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EFFECT OF MALTODEXTRIN CONCENTRATION ON PHYSICOCHEMICAL PROPERTIES AND LEVEL OF INSTANT DRINK LIKED POWDER FRUIT (*Ananas comosus* L. *merr*)

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Abstract

This research on pineapple powder instant drink processing aims to determine the effect of variations in maltodextrin concentration on the physicochemical properties and level of preference of pineapple fruit powder instant drink (*Ananas comosus* L.*merr*). Pineapple is a *perishable food*, so its shelf life is relatively short. One of the processing to extend the shelf life of the product is to use it as a raw material in the manufacture of powdered instant drinks. Powdered instant drink is a food product in the form of fine grains, practical in serving, easily soluble in hot or cold water. In the manufacture of instant powdered drinks, a filler material is needed, one of which is maltodextrin, which functions to prevent damage to the material due to heat, as well as increase its solubility. The results showed that the addition of 15% maltodextrin was the treatment with the least amount of damage to vitamin C with vitamin C content of 108.27 mg/100gr, total soluble solids 94.67 °brix, soluble time 13.27 seconds, preference for taste 5.56. , aroma 4.6, and color 5.08.

***Keywords**: Drink powder, Pineapple, Maltodextrin*

INTRODUCTION

Pineapple is a non-climacteric fruit which contains 24 mg of vitamin C and 39 mg of vitamin A in every 100g of ingredients. Both vitamins have activity as antioxidants that can stop the chain reaction of free radical formation in the human body which is believed to be the trigger of various diseases (Sibuea, 2008). Pineapple is a*perishable food*so that it has a relatively short shelf life.

Powder drinks are food products in the form of granules which in their use are easily soluble in cold or hot water (Permana, 2008). The advantage of instant powder drink is that its shelf life is longer than its fresh form. Powder drinks have better product quality and stability when compared to liquid drinks because the water content in them is very low, and will also be resistant to damage to nutrients such as vitamins and minerals (According to Verral, 1984 in Bunardi, 2016). In general, in the manufacture of instant powdered drinks, problems often occur such as material damage due to the drying process which generally requires heating temperatures ranging from 60-80°C so that it can trigger loss or damage to flavor components (Alfonsius, 2015). To anticipate this, it is necessary to add filler material to prevent damage to the material due to heat (Masters, 1979 in Bunardi, 2016). One of the fillers that can be added in the manufacture of powdered instant drinks is maltodextrin.

Maltodextrin in SNI 7599-2010 is a white powder, odorless, also a mixture of purified or crystallized oligosaccharides, the result of starch hydrolysis. According to Bundock (1997) in Yohana (2016), maltodextrin is a food additive that is safe for consumption because it is included in *GRAS (Generally Recognized As Safe)*. The addition of maltodextrin in the manufacture of powdered drinks serves as a filler which aims to prevent damage to materials due to heat, as well as increase the solubility of powdered drinks (Oktaviana, 2012 in Adawiyah, 2017).

RESEARCH METHOD

Place and Time of

Research This research was conducted at the Food Technology Laboratory, Department of Agricultural Technology, Faculty of Agriculture, Samratulangi University, Manado for 3 months.

Tools and Materials

The tools used include cutting boards, knives, plastic gloves, blenders, containers, spoons, grinders, filter cloths, stoves, pans, wooden mixers, tissue, digital scales, sieves, forks, label paper, plastic packaging, aluminum foil container, measuring cup, Erlenmeyer, oven, furnace, porcelain dish, analytical balance, dropper, refractometer, litmus paper.

The materials used in this study were pineapple raw materials from Lobong village, Bolaang Mongondow Regency, sugar (sucrose) Gulaku brand, maltodextrin, Asahi brand sodium bicarbonate, Aqua brand mineral water, 0.01N iodine solution, distilled water. .

Research Design

This study used a completely randomized design (CRD) consisting of 4 treatments with maltodextrin concentration and each treatment was repeated 3 times:
A: Maltodextrin 0%
B: Maltodextrin 5%
C: Maltodextrin 10%
D: Maltodextrin 15%

Working Procedure

Making Drinks Powder

Pineapple peeled, then washed and cut into pieces. Pineapple fruit as much as 500gr blended with the addition of 250 ml of water, filtered using a filter cloth. Performed starting from each treatment to completion and continued with repetition.

The resulting fruit juice is added with sugar (sucrose) as much as 500gr, stirred until dissolved. Then 3g of sodium bicarbonate was added to neutralize the pH. The treatment did not add maltodextrin (0% maltodextrin). Treatment B added 25gr maltodextrin (5% maltodextrin). Treatment C with the addition of 50gr maltodextrin (10% maltodextrin). Treatment D addition of 75gr maltodextrin (15% maltodextrin). Cook all ingredients over medium heat until bubbling then reduce the heat, stirring constantly until crystals or powder form, then turn off the fire. After that, the crystals are allowed to cool and then ground. Then sieve until you get a homogeneous powder. Then the powder is packed using a plastic clip.

Observation Parameters

- Analysis of Vitamin C Levels
- Total Dissolved Solids Analysis
- Late Time Test
- Moisture Analysis
- Ash Content Analysis
- Sensory Test

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Observation of

Vitamin C Analysis (AOAC, 1995 in Gabriella MC, 2020)

Samples of powder drink from crushed pineapple juice were weighed as much as 5g. The solution was filtered and the filtrate was filtered, taken as much as 25 ml. Add a few drops of starch indicator, then titrate rapidly with 0.01N iodine solution until a blue color appears. Vitamin C content can be calculated by the formula:

$$\text{Vitamin C (mg/100g)} = \frac{(\text{VI2 x } 0{,}88\text{mg x Fp}) x\ 100}{\text{W s (gram)}}$$

Information:
V I2 = Iodine volume (ml)
0.88 = 0.88 mg of ascorbic acid equivalent to 1 ml of 0.01N I2 solution
Fp = Dilution factor
W s = Sample weight (grams)

Analysis of Total Dissolved Solids (Amrina, 2019)

The measurement of total dissolved solids is carried out using a refractometer in the following way:

1. The sample is diluted with a 1:1 ratio of sample and water.
2. The refractormeter is calibrated using water and the number shown is zero. The lens is cleaned and dried using a tissue.
3. The sample is placed on the refractometer lens.
4. The total value of dissolved solids on the refractometer is recorded and calculated by the formula.

°brix = Value on refractometer x Dilution factor

Dissolution Time Test (Olivia, 2012)

8 grams of pineapple powder drink is dissolved in 200 ml of water. Then, note how long it takes for the powder to be completely dissolved in the water.

Analysis of Moisture Content The

Sample is weighed as much as 3 grams in a cup of known weight. Then dried in the oven at a temperature of 105ºC for 3 hours. Then cooled in a desiccator until it reaches room temperature, then weighed. Then it was reheated in the oven for 30 minutes, cooled in a desiccator and weighed. This treatment was repeated several times until the weight was constant (SNI 01-2891-1992). Calculate the water content with the formula:

$$\text{Water content} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \text{ x } 100\%$$

Analysis of Ash Content

Carefully weigh 2-3 grams of the sample into a porcelain dish of known weight. Charcoal over a burner flame, then ash in an electric furnace. At a maximum temperature of 550°C until complete ashing (occasionally opening the furnace door slightly, so that oxygen can enter). Cool in a desiccator, then weigh with a constant weight (SNI 01-2891, 1992). Calculation of ash content using the formula:

$$\text{Ash content} = \frac{\text{Ash weight}}{\text{Sample weigth}} \text{ x } 100\%$$

Sensory Test (Like Level in Ayustaningwarno, 2014)

The sensory test carried out was a preference level test using a hedonic scale, namely the level of preference for color, taste and aroma of pineapple pollen drinks. The panelists used were 25 people where each panelist was given a research format and asked to provide personal responses to the sample presented. The sensory test data were then analyzed by the ANOVA test. The number of scales used consists of 7 information scales as follows: number 1 does not like it very much, number 2 does not like it, number 3 does not like it slightly, number 4 is neutral, number 5 likes it somewhat, number 6 likes it, number 7 likes it very much.

RESULTS AND DISCUSSION

Vitamin C content

The average vitamin C content of pineapple powder drink ranged from 49.81 to 108.27 mg/100gr. The average value of vitamin C content of pineapple powder drink can be seen in table 1.

Based on the results of the analysis of variance that the calculated F value is greater than the F table which indicates an influence on the treatment, it is continued with the LSD test. The results of the 1% LSD test showed that treatment A was very significantly different from treatment B, C, and D. Treatment B was not significantly different from treatment C, but very significantly different from treatment A and D. Treatment D was very significantly different from treatment A, B , and C. The lowest average value of vitamin C content of pineapple powder drink was found in treatment A (0% maltodextrin) which was 49.81 mg/100gr and the highest average value was found in treatment D (15% maltodextrin), which This means that the more concentration of maltodextrin added, the less damage to vitamin C in pineapple powder drinks. The maltodextrin concentration of 15% can prevent the damage of vitamin C in the ingredients contained during processing. The possibility of damage to the vitamin C contained in the pineapple during the heating process so that the vitamin C contained will be oxidized by heat and become damaged. However, the addition of maltodextrin can prevent damage to vitamin C. This is due to the ability of maltodextrin to protect the coated material. Maltodextrin can also function to protect important compounds in the material because maltodextrin has a strong binding capacity to the coated material (Oktaviana, 2012).

Total Dissolved Solids

The average result of analysis of total sugar on instant drink of pineapple powder is in the range of 94.67-97.33 °brix. The average value of total sugar can be seen in table 2.

Table 1. Average Value of Vitamin C Level of Powdered Drink

Treatments	Average	Notation
A (Maltodekstrin 0%)	49,81 mg/100gr	a
B (Maltodekstrin 5%)	76,53 mg/100gr	b
C (Maltodekstrin 10%)	84,62 mg/100gr	b
D (Maltodekstrin 15%)	108,27 mg/100gr	c

LSD 1% (α=0 .01) = 13.91. Different notations express very significant differences in treatment

Table 2. Average Value of Total Dissolved Solids Analysis of Powdered Drinks

Treatments	Average
A (0%Maltodekstrin)	96,67 °brix
B (5% Maltodekstrin)	94,67 °brix
C (10% Maltodekstrin)	97.33 °brix
D (15% Maltodekstrin)	94,67 °brix

Based on the results of analysis of variance (α = 0.01) the F-count value is smaller than the F-table value, it shows that the addition of maltodextrin does not have a significant effect on the total sugar of instant pineapple powder drink, so it is not continued with the LSD test.

Maltodextrin is a filler that has a high solubility level, this is because of the nature of maltodextrin which is soluble in water and has a fast dispersion process

(Ramadhani, 2016). Total dissolved solids shows the content of dissolved materials in the solution (Farikha, 2013 in Ariska 2020). The components contained consist of water-soluble components such as glucose, fructose, sucrose and protein (Bachtiar, 2011).

Dissolution time

The average value of the dissolving time of pineapple powder instant drink can be seen in table 3.

The results of the analysis of variance showed that the calculated F value was greater than the F table which indicated an influence on the treatment, so it was continued with the LSD test. The results of the 1% LSD test showed that treatment A was very significantly different from treatment B, C and D. Treatment B was not significantly different from treatment C, but very significantly different from treatment A and D. Treatment D was very significantly different from treatment A, B, and C. The results showed that the more addition of maltodextrin had an effect on the dissolution rate of the pineapple powder drink. This is because the increased surface area of the powder can cause the powder to dissolve more quickly when it is in direct contact with a lot of water in its presentation. This is in accordance with Pradana's statement (2005) in Ramadhani (2016), that maltodextrin is a filler that has a high solubility level because of the nature of maltodextrin which is soluble in water, and the dispersion process is fast.

Water Content The

Results of the analysis of the average water content of instant drink pineapple powder are in the range of 3.1-4.23%. The average value of water content of pineapple powder instant drink can be seen in table 4.

Based on the results of the 1% LSD test, it shows that treatment D is not significantly different from treatment C, but is very significantly different from treatment B and A. Treatment A is very significantly different from treatment B. This indicates that The higher the maltodextrin concentration, the lower the water content.

According to Garaditjo et al (2006) in Kaljannah (2018) maltodextrin has a lower molecular weight and a simpler molecular structure, so that free water and water bound to the material can be easily removed during the heating process. According to Wulansari et al, (2010) in Ningtias et al, (2017) in the manufacture of pumpkin instant drink, maltodextrin is hygroscopic, that is, it can absorb water in the material, but although maltodextrin can absorb water when heated, the water absorbed by maltodextrin will be released therefore The higher the concentration of maltodextrin the more water is absorbed and evaporated so that the water content decreases. The overall water content of the maltodextrin concentration treatment in this study met the requirements of SNI 01-4320-2004, the water content of traditional powder drinks was 3% - 5%.

Ash content

Is an inorganic residue produced in the process of combustion or oxidation of organic components in food ingredients. The ash content of an ingredient shows the mineral content contained in the material, the purity, and cleanliness of the resulting material (Andarwulan et al., 2011 in Gabriella, 2020). The average value of the ash content of pineapple powder instant drink can be seen in table 5.

Based on the analysis of variance, the calculated F value obtained is greater than the F table, which means that the concentration of maltodextrin affects the ash content of the pineapple fruit instant powder drink, so it is continued with the LSD test. The results of the 1% LSD test obtained showed that treatment A was not significantly different from treatment B, but very significantly different from

treatment C and D. Treatment B was not significantly different from treatment C, but very significantly different from treatment D. Treatment D was very significantly different with treatments A, B, and C. These results indicate that the higher the concentration of maltodextrin added, the lower the ash content contained in the product. According to Gabriella (2020) a slight decrease in ash content with increasing proportion of addition of maltodextrin shows that most of the ash content comes from raw materials, both fruit juice and sucrose used, while maltodextrin contains a smaller ash content.

Table 3. Average value of Dissolving Time Test of Powdered Drink

Treatments	Average	Notation
D (15% Maltodekstrin)	13.27 detik	a
C (10% Maltodekstrin)	15.21 detik	ab
B (5% Maltodekstrin)	16.51 detik	b
A (0% Maltodekstrin)	18.36 detik	b

LSD 1% (α=0.01) = 2.53. Different notations express very significant differences in treatment

Table 4. Average Value of Powdered Beverage Water Rate

Treatments	Average	Notation
D (15% Maltodekstrin)	3.11%	A
C (10% Maltodekstrin)	3.37%	A
B (5% Maltodekstrin)	3.77%	B
A (0% Maltodekstrin)	4.32%	C

LSD 1% (α = 0.01) = 0.38. Different notation states a very significant difference in treatment

Table 5. Average Value of Ash Content of Powder Drinks

Treatments	Average	Notation
D (Maltodekstrin 15%)	0,16%	A
C (Maltodekstrin 10%)	0,31%	Ab
B (Maltodekstrin 5%)	0,44%	B
A (Maltodekstrin 0%)	0,75%	C

LSD 1% (α = 0.01) = 0.21. Different notation expresses a very significant difference in the treatment.

Sensory Test

Taste

In this study, treatment D with a maltodextrin concentration of 15% was the treatment with the highest average value with a value of 5.56 or like. The average value of the panelists' preference for taste can be seen in the following (Table 6).

The results of the analysis of variance showed that there was no significant effect on the level of taste preference in pineapple powder drinks with different maltodextrin concentrations, so it was not continued with the LSD test. This is because in the process of making instant drink, pineapple powder uses the same proportion of ingredients in each treatment and replication, only differing in the concentration of maltodextrin in each treatment. In accordance with the statement of Jati (2007) in Gabriella (2020) maltodextrin will not change the sweet taste or make the product sweeter. So that in the manufacture of the product, the average taste will not be different or the treatment will not have a real effect.

Aroma

The average value of the panelists' preference for the aroma of pineapple powder drinks with different

concentrations of maltodextrin ranged from 4.24 (neutral) to 4.6 (somewhat like). The average value of the level of preference for aroma can be seen in the following (Table 7).

Based on the results of the analysis of variance, there was no significant effect on the aroma of pineapple powder drink with different maltodextrin concentrations, so it was not continued with the LSD test. Several panelists stated that the aroma of the pineapple powder drink in each sample could not be distinguished or had the same aroma. This is presumably because the aroma of sucrose is more dominant than the aroma of pineapple, besides the addition of maltodextrin also has no effect on the aroma of pineapple powder drinks because maltodextrin itself does not have a distinctive aroma. In previous research conducted by Adawiyah (2017) showed that there was no significant effect on the aroma of the resulting powdered drink.

Color

The highest average value of preference for the color of pineapple powder drink is found in treatment D (15% maltodextrin) with a value of 5.08 or somewhat like, and the lowest average value is found in treatment B (5% maltodextrin) with a value of 4, 36 or neutral.(Table 8)

The results of the calculation of variance showed that the addition of maltodextrin with different concentrations did not have a significant effect on the color of the pineapple powder drink, so it was not continued with the BNT test. This is in accordance with the results of research by Yuliawaty and Wahono (2015) in Adawiyah (2017) which shows that the addition of maltodextrin does not have a significant effect on the color of the instant drinks produced.

Overall Sensory Test The

Results of the evaluation of the overall organoleptic properties are an assessment to see as a whole with the assessed attributes namely taste, aroma and color from all treatments can be seen in Figure 1.

In the figure, it can be seen that the overall treatment with the broadest and most balanced form of radar between taste, aroma and color was orange or treatment D (15% maltodextrin). The most preferred taste, aroma and color assessment was treatment D (15% maltodextrin). In terms of aroma, several panelists stated that treatment D still smelled a little pineapple aroma when the panelists tasted the brewed powder drink. In terms of color, the panelists wrote comments that the color in treatment D was the most attractive of the colors in the other treatments.

Table 6. Average Value of Powder Drink Taste

Treatments	Average
A (0% Maltodekstrin)	5
B (5% Maltodekstrin)	5,28
C (10% Maltodekstrin)	4,64
D (15% Maltodekstrin)	5,56

Table 7. Average Value of Powder Drink Aroma

Treatments	Average
A (0% Maltodekstrin)	4,44
B (5% Maltodekstrin)	4,48
C (10%Maltodekstrin)	4,24
D (15% Maltodekstrin)	4,6

Table 8. Average Color Value of Powdered Drinks

Treatments	Average
A (0% Maltodekstrin)	4,8
B (5% Maltodekstrin)	4,36
C (10% Maltodekstrin)	4,84
D (15% Maltodekstrin)	5,08

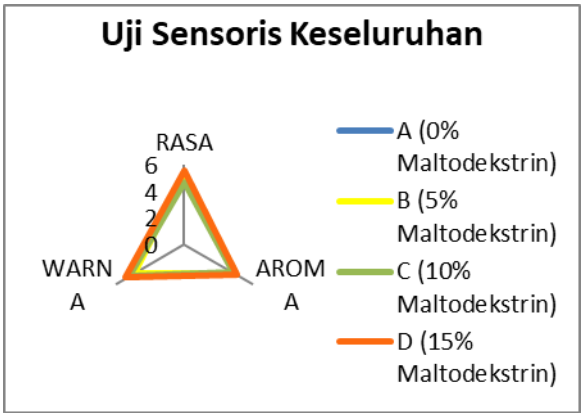

Figure 1. Overall Sensory Test Radar Diagram

CONCLUSION

The addition of maltodextrin with a concentration of 15% produces the best pineapple powder instant drink product with the highest vitamin C content of 108.27 mg/100gr, water content 3.11%, ash content 0.16%, total dissolved solids 94.67 °brix, and dissolving time for 13.27 seconds.

The level of preference for the taste, aroma and color of pineapple powder instant drink with the highest average value, namely powder drink with a 15% maltodextrin concentration treatment with a taste value of 5.56 (like), aroma 4.6 (slightly like), color 5 .08 (rather like).

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