, calcium, fiber, energy, fat and protein (Bethany, Julianti, & Nurminah, 2020). Passion fruit is used as a pain reliever, anti-spasm, colitis, tranquilizer, anti-inflammatory, constipation-like disorders, insomnia, relaxes nerves during headaches, relieves diarrhea (Winkanda, 2019). Passion fruit is a high-fiber fruit and can be used to maintain digestive health, including seeds that can be consumed because they contain fiber (Susilo, 2020).



Cordial with passion fruit as the basic ingredient can be consumed by various groups, so that it can compete in the market with other fruit juice drinks. According to Viera et al. (2022), passion fruit contains vitamin C and polyphenolic compounds, while according to Ramaiya et al (2019), passion fruit contains a lot of dietary fiber and minerals. Various studies have also proven that passion fruit is useful as an antioxidant, antidiabetic, antihypertensive, and anti-cancer (Kawakami et al., 2022). Judging from the content of passion fruit can make it clear that this cordial is safe for consumption by all people.

## 2. Methods

### Materials and Tools

This research was conducted from September 2023 to September 2023. This research was conducted in the laboratory of the faculty of food and science. The main ingredients used in this research are passion fruit, sugar, salt, and pandan leaves. And the tools used in this research are digital scales, blender, measuring cup, spatula, gas stove, knife, stainless steel pot, plastic bottle, gloves, chromameter, pH meter, and brix refracometer.

### Cordial Drink Making

Fresh and ripe passion fruit 1kg from bukit koor. then prepare 2kg of sugar. then 4 pandan leaves. and 20grams of salt. Split the passion fruit using a knife and remove the passion fruit from the skin. Then heat the passion fruit and pour 1 liter of fruit juice into a saucepan, then add 2 kg of white sugar, then cook until the sugar is dissolved. Then add water to the pot up to 2 liters. After the sugar is dissolved and the water boils, turn off the stove and let it stand for 5 minutes or until it cools.

### Analisis pH

The pH analysis refers to the method conducted by Dari et al. (2021). The pH test is carried out using a pH meter. The pH meter is dipped in the sample and then wait until an indicator number appears on the pH meter screen indicating the pH value of the sample.

### Analisis Colour

Total color difference analysis is performed with a chromameter, which measures the color difference on the surface of the material to be tested. The resulting color intensity is expressed by the L\* value which indicates the degree of brightness between 0 (black) and 100 (white), a\* values indicate the intensity of red (+) and green (-) colors, b \* values indicate the intensity of yellow (+) and blue (-) colors ( Laia et al., 2023 ).

### Analisis Sensory

Sensory assessment was carried out with the hedonic test, including color, taste, aroma, and overall acceptance of the hedonic test carried out to 30 trained panelists, the percentage of panelists choosing 1 strongly like - 7 strongly dislike.

### Analisis brix

Analisis brix dilakukan dengan alat brix refracometer digital AMR-100, yang di mana alat digunakan untuk mengukur besarnya konsentrasi larutan yang terkandung di dalam suatu larutan. Satuan skala pembacaan portable brix meter adalah % brix.

### Data Analysis

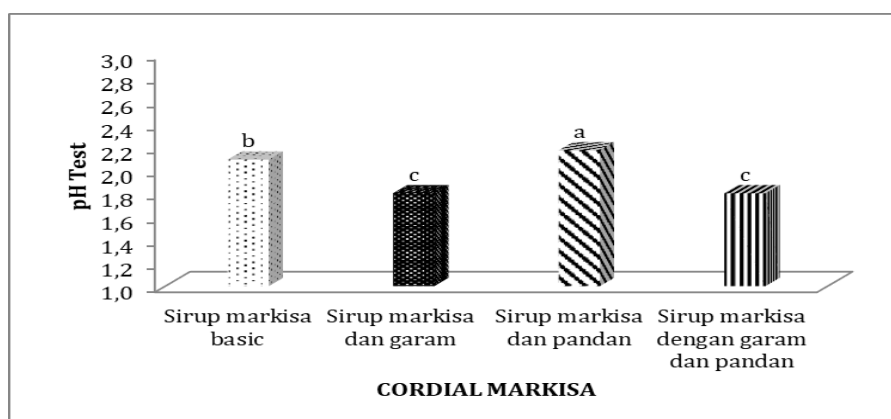
Analysis The data obtained from the results of the study were analyzed statistically

with an analysis of variance (Anova). If the data obtained is significantly different, then continued with the Duncan Multiple Range Test (DMRT) at the 5% level and data processing using the Statistical Analytical System (SAS) application. With a randomized complete design model with 4 types of treatment on syrup and the parameters observed are: pH, Brix, Color and Sensory analysis (Organoleptic Test)

### 3. Results and Discussion

This research is about making passion fruit cordial and adding food ingredients to processed passion fruit cordial while the food ingredients added to the cordial processing are sugar, salt and pandan leaves. The first step is to take passion fruit (*passiflora edulis*) in kor hill. Then the processing of passion fruit is carried out in the food science laboratory. The data analysis carried out is the pH test, total soluble solids (TSS) content, color test and organoleptic test to 30 panelists. The results of the research obtained from the research that has been done are getting the pH level found in passion fruit syrup with pandan 2.2. total soluble solids (TSS) levels in passion fruit syrup with pandan 74%Brix. Color levels in passion fruit syrup and salt with pandan  $L^* 29.6$ . And the results of the organoleptic test that has been tested by 30 panelists are getting results there is no real difference because all processed passion fruit syrup is liked by the panelists.

#### pH



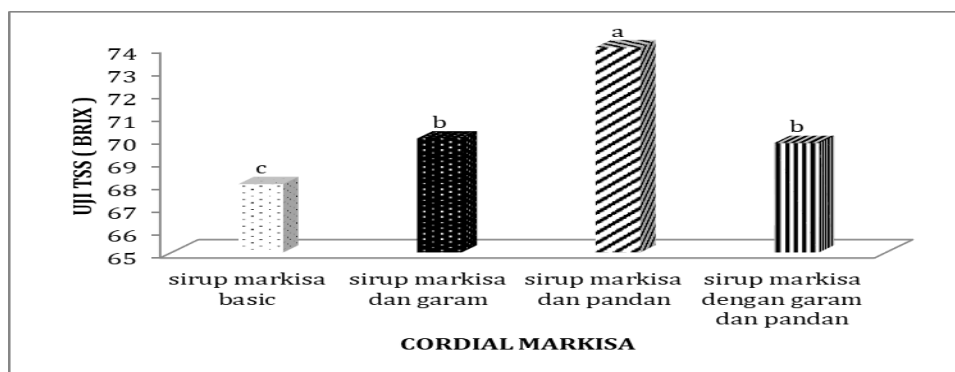
**Figure 1.** Effect of Additional Food Ingredients in Passion Fruit Syrup Drink on Ph Description: a (2.2), b (2.1), c (1.8) and d (1.8). Different letters in the figure indicate significant differences at the level of  $\alpha = 0.05$ .

From Figure 1 above, it is obtained that the pH of passion fruit syrup with pandan (2.2) is higher than the pH of passion fruit syrup (2.1), passion fruit syrup with salt and pandan (1.8), and passion fruit syrup with salt (1.8). Then it is known that the pH of passion fruit syrup with salt and pandan is not significantly different from the pH of passion fruit syrup with salt. (Susanti and Putri 2019) suggested that sour passion fruit (*Passiflora edulis f. edulis* Sims) is useful for inhibiting cancer cells and lowering cholesterol because of its high fiber content, which contains dietary fiber around 10.40 g or 27%. Passion fruit syrup can be stored for a long time without adding ingredients and without sterilization due to its high sugar content (67.5%) and low pH below 4.0.

The high pH of pandan cordial is certainly caused by the addition of pandan leaves. In accordance with research (Wiraguna et al.2020). states that the average pH of fragrant

pandan leaves ranges from 5.00 to 5.8. These results are in line with research (Luzia et al. 2019) where the physicochemicals in the fruit pulp of various passion fruit species are TSS (total dissolved solids), 9.06% titratable acidity (citric acid) and pH 2.66 in passion fruit pulp. Therefore, the addition of pandan leaves to passion fruit syrup can increase the pH of passion fruit syrup.

### TSS ( Total Dissolved Solids )

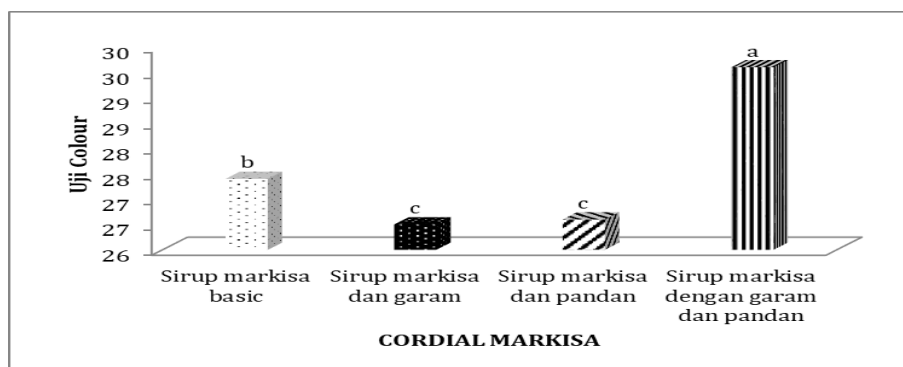


**Figure 2.** Effect of additional food ingredients in passion fruit syrup on TSS Description: a (74%), b (70%), c (68%). Different letters in the figure indicate significant differences at the  $\alpha = 0.05$  level.

Figure 2 shows the value of total dissolved solids (TSS) found in the treatment of passion fruit syrup with pandan leaves, namely 74%Brix. And in the treatment of passion fruit syrup and salt get a total dissolved solids of 70%Brix. And followed by the treatment of passion fruit syrup with salt and pandanus to get a total dissolved solids of 70%Brix. And the lowest total soluble solids is found in the basic passion fruit syrup treatment, which is 68%Brix. Total soluble solids (TSS) was found in the treatment of passion fruit syrup with pandan leaves, which was 74%Brix. This is due to the fact that pandan leaves have ingredients that function to improve aroma, taste and color. In addition to containing compounds that produce aroma, fresh *P. amaryllifolius* leaves contain carbohydrates in the form of 2.38 mg/g fructose and 1.77 mg/g glucose and amino acids (Cheetangdee and Chaiseri, 2020). Total soluble solids show ingredients that can dissolve in solution.

These components in fruit are glucose, fructose, sucrose and water-soluble proteins (pectin) (Farikha et al., 2019). Total soluble solids can be measured with a hand refractometer (Ihsan and wahyudi, 2020). Total TSS in the treatment of passion fruit syrup with pandan leaves is higher than the treatment of passion fruit syrup with salt (70%) and after that it is also followed by the treatment of passion fruit syrup with salt and pandan (70%) and followed by the treatment of passion fruit syrup without treatment (68%). Although the treatment of passion fruit syrup with salt and the treatment of passion fruit syrup with salt and pandan did not differ significantly, the passion fruit syrup with salt had a higher level of Total Dissolved Solids (TSS) than the treatment of passion fruit syrup with salt and pandan by 69.8%. According to Indonesian National Standard (SNI) 01-3544-1994, the minimum sugar content in syrup is quality I 65% and quality II 55%. According to Pratama et al (2019). Total soluble solids in syrup in Pasarran ranged from 68.40 Brix.

### Colour



**Figure 3.** Effect of Additional Food Ingredients in Passion Fruit Syrup Drink on Color. Description: a (29.6), b (27.4), c (26.6), c (26.5). Letters that are significantly different in the figure indicate significant differences at the  $\alpha = 0.05$  level.

In Figure 3 based on the analysis of passion fruit syrup treatment with pandanus and salt, the brightness value ( $L^*$ ) is 29.6 while the brightness value ( $L^*$ ) in the basic passion fruit syrup treatment is 27.4. Based on Figure 3 above, it shows the difference in brightness value in the treatment of passion fruit syrup with pandanus and salt has a higher syrup brightness when compared to the syrup treatment.

Basic passion fruit syrup, passion fruit syrup and pandanus treatment, and passion fruit syrup and salt treatment. From the treatment of basic passion fruit syrup has decreased due to the addition of sugar while in the treatment of passion fruit syrup with pandan and salt is higher due to the addition of pandan leaves and salt which can provide color brightness. According to Winarno (2019) that salt is an acidulant that is added to the food processing process for various purposes. Acidulants (acidity regulators) function as flavor and color enhancers, these compounds are synergistic towards brightness by preventing browning reactions in syrups. And according to Sasidharan (2020) pandan leaves are one of the herbal jenis that are widely used to add aroma and flavor as well as coloring to food and beverages in Indonesia. In Malaysia, pandan leaves are widely used as traditional medicinal ingredients for diabetics. According to Dalimartha (2020), the chemical compounds of pandanus leaves include alkaloids, saponins, flavonoids, polyphenols which function as natural antioxidants, and coloring agents in the extract.

### Sensory (Organoleptic) Test On Passion Fruit Syrup

Hedonic organoleptic test is a test used to measure the level of liking for a product so that it can be accepted. Organoleptic testing includes color, aroma, texture, appearance, taste and overall assessment. This level of preference is called a hedonic scale, namely like, really like, neutral, dislike and really dislike. Hedonic quality test is a quality test used to identify important characteristics in a product and provide information about the degree of ability of these characteristics. This test can help identify more details about the variables of ingredients used or processes related to certain sensory characteristics of the product (Permadi et al., 2019).

**Table 1.** Uji Sensori ( organoleptik ) in passion fruit cordial

Parameter	Color	Aroma	Appearance	Flavor	Texture	Overall Rating
Cordial basic	1.6 <sup>a</sup>	1.6 <sup>a</sup>	2.3 <sup>a</sup>	1.6 <sup>a</sup>	1.6 <sup>a</sup>	1.6 <sup>a</sup>
Cordial with salt	2.3 <sup>a</sup>	2.6 <sup>a</sup>	2.6 <sup>a</sup>	2.3 <sup>a</sup>	2.3 <sup>a</sup>	2.3 <sup>a</sup>

Cordials with pandan	2.0 <sup>a</sup>	2.0 <sup>a</sup>	2.0 <sup>a</sup>	2.0 <sup>a</sup>	1.6 <sup>a</sup>	2.3 <sup>a</sup>
Cordial with salt and pandan	2.3 <sup>a</sup>	2.6 <sup>a</sup>	2.3 <sup>a</sup>	2.6 <sup>a</sup>	2.3 <sup>a</sup>	2.6 <sup>a</sup>

Notes: Different letters in one column indicate significantly different at the  $\alpha = 0.05$  level.

In table 1. The results of the sensory test assessment from 30 panelists all really liked the basic passion fruit syrup, passion fruit syrup with pandan, passion fruit syrup with salt, and passion fruit syrup with salt and pandan. Starting from color, smell, appearance, taste, texture, overall assessment. Of the 30 panelists who did the sensory test (organoleptic) really liked the passion fruit syrup. But most panelists really liked passion fruit syrup with salt and pandan because of the mixture of pandan and salt in passion fruit syrup. Then followed by passion fruit syrup with pandanus, the panelists liked it because of the pandan mixture because of the aroma of the pandanus. Then the panelists also liked the passion fruit syrup with salt because of the added salt in the passion fruit syrup so that the passion fruit flavor is more flavorful unlike the usual passion fruit syrup.

- a) Results of the color liking test, color gives a strong stimulus to the level of panelist liking and is also visually appealing. The more attractive the color of a food ingredient, it can increase consumer interest in owning the product (Trisanthi and Susanto, 2019). According to Satuhu (2020). Color is also one of the important determinants of food quality, especially in marketing food products. Before other quality factors are considered such as taste, aroma, and texture, visually the color factor appears first.

In the liking test, panelists were asked to rate 4 samples of passion fruit syrup that had been coded. The assessment is in accordance with the panelists' level of liking for the color of the passion fruit syrup. After conducting a color liking test on passion fruit syrup and calculating it, the results can be seen in Table 1. The conclusion from Table 1. above is that the results obtained are the value of basic passion fruit syrup is smaller than passion fruit syrup with salt and pandan at the 5% significance level. So, there is no need to conduct further tests because this shows that there is no significant difference between samples on the level of liking for the color of the four passion fruit syrup samples tested.

- b) Taste test results on aroma, whether or not a food is accepted is determined by its aroma because in the food industry the aroma test can determine the results of consumer assessments of the products produced (Winarno, 2020). In addition, according to Suharyono (2019), aroma can also be used as a determinant of damage to the resulting product. The components that make up the aroma are volatile or easily damaged in the processing process.

In the favorability test, panelists were asked to give an assessment of 4 samples of passion fruit syrup that had been coded. The assessment is in accordance with the panelists' level of preference for the aroma of passion fruit syrup. After conducting a favorability test on the aroma of passion fruit syrup and performing calculations, the results can be seen in Table 1.

The conclusion from Table 1. above is that the results obtained are the value of basic passion fruit syrup is smaller (1.6) than passion fruit syrup with salt and pandan (2.6) at the 5% significance level. So, there is no need to do further tests because this shows that

there is no significant difference between samples on the level of liking for the aroma of the four passion fruit syrup samples tested.

- c) Favorability test results on the appearance of passion fruit syrup, in the favorability test, panelists were asked to rate 4 samples of passion fruit syrup that had been coded. The assessment is in accordance with the panelists' level of liking for the appearance of passion fruit syrup. After conducting the display liking test on passion fruit syrup and calculating, the results can be seen in Table 1.

The conclusion from Table 1. above is that the results obtained are the value of basic passion fruit syrup is smaller (2.3) than passion fruit syrup with salt (2.6) at the 5% significance level. So, there is no need to do further tests because this shows that there is no significant difference between samples on the level of liking for the appearance of the four passion fruit syrup samples tested.

- d) Taste test results, one of the quality attributes that can determine whether a product is acceptable is taste. Although the other assessment parameters are good, if the taste is not liked, then a product can be rejected. Taste is the last consideration for consumers in choosing food ingredients. In general, flavors can be divided into salty, sweet, sour and bitter. The determination of the taste of a product can be influenced by several factors including chemical compounds, temperature, concentration and interaction with other flavor components (Winarno, 2020). According to Satuhu (2020). One of the factors that affect the taste of a product is the level of sweetness. The function of sugar besides being a sweetener can also increase the acceptance of a food product because it can cover up the unpleasant taste of the product. In the favorability test, panelists were asked to rate 4 samples of passion fruit syrup that had been coded. The assessment is in accordance with the panelists' level of liking for the taste of passion fruit syrup. After conducting a favorability test on the taste of passion fruit syrup and performing calculations, the results can be seen in Table 1. The conclusion from Table 1. above is that the results obtained are the value of basic passion fruit syrup is smaller (1.6) than passion fruit syrup with salt and pandan (2.6) at the 5% significance level. So, there is no need to conduct further tests because this shows that there is no significant difference between samples on the level of liking for the taste of the four passion fruit syrup samples tested.
- e) Results of the texture favorability test, in the favorability test, panelists were asked to give an assessment of 4 samples of passion fruit syrup that had been coded. The assessment is in accordance with the panelists' level of liking for the texture of the passion fruit syrup. After conducting a favorability test on the texture of passion fruit syrup and calculating, the results can be seen in Table 1.

The conclusion from Table 1. above is that the results obtained are the value of basic passion fruit syrup is smaller (1.6) than passion fruit syrup with salt and pandan (2.3) at the 5% significance level. So, there is no need to conduct further tests because this shows that there is no significant difference between samples on the level of liking for the texture of the four passion fruit syrup samples tested.

- f) Results of the favorability test on overall assessment, in the favorability test, panelists were asked to provide an assessment of 4 samples of passion fruit syrup that had been coded. The assessment is in accordance with the panelists' level of liking for the overall assessment of passion fruit syrup. After conducting a favorability test on the overall assessment of passion fruit syrup and calculating, the results can be seen in Table 1.

The conclusion from Table 1. above is that the results obtained are the value of basic passion fruit syrup is smaller (1.6) than passion fruit syrup with salt and pandan (2.6) at the 5% significance level. So, there is no need to do further tests because this shows that there is no real difference between the samples on the level of liking of the overall assessment of the four passion fruit syrup samples tested.

#### 4. Conclusion

From this study it can be concluded that passion fruit cordial with basic passion fruit cordial treatment, passion fruit cordial and salt, passion fruit cordial and pandan and passion fruit cordial with salt and pandan have pH, (2.2; 2.1; 1.8; 1;8), TSS brix (74%; 70%; 70%; 74%), Color L (29.6; 27.4; 26.6; 26.5) and Sensory test (organoleptic) all preparations can be accepted and liked by 30 trained panelists.

The content in passion fruit and pandan leaves has the same properties for health, namely the content of antioxidants, antidiabetes, antihypertension, and anti-cancer for health.

To complete this report we will submit some suggestions that might help fill in the gaps. Among others as follows :

- Make the most of your time.
- Never be satisfied with the results you have achieved.

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