

QUALITY CHARACTERISTICS OF PALM SUGAR (CASE STUDY IN UD SOBAR BULUMARIO VILLAGE AND SIMANINGGIR VILLAGE SIPIROK DISTRICT TAPANULI SELATAN DISTRICT)

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Abstract

This research aims to determine the quality of palm sugar produced by UD Sobar. The samples were taken from the two factories owned by UD Sobar located in Bulumario Village and Simaninggir Village. The parameter that is used to determine the quality of the palm sugar produced by UD Sobar is SNI (SII 0265-85). The parameters in SNI (SII 0268-65) are total sugar (reducing sugar and sucrose), reducing sugar, sucrose, water, ash, insoluble parts, pigment, starch, dangerous metal form and content. Additional testing that has been done is a pH test and color scale test. The result of the test on palm sugar sample produced in Bulumario Village, the ash content is not up to SNI standard (SII 0268-85) which is 2.73% (maximum SNI requirement of 2%). Whilst in the sample from Simaninggir Village, the parameters that are not suitable are total sugar 79,

keywords : *palm sugar, sap, quality, palm tree, brown sugar*

1. INTRODUCTION

Palm sugar is a type of sugar made from sap in the form of powder or crystals and is brownish yellow to brown in color. Palm sugar is not sugar that looks like ants and it is not sugar that is surrounded by ants (Lutony, 1993). Palm sugar is another form of printed brown sugar. The shape is smoother and more soluble than printed palm sugar. The small granules in palm sugar are between 0.8 – 1.2 mm in diameter.

Palm sugar is widely used to add sweetness to food or drinks, as is the use of granulated sugar (cane). Currently many uses for herbal drinks. It is considered that using palm sugar is healthier than using granulated sugar. According to Utami (1996), brown sugar has a fairly good nutritional value compared to granulated sugar which is widely consumed today. The use of palm sugar is considered to be a new lifestyle among the people. Because palm sugar gives a distinctive taste to drinks consumed such as coffee and tea.

To protect the health of consumers It is important to pay attention to the quality and safety of food. So that people are protected from bad palm sugar and must be safe for consumption. Likewise with the palm sugar produced by UD Sobar. It is necessary to know the quality and safety of the resulting palm sugar products. To see the quality and free from harmful metal content in palm sugar produced by UD Sobar, the parameters used refer to SNI (SII 0268-85). The components that are required for the quality of palm sugar according to SNI (SII 0268-85) are sugar, sucrose, reducing sugar, water, ash, water-insoluble parts, dyes, harmful metal content, starch, and form.

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1.1. MATERIALS AND METHODS

Ingredients

The main raw material observed was palm sugar taken from the UD Sobar factories in Bulumario Village and Simaninggir Village.

Materials used in addition to the main raw material are Aquades, 20% KI, H₂SO₄, Sodium thio sulfate, luff-scrh and starch solution, buffer solution

Tool

The tools used in this observation included analytical balances, measuring flasks, Erlenmeyer tubes, moisture analyzers, cups, desiccators, burners, filter paper, ovens, hunterlab colorFlax EZ spectrophotometers, pH meters and 40 mesh sieve.

2. RESEARCH METHOD

The research design used was Completely Randomized Design (CRD). Using 2 treatments and 3 repetitions. Furthermore, for the repeated data obtained, the standard deviation is calculated.

Treatment: Samples of palm sugar taken from the UD Sobar (V) factory

V1 = Sample of palm sugar from the Village Bulumario

V2 = Sample of palm sugar from the village Simaninggir

Replication: each sample was tested with 3 repetitions.

2.1. Procedure Analysis

Tests carried out on palm sugar include analysis of sugar (total sucrose and reducing sugar %), reducing sugar (%), sucrose (%), water content (%), ash content (%), water insoluble portion (%), color, content of harmful metals (Cu, Hg, Pb, As), starch content, shape and pH.

2.2. Observation Procedure

Sugar (Sucrose and Reducing Sugar)

- 1) Weigh the material (sample) as much as 2 grams using an analytical balance.
- 2) The weighed sample was put into a 100 ml measuring flask and then added distilled water up to the 100 ml mark.
- 3) Take 10 ml of the sample solution and then add 15 ml of distilled water and then add 25 ml of luff-schroll solution.
- 4) After that, put the boiling stone into the Erlenmeyer containing the above solution and then heat it on a hot plate until it boils.
- 5) After starting to boil, the time for 10 minutes was calculated, the solution was boiled, then the Erlenmeyer containing the sample was cooled.
- 6) After the cold sample solution was added 15 ml of KI 20% and then added 25 ml of H₂SO₄.
- 7) After that, 5 drops of starch were added to clarify the color change.
- 8) Next, titrate using 0.1 N sodium thio sulfate until the color is milky white.

Reducing Sugar

- 1) Weigh the material (sample) as much as 2 grams using an analytical balance.
- 2) The weighed sample was put into a 100 ml measuring flask and then added distilled water up to the 100 ml mark.
- 3) Take 10 ml of the sample solution and then add 15 ml of distilled water and then add 25 ml of luff-schroll solution.

- 4) After that, put the boiling stone into the Erlenmeyer containing the above solution and then heat it on a hot plate until it boils.
- 5) After starting to boil, the time for 10 minutes was calculated for the solution to boil, then the Erlenmeyer containing the sample was cooled.
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sucrose

- 1) Weigh the material (sample) as much as 2 grams using an analytical balance.
- 2) The weighed sample was put into a 100 ml measuring flask and then added distilled water up to the 100 ml mark.
- 3) Take 10 ml of the sample solution and then add 15 ml of distilled water and then add 25 ml of luff-schroll solution.
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Water

Measurement of water content was carried out using a moisture analyzer. The principle of measuring the water content is by heating the sample at 105 oC and then the percentage of water content is calculated based on the percentage of the initial weight of the sample to the final weight after heating. Measurements are carried out in the following way:

- 1) Enter the sample into the moisture analyzer as much as 0.5 grams.
- 2) After pressing the "test" button on the tool, the tool will automatically start calculating the water content.
- 3) The time set on the tool to calculate the water content is 6 minutes.
- 4) After the time is up, the tool will show the value of the moisture content on the monitor screen of the tool.

Ash

Ash content testing procedure:

- 1) The ashing cup is prepared, then burned in the furnace, cooled in a desiccator and weighed.
- 2) A sample of 3-5 grams is weighed in the cup, then placed in an ashing sprinkler, burned until a constant weight is obtained. Ashing is carried out in two stages: the first at a temperature of around 400oC and the second at 550oC.
- 3) Cooled in a desiccator, then weighed.

$$\% Abu = \frac{\text{Berat abu (gram)}}{\text{Berat sampel (gram)}} \times 100$$

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Water insoluble parts

- 1) Filter paper in the oven at 105 oC for 3 minutes, cooled in a desiccator and weighed.
 - 2) Put 10 grams of sample in 200 ml of water at 95 oC and stirred 15 times.
 - 3) Filter the above sample solution using filter paper whose weight is known.
 - 4) The filter paper was taken and then dried in the oven at 105 oC for 3 hours, cooled in a desiccator and then weighed.
- insoluble material = 100 % - % solubility

$$\% \text{ Kelarutan} = \frac{(B \times D) - A - C}{B \times D} \times 100$$

Information :

A = Initial weight of filter paper

B = Sample weight

C = Weight of filter paper + sample (paper that has been used)

D = Total solids of the sample

Dyes (which are permitted)

This observation was not carried out because of the palm sugar produced. There is no addition of dyes in the production.

Test for Hazardous Metal Content (Cu, Pb, Hg, As)

- 1) The sample is weighed as much as 1 gram
- 2) Then the sample is put into the test bottle
- 3) The bottle is put into the XRF test kit
- 4) Then it is processed by the machine and the results will come out on the XRF machine monitor

Starch

- 1) Weigh as much as 0.5 gram of sample in a porcelain cup.
- 2) Dissolved using 10 ml of aquadest.
- 3) Then drop the iodine solution into the sample solution, if there is a color change then the sample contains starch (positive), but if there is no color change then the sample does not contain starch (negative).

Shape

The shape of the palm sugar was observed and sieving was carried out using a sieving tool to determine the value of the sugar and mesh.

Test pH

- 1) Dissolve the 2 gram sample in 100 ml of distilled water
- 2) Gauge calibration
- 3) Then do a pH test on the solution with a pH meter
- 4) After the numbers are stable then recorded.

Color Scale

Color analysis is carried out using toolshunterlab color Flax EZ spectrophotometer. Color testing was performed with the Hunter color system contained in the tool.

3. RESULTS AND DISCUSSION

3.1. Chemical Analysis – Physical Sugar Ants

Sugar

Observation results of total sugar in the village sampleBulumario obtained an average value of 98.94% with a standard deviation of 0.37. Meanwhile, in the Simaninggir Village sample, an average value of 79.71% was obtained with a standard deviation of 1.2.

Table 1. Results of Quality Character Test of Palm sugar (Sugar)

Quality Components	Palm sugar Sample Levels				
	SNI requirements	Bulumario village	Information	Simaninggir village	Information
Sugar (total sucrose and reducing sugar %)	Minimum 80.0	96, 27	According to SNI	79, 71	Not in accordance with SNI

Reducing Sugar

The results of observing the reducing sugar content in the Bulumario Village sample obtained an average value of 1.63% with a standard deviation of 0.09. Meanwhile, in the Simaninggir Village sample, an average value of 2.72 was obtained with a standard deviation of 0.28.

Table 2. Results of Quality Character Test of Palm sugar (Reducing Sugar)

Quality Components	Palm sugar Sample Levels				
	SNI requirements	Bulumario village	Information	Simaninggir village	Information
Reducing Sugar	Maximum	1.63	According to SNI	2.72	According to SNI

sucrose

The results of observing the sucrose content in the Bulumario Village sample obtained an average value of 91.91% with a standard deviation of 0.78. Whereas in the Simaninggir Village sample, an average value of 73.30% was obtained with a standard deviation of 0.73

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Table 3. Results of Quality Character Test of Palm sugar (Sucrose)

Quality Components	Palm sugar Sample Levels				
	SNI requirements	Bulumario village	Information	Simaninggir village	Information
Sucrose (%)	Minimum 75.0	89,91	According to SNI	73.30	Not in accordance with SNI

Water content

The results of observing the water content in the Bulumario Village sample obtained an average value of 2.63% with a standard deviation of 0.54. Whereas in the Simaninggir Village sample, an average value of 2.33% was obtained with a standard deviation of 0.65

Table 4. Character Test Results for Palm sugar Quality (Moisture Content)

Quality Components	Palm sugar Sample Levels				
	SNI requirements	Bulumario village	Information	Simaninggir village	Information
Water Content (%)	Maximum 3.0	2.63	According to SNI	2,33	According to SNI

Ash Content

The results of observing the ash content in the Bulumario Village sample obtained an average value of 2.73% with a standard deviation of 0.16. Meanwhile, in the Simaninggir Village sample, an average value of 2.39% was obtained with a standard deviation of 0.83.

Table 5. Character Test Results for Palm sugar Quality (Ash Content)

Quality Components	Palm sugar Sample Levels				
	SNI requirements	Bulumario village	Information	Simaninggir village	Information
Ash Content (%)	Maximum 2.0	2.73	Not in accordance with SNI	2.39	Not in accordance with SNI

PartInsoluble Water

The results of observing the water insoluble portion in the Bulumario Village sample obtained an average value of 0.03% with a standard deviation of 0.01. Whereas in the Simaninggir Village sample, an average value of 0.04% was obtained with a standard deviation of 0.01

Table 6. Character Test Results for Palm sugar Quality (Water Insoluble Part)

Quality Components	Palm sugar Sample Levels				
	SNI requirements	Bulumario village	Information	Simaninggir village	Information
Water Insoluble Part (%)	Maximum 1.0	0.01	According to SNI	0.01	According to SNI

Pigment

The palm sugar production process at UD Sobar does not add dyes to its palm sugar products.

Table 7. Test results for the character of Palm sugar Quality (Dye Substances)

Quality Components	Palm sugar Sample Levels				
	SNI requirements	Bulumario village	Information	Simaninggir village	Information
Pigment (%)	Which is allowed	-	According to SNI	-	According to SNI

Hazardous Metal Content

The results of observations on the samples from Bulumario Village and Simaninggir Village did not find any harmful metals (Cu, Hg, Pb, As).

Table 8. Results of Quality Character Test of Palm sugar (Dangerous Metal)

Quality Components	Palm sugar Sample Levels				
	SNI requirements	Bulumario village	Information	Simaninggir village	Information
Pigment (%)	Negative	Negative	According to SNI	Negative	According to SNI

Starch

The results of observations on the samples from Bulumario Village and Simaninggir Village did not find starch content

Table 9. Results of Quality Character Test of Palm sugar (starch)

Quality Components	Palm sugar Sample Levels				
	SNI requirements	Bulumario village	Information	Simaninggir village	Information
Starch	Negative	Negative	According to SNI	Negative	According to SNI

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Shape

The results of shape observations (passing the 40 mesh sieve) in the Bulumario Village sample obtained an average value of 19.83% with a standard deviation of 13.05. Meanwhile, in the Simaninggir Village sample, an average value of 25.78% was obtained with a standard deviation of 14.38.

Table 10. Test results for the character of Palm sugar Quality (Shape)

Quality Components	Palm sugar Sample Levels				
	SNI requirements	Bulumario village	Information	Simaninggir village	Information
Shape	Crystals or powder	Crystal	According to SNI	Crystal	According to SNI

pH (Acidity)

The results of pH observations in the Bulumario Village sample obtained an average value of 6.34 with a standard deviation of 0.33. Meanwhile, in the Simaninggir Village sample, an average value of 6.04 was obtained with a standard deviation of 0.05.

Color

ResultsColor observations in the Bulumario Village sample obtained an average (“hue”) value of 53.95 with a standard deviation of 0.33. Meanwhile, in the Simaninggir Village sample, an average value of 54.42 was obtained with a standard deviation of 0.20. So that the color of the sample in Bulu Mario Village is red and the color of the sample in Simaninggir Village is reddish yellow.

4. CONCLUSION

1. Palm sugar produced by UD. Sobar does not meet all SNI quality standards (SII 0268-85).
2. In the sample from Bulumario Village, the parameter that is not in accordance with SNI (SII 0268-85) is the ash content parameter (%), which is a maximum of 2.0, where the resulting sample data is 2.73.
Whereas in the sample from Simaninggir Village the parameters that were not suitable were total sugar parameters (minimum 8.0), sucrose (minimum 75.0%) and ash content (maximum 2.0%). The data obtained is total sugar 79.71%, sucrose 73.30%, ash content 2.39%
3. The results of the observations of the two samples showed that the quality of the palm sugar produced in Bulumario Village was better than the quality of the palm sugar produced in Simaninggir Village.

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