Production of bay leaf instant powder drink using different amounts of rock sugar to the level of preference and nutrient content (carbohydrates and flavonoids)

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Abstract. The purpose of this research is to find out about people’s level of likeness, and nutrient content (carbohydrates & flavonoids) of instant bay leaf powder beverage with different amounts of rock sugar (60 gr, 80 gr, and 100 gr). This research used experimental method. The experimental design was the perfectly randomized design. The likeness test was analysed using a descriptive percentage analysis to determine people’s level of likeness. Nutrient content (carbohydrates and flavonoids) was determined by laboratory tests. The results showed that people’s level of likeness for instant bay leaf powder beverage for sample A, B and C respectively were 82.6339%, 82.3214%, 76.2946%. The three scores fall into “like” category and sample A is the most liked sample. The results of laboratory tests for carbohydrate in sample A, B and C respectively were 73.2511%, 76.2217%, 78.0552%. Meanwhile the result for flavonoids in sample A, B and C respectively were 0.0638%, 0.0636%, 0.0472%.

1. Introduction

Instant powder drink is a drink in the form of powder made of fruit, herbs, seeds, and leaves, which can be drunk directly by brewing it with boiled water, both cold and hot [1]. Bay leaf is a leaf that is often found in rural areas which is usually used as a spice in cooking and healthy drinks with its species name *Syzygium polyanthum* [2]. To facilitate the consumption of bay leaf as a healthy drink, it is necessary to innovate the processing into bay leaf instant powder drink using rock sugar.

Bay leaf is a leaf that has an elliptical oval shape with a tapered tip, flat edge, 5-15 cm long, 3-8 cm wide, pinnate bone, smooth dark green top surface and light green bottom surface [3]. Bay leaf contains flavonoids, tannins, 0.05% essential oil consisting of citral and euganone [4]. Glycosides and flavonoids in bay leaf have been proved to reduce hyperlipidemia [5]. In addition, bay leaf extract contains flavonoids that can inhibit NFB, which has an important role in the synthesis of proinflammatory cytokines such as TNF- and IL-1β [6]. Some of the vitamins contained in bay leaf include vitamin C, vitamin A, thiamin, riboflavin, niacin, vitamin B6, vitamin B12, and folate. Some of the minerals contained in bay leaf include selenium, magnesium, calcium, zinc, sodium, potassium, phosphorus, and iron [7]. The essential oil content in bay leaf consists of phenolic acids, simple phenols, such as gallic acid, sesquiterpenoids, and lactones [8]. Bay leaf also contains alkaloids which
are the largest class of secondary plant substances that are widely used in medicine [9]. In addition, antioxidants and antibacterials are also contained in bay leaf extract [10].

Rock sugar, in the making of instant powder drinks, serves as a sweetener and also as a crystallizing agent. Researchers use rock sugar as a crystallizer because rock sugar has a different effect from granulated sugar for the pancreas and body. To convert sugar cubes into blood sugar takes three minutes. It also takes three minutes to convert blood sugar into energy. Meanwhile, to convert sugar into blood sugar takes three minutes, but to convert blood sugar into energy, the pancreas takes about 140 minutes. Thus, converting granulated sugar into energy is a tiring job for the pancreas [11]. Rock sugar serves as a crystallizing material in the crystallization process. This crystallization process is used because the products made are instant products [12]. Spontaneous crystallization can occur due to the rapid stirring of supersaturated pure sugar which produces crystal aggregates that have micro size [13-14].

Research objectives: (1) to determine the differences in the level of public preference for bay leaf instant powder drink using different amounts of rock sugar (60 g, 80 g and 100 g). (2) to determine the nutrient content (carbohydrates and flavonoids) contained in bay leaf instant powder drink using different amounts of rock sugar (60 g, 80 g, and 100 g).

2. Research method
The object of this research is bay leaf instant powder drink using different amounts of rock sugar. The experimental design used in this study is a completely random design. This study uses three types of variables, namely the independent variable is the use of different amounts of rock sugar; 60 g, 80 g and 100 g. The dependent variable is the level of people preference; nutrition includes the content of carbohydrates and flavonoids. The control variables in this study are the composition of materials, equipment, boiling time and temperature.

There are 2 data collection methods used, namely subjective assessment and objective assessment. Subjective assessment is a preference test with 80 untrained panelists. The results of preference level are analyzed by using percentage descriptive analysis. Objective assessment is analyzed by testing the nutrient content of the laboratory including carbohydrate content using acid hydrolysis, and flavonoids using the spectrophotometric method.

2.1. Bay leaf instant powder drink making
Add water to the bay leaves, boil for 20 minutes at a temperature of 80°C, then cool and filter by gauze. Put the bay leaf juice into the pan, add sugar, and boil over low heat to 95°C, stir constantly for 40 minutes until it crystallizes. After cooling, the crystal lumps are crushed by a blender until they are in the form of fine gains, then sieved in a size of 100 meshes. Furthermore, it is packaged in a tightly closed glass bottle so that it does not clot. The formula can be seen in Table 1 below.

| Table 1. Ingredients of bay leaf instant powder drink making |
|-------------------------------------------------------------|
| Materials | Experimental group materials |
|           | Sample A | Sample B | Sample C |
| Rock sugar 60 g | 100 g | 100 g | 100 g |
| Rock sugar 80 g | 60 g | 80 g | 100 g |
| Water 300 ml | 300 ml | 300 ml | 300 ml |

3. Result and Discussion
The experimental results of bay leaf instant powder drink using different amounts of rock sugar (A.60 g, B 80 g and 100 g) produced the following products; it produced 50 g by using 60 g rock sugar, 50 g
by using 80 g rock sugar, and 90 g by using 100 g rock sugar. By using the solid rock sugar, it results in increasing the viscosity of the liquid, and getting more instant drink crystals.

The texture of the bay leaf instant powder drink using 60 g rock sugar has the driest texture compared to others. The amount of 80 g rock sugar has a slightly wet texture, while the amount of 100 g rock sugar has the wettest texture. When it is compared among the three samples, the 60 g sample has the best criteria because the result powder is dry so it has lower water content and its shelf life is longer than the 80 g and 100 g samples.

Based on the results of the preference test in terms of indicators of color, texture, aroma and taste, it shows that the samples of A, B and C of bay leaf instant powder drink are favored by the public. Sample A is a sample of instant bay leaf powder drink using 60 grams of rock sugar and 300 ml of bay leaf extract gets 82.6339%, sample B is a sample of bay leaf instant powder drink using 80 grams of rock sugar and 300 ml of bay leaf juice gets 82.3214%, sample C is a sample of bay leaf instant powder drink using 100 grams of rock sugar and 300 ml of bay leaf extract gets 76.2946%. Figure 1 describes the details of level of preference.

**Figure 1. Results of the level of preference test for bay leaf instant powder drink**

The results of data analysis on the level of preference for bay leaf instant powder drink using different amounts of rock sugar (60 g, 80 g and 100 g) which were carried out by untrained panelists resulted in different total scores for the three samples of bay leaf instant powder drink. Sample A got a percentage of 82.6339%, sample B got a percentage of 82.3214%, sample C got a percentage of 76.2946%. The results of the preference test above show that the higher the rock sugar content, the lower the level of people preference. Thus, the sample that gets the highest score is sample A with a percentage of 82.6639%. The score falls into the level of preference category.

Sample A is the bay leaf instant powder drink using the amount of 60g rock sugar and is the sample with the lowest amount of rock sugar. The lower the rock sugar content in the instant powder drink, the more concentrated the bay leaf's distinctive taste. This is in line with the data from the analysis of the preference test on the taste aspect which has the highest percentage (5.987%). This is understandable along with people's understanding of sweet-tasting drinks, which is the sweetened drink can be harmful to health, especially when it is consumed excessively. In addition, even though the taste of the drink does not taste good, if it has a healthy function for the body, it can increase the preference for consumption. The texture of bay leaf instant powder drink sample A also got the highest percentage of preference level (5.7%). This is in accordance with the product characteristics of the experimental results and pre-experimental results which state that sample A has the driest texture and is thought to have a long shelf life. The slightly wet texture of the drink gives the impression of an expired drink.
The results of the analysis of the nutrient content (carbohydrates & flavonoids) of bay leaf instant powder drink that had been carried out at the Chem-Mix Pratama Laboratory obtained in Table 2.

Table 2. The results of the analysis of the nutritional content of carbohydrates per 100 g

| Sample  | Carbohydrate       |
|---------|--------------------|
| A (60 gr) | 73.2511%          |
| B (80 gr) | 76.2217%          |
| C (100 gr) | 78.8552%         |

Based on the results of the carbohydrate nutritional content test above, the highest carbohydrate content is shown in sample A of 78.8552%, then sample B of 76.2217%, and sample C of 73.2511%, as given in Table 3. This indicates that the higher the amount of rock sugar used, the higher the carbohydrate content in the instant bay leaf powder drink. This is because the amount of rock sugar used in the experiment is also getting higher, namely A 60 g, B 80 g and C 100 g.

Table 3. The results of the analysis of the nutritional content of flavonoids per 100 g

| Sample  | Flavonoid |
|---------|-----------|
| A (60 gr) | 0.0638   |
| B (80 gr) | 0.0636   |
| C (100 gr) | 0.0472   |

Based on the results of the flavonoid nutritional test above, the highest flavonoid content is shown in sample A of 0.0638%, sample B of 0.0636%, and sample C of 0.0472%. This shows that the higher the amount of rock sugar used, the lower the flavonoid content in the bay leaf instant powder drink. Flavonoids are a group of phenolic compounds. In a study of making tea drinks the more sugar was added, the phenol levels and anti-oxidant activity in the drink decreased [15]. Therefore, the decrease in flavonoid levels in the bay leaf instant powder drink is thought to be due to the increasing difference in the amount of rock sugar [16].

4. Conclusion
Based on the results of the research and discussion, it can be concluded that the level of people preference for bay leaf instant powder drink sequentially using 60 g rock sugar is 82.6339%, 80 g rock sugar is 82.3214%, and 100 g rock sugar is 76.2946%. The higher the rock sugar content, the lower the level of people preference. The nutrient content of carbohydrates for bay leaf instant powder drink using 60 g rock sugar is 73.2511%, 80 g is 76.2217%, and 100 g is 78.8552%. While the nutrient content of flavonoids in bay leaf instant powder drink using 60 of rock sugar is 0.0638%, 80 g is 0.0636% and 100 g is 0.0472%.

It is suggested to use formula A which use the addition of 60 g rock sugar, because of the level of people preference, taste, color and texture which has the highest level of preference value. It is necessary to test the water content in the instant bay leaf powder drink to determine the suitability of the water content based on SNI requirements for powder drink quality. It is necessary to test the shelf life of bay leaf instant powder drink in order to determine the shelf life of the product. Further research needs to be carried out regarding the appropriate dose for consumption of bay leaf instant powder drink according to the type of disease suffered.
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