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ANALYSIS OF NUTRITIONAL CONTENT AND ORGANOLEPTIC TEST OF SANGKURMA SNACK CUP (BANANAS, DATES, AND HONEY) AS FUNCTIONAL FOOD HIGH IN IRON AND VITAMIN C

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Abstract

Introduction: Food's functional value can be done in various ways, one of which is food modification. SangKurMa snack cup is a modified-food product made from bananas, dates, honey, and crackers. These three main ingredients (bananas, dates, and honey) contain various vitamins and minerals, including iron and vitamin C. This study aimed to determine the most preferred formulation of the SangKurMa snack cup and the amount of iron and vitamin C in each product.

Method: The analytical methods selected include the Jacobs method for iron and Spectrophotometry for vitamin C. The experimental design used in this study was a Completely Randomized Design (CRD) with four formulations. The organoleptic test uses a hedonic test on aspects of color, aroma, taste, and texture in each formula (F1, F2, F3, and F4) involving 25 semi-trained panelists using 9 Likert scales.

Results: Iron and vitamin C per 100 g include 8.48 mg and 70.25 mg in bananas, 3.39 mg and 20.45 mg in dates, 4.41 mg and 11.03 mg in honey, and 5.48 mg and 14.12 mg in crackers. The amount of iron and vitamin C per serving of SangKurMa snack cup includes 10.45 mg and 78.71 mg (F1); 11.45 mg and 86.46 mg (F2); 12.45 mg and 94.20 mg (F3) and 13.44 mg and 101.95 mg (F4). The statistical analysis of organoleptic tests showed no difference in the aspects of color, aroma, taste, and texture in all formulas (p -value>0.05).

Conclusion: SangKurMa snack cups contain high iron and vitamin C, which can fulfill 69.70-82.98% of daily iron needs, 1.05-2.02 mg of absorbed iron, and 104.96-135.94% of vitamin C requirements. In addition, the organoleptic test showed that the panelists had the same preference for color, aroma, taste, and texture in all formulas.

Keywords: Iron, SangKurMa Snack Cup, Vitamin C

INTRODUCTION

Functional food is a dish that contains energy and nutrients and has other benefits for the body, such as increasing physiological responses and reducing the risk of certain diseases (Nicoletti, 2012). This functional quality and value can be improved in several ways, such as fortification, substitution, food modification, genetic manipulation, increasing the content of certain materials, and various other efforts (Lau et al., 2013).

Snack is food or drink consumed between main meals (interludes) and has become part of people's daily consumption because it assists the implementation of dietary regulation (Chinnadurai & Sequeira, 2015; Tumuluru, 2015). These snacks can include chips, popcorn, pretzels, extruded foods, processed meats, seeds, nuts, fruits, vegetables, and other preparations (Riaz, 2015). Snack products are said to be healthy if they contain good nutrients and are low in salt and fat (Tumuluru, 2015). The SangKurMa snack cup is a modified layered snack that is packaged using a cup made of bananas, dates, honey, and crackers as additional ingredients.

Banana is a fruit whose 75% component consists of water. This fruit contains high levels of vitamin A, vitamin B, vitamin C, iron, calcium, potassium, phosphorus, sodium, magnesium, copper, fiber, and zinc (Agoes, 2011; Hasanah et al., 2017; Kumar et al., 2020). The high levels of some nutrients in Ambon bananas provide various benefits for individuals who consume them, one of which is iron. This component plays a significant role in the body, especially in synthesizing oxygen transport proteins such as hemoglobin, where about 65-74% of the iron in the body will later be used in this process (Arisman,

2017; Briawan, 2013). The availability of iron will directly affect the amount of hemoglobin formed. When hemoglobin levels are low, oxygen supply throughout the body will also decrease (Lopez et al., 2015). Low oxygen transport to all body tissues can cause various cognitive process disorders, such as reduced concentration and enthusiasm for learning and weakened individual memory skills (Chamaschella, 2015; Siva et al., 2016).

In addition to iron, bananas also contain high levels of vitamin C, which can help the process of blood formation and increase iron absorption (Mahardika & Zuraida, 2016). Consumption of 25-75 mg of vitamin C can increase the absorption of nonheme iron up to four times (Briawan, 2013). It is because vitamin C as an enhancer can reduce ferric ions (Fe^{3+}) to ferrous (Fe^{2+}) so that iron that initially enters the body in the form of ferric will be more easily absorbed by the intestines (Gropper et al., 2016).

SangKurMa snack cups also use dates as a primary ingredient. Dates are fruit with sweet characteristics, soft to hard texture, and colors ranging from yellow, green, golden brown to dark brown (Shiddiq & Greiby, 2013). Dates are also a fruit that has many benefits for the body because of their nutritional content. For example, most studies say dates have potential effects as antioxidants, anticancer, anti-hyperglycemic, and antimicrobial (Al-Shwyeh, 2019; Elhemeidy et al., 2018; Mia et al., 2020). In addition, other studies also mention that the content of iron and vitamin C in this fruit can help increase the synthesis of blood hemoglobin in anemia sufferers (Novadela & Imron, 2015; Susilowati, 2017).

Besides bananas and dates, honey is also used to manufacture this product. Honey is composed of various types of compounds which include carbohydrates in the form of sugar, water, vitamins, minerals, organic acids, bioactive compounds (antibacterial and antimicrobial), anti-inflammatory and enzymes (invertase, diastase, peroxide, and carbohydrate oxidase) (Almasaudi, 2021; Wirakusumah, 2010). Honey is also known for helping increase the body's hemoglobin levels through its iron and vitamin C content (Islamiyah, 2017; Lestari & Inti, 2019).

Until now, innovations in functional food products that are high in iron are generally in the form of cookies, snack bars, sorbets, sponge cakes, and similar cake products. Meanwhile, the SangKurMa snack cup is a new food product innovation high in iron and vitamin C, and this type of snack has never been made and researched before. This product is a modification of one kind of British dessert called Banoffee. As the name implies, Banoffee is made of 2 main ingredients, namely banana (bananas) and toffee (sugar boiled with butter until caramelized), as well as complementary ingredients in the form of cream, milk, and biscuit crumbs (Ayto, 2012). This snack is known for its sweet taste and high sugar and fat content. Therefore, to increase the functional value of the food, the researcher modified the Banoffee recipe by combining bananas with dates and honey into a SangKurMa snack cup which can potentially contain high levels of iron and vitamin C. Furthermore, the SangKurMa snack cup product is made without going through a cooking process and avoiding using ingredients that are inhibitors of iron and vitamin C work, so the risk of losing the nutritional content in the product is shallow.

Apart from the high content of nutrients in bananas, dates, and honey, these three ingredients are also relatively easy to find and obtain. Therefore, making SangKurMa snack cup products is also not difficult for all people to do. This product is expected to be able to provide a reference for new functional food preparations for the community in meeting the needs of iron and vitamin C. However, an organoleptic test is needed to determine public acceptance of the product. This test is one of the crucial stages in food development because it is directly related to product quality and consumer tastes (Ayustaningwarno, 2014). The quality of functional food will depend on the high component of certain nutrients and the results of this organoleptic test. Therefore, it is necessary to analyze iron and vitamin C in products made to determine their functional value and organoleptic tests to determine the preferred formula from several existing recipes through an assessment by a group of panelists on aspects of color, aroma, taste, and texture.

METHOD

The content of iron and vitamin C was analyzed on all ingredients. The bananas used were Ambon variety obtained from Gede Hardjonagoro Market, Surakarta City, Central Java. The dates used

were the Khalas variety, and the honey used was commercial forest honey. These two ingredients were obtained from the same shop in the Pasar Kliwon area, Pasar Kliwon District, Surakarta City, Central Java. Crackers used are commercial materials obtained from markets.

Materials needed in this analysis are HNO₃, NH₄SCN 1.5M, 1% starch (soluble starch), 0.01N iodine standard solution, and aqua dest. Meanwhile, the tools needed include porcelain crucible, muffle furnace, 100 ml and 125 ml Erlenmeyer, Genesys 20 visible spectrophotometry, waring blender, 100 ml volumetric flask, centrifuge Plc-03, pipette, burette, and stand. This analytical test was carried out at the Chem-Mix Laboratory of Pratama Bantul, Special Region of Yogyakarta.

The experimental design in this study was a completely randomized design (CRD) with four formulations consisting of:

- F1 = Bananas (100 g), dates (30 g) and honey (10 g)
- F2 = Bananas (110 g), dates (33 g) and honey (11 g)
- F3 = Bananas (120 g), dates (36 g) and honey (12 g)
- F4 = Banana (130 g), dates (39 g) and honey (13 g)

The tools used in making the SangKurma snack cup include digital scales, crackers crusher, 200 ml cup and lid, knife, spoon, plate, tissue, and hand gloves. All research activities were carried out in September-December 2021.

Analysis of Iron Content

Iron content was analyzed with NH₄SCN (ammonium thiocyanate) complexing based on research by Lestari (2013), which was modified using the Visible Spectrophotometry method. The stages of this analysis include (1) Weigh each sample (bananas, dates, honey, and crackers) as much as 5 g; (2) Ash in a muffle furnace; (3) Dissolve each ash with 50 ml of 1:3 HNO₃ solution while grinding in a porcelain crucible; (4) Filter the filtrate using filter paper into a 100 ml Erlenmeyer; (5) Take 1 ml of clear filtrate and add 2 ml of 1.5M NH₄SCN (if the sample contains iron, the solution will turn red); (5) Add aqua dest to a volume of 10 ml, then read the absorbance using a spectrophotometer with a wavelength of 510 nm; (6) Record the data obtained, then calculate using the standard iron curve.

Analysis of Vitamin C Content

This study's analysis of vitamin C content used the Jacobs method (iodine titration). The analytical procedures carried out include (1) Weigh 10-30 g of each sample (bananas, dates, honey, and crackers) that have been mashed; (2) Put each sample into a 100 ml volumetric flask and add aqua dest to the limit; (3) Separate the filtrate using a centrifuge; (4) Take 5-25 ml of the filtrate with a pipette and put it into a 125 ml Erlenmeyer; (5) Add 2 ml of 1% starch solution (add 20 ml of aqua dest if necessary); (6) Titrate with 0.01N iodine standard solution; (7) Perform the calculation of results (Ngginak et al., 2019). Calculation of vitamin C levels is carried out using the following formula:

$$\text{Vitamin C levels (mg/100 g)} = \frac{(\text{Vol I}_2 \times 0.88 \times \text{Fp})100}{\text{Ws}}$$

Information:

Vol I₂: Iodine volume (mL)

0.88: 1 mL of iodine solution (I₂) 0.01 N equivalent to 0.88 mg of ascorbic acid (vitamin C)

Fp: dilution factor

Ws: Sample weight (g)

Organoleptic Test

An organoleptic test is carried out as a preference (hedonic) test on aspects of the product's color, aroma, taste, and texture. This test involved 25 semi-trained panelists consisting of nutritionists and assistant chefs. Before conducting the organoleptic test, the researcher explained all the test procedures to be carried out and provided the opportunity for panelists who were willing to sign the consent form to become panelists. The assessment of the product is carried out using 9 Likert scales, which include (1) Dislike immensely (dislike very much); (2) Dislike very much; (3) Dislike moderately (dislike); (4) Dislike slightly; (5) Neither like nor dislike (neutral); (6) Like slightly; (7) Like moderately (like); (8)

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Like very much (very much like); (9) Like extremely (very very like) (Pimentel et al., 2016). Furthermore, the results of the organoleptic test will be analyzed using the One Way ANOVA test. If there is a difference, it will be continued with Duncan's test.

RESULTS

The results of the analysis of the content of iron and vitamin C in each sample are as follows:

Table 1. The results of the study of the content of iron and vitamin C

Sample	Iron (mg/100 g)	Vitamin C (mg/100 g)
Banana of Ambon	8.48	70.25
Khalas dates	3.39	20.45
Forest honey	4.41	11.03
Crackers	5.48	14.12

Table 1 shows that the iron and vitamin C per 100 g ingredients are 8.48 mg and 70.25 mg in bananas, 3.39 mg and 20.45 mg in dates, 4.41 mg and 11.03 mg in honey, and 5.48 mg and 14.12 mg in crackers. The results of the analysis of iron and vitamin C content in each serving of the SangKurMa snack cup are presented in Table 2.

Table 2. Iron and Vitamin C Content of SangKurMa Snack Cup

Formula	Iron	Vitamin C	Absorbed Iron (10-15%)	% RDA Fulfillment*	
				Iron	Vitamin C
F1	10.45 mg	78.71 mg	1.05 – 1.57 mg	69.70%	104.96%
F2	11.45 mg	86.46 mg	1.15 – 1.71 mg	76.34%	115.29%
F3	12.45 mg	94.20 mg	1.25 – 1.87 mg	82.98%	125.61%
F4	13.44 mg	101.95 mg	1.34 – 2.02 mg	89.62%	135.94%

*Percentage of RDA based on energy needs 2100 kcal, iron 15 mg, and vitamin C 75 mg

Table 2 shows that the iron content per serving of SangKurMa snack cup in each formula includes 10.45 mg (F1), 11.45 mg (F2), 12.45 mg (F3), and 14.44 mg (F4). This amount can meet the individual daily iron needs of 69.70-82.98% and contribute 1.05 – 2.02 mg of absorbed iron. The amount of vitamin C per serving of SangKurMa snack cup includes 78.71 mg (F1), 86.46 mg (F2), 94.20 mg (F3), and 101.95 mg (F4). The following are the results of the statistical analysis of organoleptic (hedonic) tests in this study:

Table 3. Results of One Way ANOVA Analysis of SangKurMa Snack Cup Hedonic Test

Formulation	Hedonic Test										
	Colour SD	±	P value	Aroma ± SD	P value	Taste ± SD	P value	Texture SD	±	P value	
F1	6.76±1.05			6.76 ± 1.12		7.04±1.42		6.68±0.99			
F2	6.64±1.25		0.78	6.40±1.19	0.44	6.52±1.73	0.51	6.56±1.36		0.42	
F3	6.80±1.08			6.64±1.08				7.08±1.32			7.04±1.24
F4	6.96±0.93			6.88±0.88				6.92±1.29			6.96±1.06

Table 3 shows that the results of organoleptic tests by 25 panelists on the color, taste, and texture of SangKurMa snack cups in all formulations were quite good, in the range of 6.5-7.49 (like moderately). In addition, the panelists' acceptance of the aroma of the SangKurMa snack cup formulations F2 was in the field 5.5-6.49 (light slightly), while F1, F3, and F4 were quite good, in the range of 6.5-7.49 (like moderately). The statistical analysis of organoleptic tests showed no difference in color, aroma, taste, and texture in each formula, indicated by p-values > 0.05. It shows that the panelists preferred the color, aroma, taste, and texture of the SangKurMa snack cup in the F1, F2, F3, and F4.

DISCUSSION

Iron and Vitamin C Content

Table 1 shows that the iron content in Ambon bananas is much higher than that of other banana

varieties, one of which is the Raja Sereh variety, which has an iron content of 0.1 mg/100 (Kemenkes RI, 2018). It indicates that Ambon has 84 times higher than Raja Sereh. Iron is an essential compound for the body that plays a role in synthesizing hemoproteins such as hemoglobin, cytochromes, and myoglobin. There are two types of iron in food, namely heme and nonheme. Heme iron is found in many animal products. About 50-60% of meat, fish, and poultry iron is heme iron, while the rest is nonheme.

In contrast to heme iron, nonheme iron is the most abundant iron found in plant products such as fruits, grains, vegetables, nuts, milk, and their derivatives (Gropper et al., 2016; Medeiros & Wildman, 2019). Between heme and nonheme, nonheme iron is the type of iron that is more difficult to absorb by the body. However, some chelators (small organic compounds that form complexes with metal ions) can bind to nonheme iron to help enhance (enhance) or inhibit its absorption (inhibit). One of these compounds that can increase (enhancer) iron absorption is ascorbic acid (vitamin C) (Gropper et al., 2016). The amount of vitamin C in Ambon bananas is also higher than in other varieties. However, research on the Raja Sereh variety also showed a lower vitamin C value of 2.9 mg/100 g (Wekti, 2018).

In line with the banana content, iron and vitamin C of dates tested in this study were also more significant than the results of research by Parvin et al. (2015) on three types of Tunisian dates (Trounja, Lagou, and Gounda). The study stated that the iron content in Trounja, Lagou, and Gounda dates was 1.9 mg, 1.79 mg, and 0.82 mg, while the vitamin C content was 0.9 mg, 0.7 mg, and 0.9 mg. mg per 100 g. Therefore, it shows that the iron and vitamin C content in Khalas dates is far superior. However, in contrast to research by Mariyam & Mary (2015), which states that the iron content in four varieties of dates (Ajwa, Safawi, Omani, and Tunisian), Tunisian dates contain the highest iron, which is 7.2 mg/100 g and Ajwa dates the lowest is 0.85 mg/100 g. In comparison, the Omani is 5.5 mg/100 g and Safawi 1.66 mg/100 g. Therefore, the difference in iron levels in this variety of Tunisian dates can be caused by the different types of dates studied. Based on these results, it can be seen that the content of Khalas dates is higher than that of Ajwa and Safawi dates but lower than that of the Omani and Tunisian varieties.

Another sample tested in this study was commercial forest honey. The analysis of the iron content in the tested honey was higher than in some varieties. For example, the results of the study by Hakim et al., (2021) on the content of two types of Kelulut honey (Trigona) showed that light-colored honey (low glucose) has an iron content of 0.77 mg/100 g and dark-colored honey (high glucose) has of 0.88 mg/100 g. In contrast, vitamin C contained in Kelulut honey was much higher, namely 110.88 mg/100 g (light-colored honey) and 93.28 mg/100 g (dark-colored honey) (Hakim et al., 2021).

Iron and vitamin C in crackers are higher than in similar food products. For example, the result of research on nutrient-rich cookies made from various flours (bananas, broccoli, tempeh, beef, chicken, and bran) showed that they contain iron of 4.07 mg/100 g and vitamin C of 0.68 mg/100 g (Lailiyana, 2012). However, the iron content of nutrient-rich cookies with tuna variant (tuna flour substitution) was superior to nutrient-rich cookies without tuna and commercial crackers, namely 8.67 mg/100 g. In contrast, the vitamin C content of tuna-rich cookies is much lower than commercial crackers and nutrient-rich cookies without tuna, which is 0.25 mg/100 g.

Iron can be oxidized into various forms, where the surrounding chemical environment strongly influences this condition. For example, Fe^{2+} (ferrous) and Fe^{3+} (ferric) are stable forms of iron in the body and food. Approximately 25% of heme iron from food can be directly absorbed by the intestine, while nonheme iron must be hydrolyzed in the gastrointestinal tract. This hydrolysis is greatly assisted by protease enzymes and hydrochloric acid found in the stomach. In addition, the absorption will increase if the source of iron consumes together with the enhancer. Conversely, if consuming the source of iron with foods containing inhibitors, the iron absorption in the body will be inhibited (Gropper et al., 2016).

Ascorbic acid (vitamin C) is one component that acts as an enhancer. Vitamin C can maintain iron in a suitable valence state for enzyme function by reducing ferric ions (Fe^{3+}) to ferrous (Fe^{2+}) so that the intestines will more readily absorb the iron that enters the body in the ferric form (Gropper et al., 2016; Mahardika & Zuraida, 2016). The Micronutrient Intervention Program (2002) in Briawan (2013) states that the consumption of 25-75 mg of vitamin C can increase the absorption of nonheme iron by four times.

Unlike the existing high-iron functional food products, the SangKurMa snack cup is a new high-iron and vitamin C product innovation. This product is a modification of one type of British dessert called Banoffee. This snack is famous for its sweet taste and is high in sugar and fat. To increase its functional value, the researchers modified the banoffee recipe by combining bananas with dates and honey into SangKurMa snack cups.

Table 2 shows the iron and vitamin C content per serving of SangKurMa snack cup in each formula. However, consuming iron is not fully absorbed by the intestines. The AKG (2019) states that the iron absorption needed in individuals is only around 1.9 mg/day or 10-15% of the daily intake. Therefore, the high vitamin C content in each serving of SangKurMa snack cup can meet daily vitamin C needs while increasing the absorption of nonheme iron in the product. As much as 65-74% of this absorbed iron will later use in the process of hemoglobin synthesis (Briawan, 2013).

The iron content in one serving of SangKurMa snack cup is relatively higher than some other high-iron products. For example, the results of research by Nopianti et al. (2019) stated that the iron content in the snack bar made from banana Kepok flour with spinach flour showed a value of 8.29 mg/kg or 0.29 mg per serving (35 g). Meanwhile, the iron content in steamed sponge cake substituted with beetroot flour and sesame powder as a functional food for anemia sufferers is 1.75 per serving (50 g) (Yuniantika, 2020). Furthermore, another study by Arviyani et al. (2022) regarding the manufacture of sorbet made from Moringa leaves and red guava also stated that each product serving contains 0.3 mg iron and 80.17 mg vitamin C.

Organoleptic Test

In addition to being superior in nutritional components, functional food quality also highly depends on consumer acceptance of the products. It can analyze through the results of organoleptic tests in the form of hedonic tests (liking).

Color

The results are in line with the research of Ruslan et al. (2015), which stated that there was no significant difference in the color between the modified brownie formulas of brown rice flour and dates because they used the same colored ingredients, namely chocolate. Color is crucial in attracting consumer interest in food (Nkuba et al., 2018). SangKurMa snack cup is a layered snack with a combination of brown and yellowish colors. Where the first layer's color is yellowish from crumbled crackers, the second layer is brown from honey, the third layer is yellowish from mashed bananas, and the fourth layer is brown from shredded dates.

The more using materials, the thickness of the layer and the proportion of colors will increase, but the variety of colors produced is still brown and yellowish. It is in line with the opinion of Selviyanti et al. (2019), which states that the more the proportion of ingredients added, the more dominant the resulting color will be. Therefore, making the SangKurMa snack cup using bananas and dates as ingredients with the highest proportion will produce a more dominant layer of yellowish and brown colors. Furthermore, it is in line with the opinion of Erawan et al. (2019), which states that bananas have various flesh colors ranging from white to orange and Ambon bananas have white to yellowish colors. At the same time, the color produced from the Khalas variety dates is brown but not as dark as other varieties. This opinion also follows the results of research by Al Harthi et al. (2015), which stated that Khalas dates have golden brown flesh and the lightest color compared to the other three varieties.

SangKurMa snack cup is only done by pulverizing and putting the ingredients into the cup sequentially without being homogenized so that the color in each formulation will be the same. Therefore, this product's color combination can give the panelists a positive impression. It is in line with the opinion of Sigarlaki et al. (2021), which states that attractive color combinations can increase consumer interest in a product.

Aroma

The result is in line with the research by Setyarini (2013), which stated that there was no difference in aroma in banana Ambon wet noodles in all treatments, which indicate by a p-value (0.82) >

0.05. Bananas are known as a fruit that has a sharp aroma. This opinion is under the explanation of Aurore et al. (2011) and Zhu et al. (2018), which state that bananas contain high volatiles, where most of the compounds consist of esters known to have a significant influence on the formation of aroma in bananas. The weak banana aroma produced in Ambon banana wet noodles causes by the presence of other more dominant ingredients, namely wheat flour and eggs (Setyarini, 2013). Meanwhile, in making the SangKurMa snack cup, although bananas dominate it, the distinctive aroma of bananas produced is very weak because it is in the 3rd layer after honey and covered by shredded dates, so the smell of the dates suppresses the scent. Therefore, dates have a weaker aroma than bananas. Mezroua et al. (2017) stated that the aromatic component in dates is relatively low. Amira et al. (2011) said that in dates found 80 volatile components that form aromas consisting of 20 esters, 19 alcohols, 13 aldehydes, 12 hydrocarbons, ten terpenes, and a small number of ketones and lactones. While in bananas, the volatile components reach 246 with 112 esters, 57 alcohols, 39 acid compounds, and small amounts of aldehydes and ketones (Aurore et al., 2011). It causes the aroma produced in the SangKurMa snack cup to be relatively weak (not typical of bananas/dates).

Aroma is an important factor for consumers in choosing food. The smell caught by the sense of smell can affect appetite and determine how big the first bite is (de Wijk et al., 2012; Morquecho-Campos et al., 2019). The difference in preference between panelists could be due to the weak characteristic aroma of bananas/dates, thus affecting the interest of some panelists in the product. It follows the opinion of Morquecho-Campos et al. (2019), who stated that the group of individuals who got flavored food had much higher interest than those with unscented food.

Taste

The test result is in line with Utami's research (2016) which states that there is no significant difference in the taste aspect in all formulations of functional biscuits substituted with sweet potato flour and dates because the main ingredients used contain high levels of sugar. Hence, the resulting sweet taste is not much different (Utami, 2016).

Snack cup SangKurMa is a snack with a dominant sweet taste from bananas, dates, and honey. Hasanah et al. (2017) stated that every 100 g of banana contains 4.64-5.22 glucose, 4.55-5.12 g sucrose, and 4.89-5.53 g fructose. In contrast, the sweetness level of dates is much higher than bananas. The results of research support this statement by AlShwyeh & Almahasheer (2021) which states that the glucose content in Khalas dates ranges from 25.84-39.03 g/100 g. This variety has a lower level of sweetness than other varieties (AlShwyeh & Almahasheer, 2021). However, the glucose levels of Khalas dates reach 5-7 times higher than bananas. Simultaneously, using honey in making SangKurMa snack cups also affects the sweetness produced. It follows the opinion of Nasution et al. (2019), which states that forest honey contains 66.24-71.42% glucose and 3.04-4.51% sucrose. Therefore, The more ingredients used, the sweeter the resulting taste. Among the four formulations, F1 has the lowest level of sweetness, and F4 has the highest level of sweetness.

Although there is a difference in the weight of the ingredients between formulations, the levels are not much different. Therefore, it makes the sweetness levels produced in the F1, F2, F3, and F4 formulations are also not much different. This opinion is under the explanation by Utami (2016) that although there are differences in the concentration of ingredients in the making of sweet potato biscuits as a functional food, the combination of sweet dates produced is not significantly different.

Texture

The result is in line with the research results of Kusumastuti et al. (2022). They state that there was no significant difference in the texture aspect of the tomato velva with the addition of honey at various concentrations. Food texture can be felt as a result of sensory responses involving visual, audio, and tactile stimuli. This texture is vital in influencing consumer assessments of a food product (Chen and Rosenthal, 2015). The SangKurMa snack cup has a unique texture. It is because of the combination of crunchy from crumbled crackers, soft and sticky from shredded dates, and soft from mashed bananas. It follows the opinion of Al Harthi et al. (2015), which state that Khalas dates have a soft texture and are sticky. The high sugar content in this fruit can make the texture of dates sticky (Kamal-Eldin et al., 2020).

Using Ambon bananas with the highest proportion of ingredients also gives the product a softer texture. It is under the explanation of Hapsari & Lestari (2016), which state that Ambon banana flesh has a sweet taste and soft texture. Therefore, the more bananas and dates you use, the more pronounced the soft and sticky texture of the product will be.

Consumer satisfaction with the product depends on the texture of the food during the chewing process. Foods with a hard, thick, and thick texture are generally not liked by consumers (Forde & de Graaf, 2022). On the other hand, the SangKurMa snack cup has a soft, sticky, and crunchy texture that all the panelists like.

CONCLUSION

The analysis of iron content per 100 g of Ambon banana, Khalas dates, forest honey, and commercial crackers were 8.48 mg, 3.39 mg, 4.41 mg, and 5.48 mg, respectively. This value indicates that the iron content in the tested material is superior to several other varieties or similar materials. The vitamin C content in Ambon bananas, Khalas dates, forest honey, and commercial crackers, respectively, was 70.25 mg, 20.45 mg, 11.03 mg, and 14.12 mg. The content of vitamin C in bananas, dates, and crackers tends to be higher than in some varieties and similar ingredients. However, the content of commercial forest honey is still much lower than that of other varieties. Iron content per serving of SangKurMa snack cup in F1, F2, F3, and F4 ranged from 10.45-13.44 mg, and the vitamin C content was 78.71-101.96 mg. This value is superior to some existing high-iron and vitamin C food products. This figure shows that the SangKurMa snack cup can be used as an alternative snack to meet the daily iron needs of 69.70-82.98%, absorbed iron of 1.05-2.02 mg, and vitamin C needs of 104.96-135.94% (based on the RDA for energy needs of 2100 kcal, iron 15 mg and vitamin C 75 mg). The organoleptic test showed that the panelists preferred the F1, F2, F3, and F4 formulations on color, aroma, taste, and texture. Further research on the effects of consuming this product needs to be done to determine the clinical results, especially in the hemoglobin level of patients with anemia.

ACKNOWLEDGMENTS

None of the authors received funding for this Article. However, we thank all the panelists for taking the time during their busy times.

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