

SENSORY AND CHEMICAL CHARACTERISTICS OF SOLID BREM WITH THE ADDITION OF GEDONG GINCU MANGO JUICE (*Mangifera indica* L. var. *Gedong Gincu*)

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ABSTRACT

Brem is a type of advanced processed food from fermented white glutinous rice. This study aims to determine the characteristics of solid *brem* with the addition of *Gedong Gincu* mango juice. This research uses a one-factor, completely randomized design (CRD) with three levels of treatment with a comparison of white sticky tape juice and *Gedong Gincu* mango juice, namely A1 (85%:15%), A2 (75%:25%), and A3 (65%:35%). As well as testing paired T-tests for selected products and control. The data analysis used is ANOVA with Duncan advanced test ($\alpha=0,05$). Based on the results of research solid *brem* addition of *Gedong Gincu* mango juice affects the sensory quality (color (3,53-8,44), flavor (5,61-6,79), and appearance (5,44-7,85)), hedonic (color (4,97-7,29), aroma (6,04-7,30), texture (6,34-7,79), and overall (6,41-7,53)), and chemical (water content (18,31%-20,71%), carbohydrates as starch (2,63%-9,17%), acidity (9,51%-17,85%), and vitamin C (2,25 mg/100g-3,02 mg/100g)). However, the addition of *Gedong Gincu* mango juice did not affect the sensory quality (aroma (5,92-6,45), taste (6,77-7,60), and texture (7,41-7,75)), hedonic (taste (6,34-7,16)), and chemical (ash content (1,45%-4,06%), and water-insoluble part (3,61%-4,15%)). Further test results T-test sample A1 and control showed parameters of color, aroma, and appearance (sensory quality); color, aroma, and taste (hedonic); and the value of water content, ash content, carbohydrates, acid degrees, and vitamin C has no significant effect with the addition of *Gedong Gincu* mango juice. In contrast, the parameters of taste, flavor, texture (sensory quality), texture and overall (hedonic), and water-insoluble part significantly affect the addition of *Gedong Gincu* mango juice.

1. INTRODUCTION

Solid *brem* is one of the typical snacks of East Java that the public favors. *Brem* is a type of advanced processed food from fermented white glutinous rice. The fermented product of white glutinous rice is known as white glutinous tape. Tape is one of the traditional foods made from the fermentation of carbohydrate foods using yeast tape. *Brem* has a dense texture, dry, not mushy; the taste is sweet to sweet acidity, white to Brown, and easily soluble in the mouth without leaving fibers or crystals (K. Sutrisno et al., 2017). Solid *brem* products sold today are a little development of new product variations that make the product becomes monotonous. According to Kurniati (2020), it is necessary to develop the taste and variety of solid *brem* products so that they can be enjoyed by the broader community with different variations. Solid *brem* product development can be done with a variety of flavors. One material that can enrich the flavor of solid *brem* is the addition of mango juice from the *Gedong Gincu* variety.

Gedong Gincu mango is a local fruit in great demand by consumers because it has distinctive and specific characteristics. *The West Java province Gedong Gincu* mango fruit development center includes Cirebon, Indramayu, and Majalengka (Sulistiyowati & Natawidjaja, 2016). In 2018 the level of mango production in West Java province amounted to 404.542 tons, of which about 30% was *Gedong Gincu* mango (Ariningsih et al., 2021). *Gedong Gincu* mango fruit has a sweet taste legit, a sharp distinctive aroma, and lots of fiber; the fruit is round, medium-sized (200-250 g/fruit), the fruit skin color of bright yellow purplish red and bright orange flesh (Ariningsih et al., 2021).

Research on solid *brem* with modification and addition of flavor variants has been carried out, including optimization of solid *brem* with the addition of orange juice by Hiovenaguna and Widjanarko (2017) and Kurniati (2020) with the addition of salak juice. Based on the results of research on the addition of fruit juice is rarely considering the health benefits contained in it. In the study by Jatiyati et al. (2021), solid *brem* with the addition of purple sweet potato as a natural dye considered health benefits such as antioxidants. Therefore, in this study, adding local fruit juice from mango varieties *Gedong Gincu* contains health benefits such as vitamin C. According to Istianto and Muryati (2014), the *Gedong Gincu* mango is one of the best sources of antioxidants. In addition, this mango contains vitamin A, vitamin B complex, vitamin C, vitamin E, and minerals. This study aims to determine the characteristics of solid *brem* products with the addition of juice from local fruits, namely *Gedong Gincu* mango fruit, to improve the taste and development of solid *brem* products. To produce a good quality solid *brem* and public interest, it is necessary the right proportion of *Gedong Gincu* mango juice and sensory characteristics testing (sensory and hedonic quality), and chemicals include water content, ash content, acid degree, carbohydrates, water-insoluble matter, and vitamin C.

2. METHODS

2.1. Materials and Tools

The ingredients used are white glutinous rice, *Gedong Gincu* mango, yeast tape (Na Kok Liong), baking soda (Koepoe-Koepoe), and chemicals used in chemical testing. While the tools used are digital scales, Basin, a steaming pot, a gas stove, a tray, a banana leaf, a ladle, a spoon, a knife, a baking sheet, a filter cloth, a measuring cup, a pan, slow juicer (SHARP EJ-C20Y-RD), thermometer, stopwatch, hand mixer (Miyako HM-620), plastic wrap and aluminum foil, as well as equipment for conducting chemical and organoleptic testing.

2.2. Research Methods

2.2.1. *Gedong Gincu* Mango Juice

Gedong Gincu mango fruit lean with clean water, peeling the mango's skin and flesh. After that, the mango pulp is cut into smaller pieces to make it more accessible during crushing. The process of crushing mango flesh using a slow juicer to get *Gedong Gincu* mango juice without adding water. Then re-filtering the juice with a filter cloth or filter device 400 mesh.

2.2.2. *White Sticky Tape* Juice

White glutinous rice weighed 500 grams for each treatment. Then the rice is washed using clean water five times. Glutinous rice soaked with clean water for 2 hours. After that, glutinous rice is steamed for 15 minutes. Then the half-cooked glutinous rice is removed, then washed with clean water for one time. Then the rice is steamed again for 15 minutes. After the glutinous rice is cooked, then cooling at room temperature. Then, yeast tape (Na Kok Liong) was mixed evenly with as much as 1 g. After that, the glutinous rice is placed in a basin container, covered with banana leaves, and covered again with plastic wrap to prevent oxygen or air from entering. The fermentation process is anaerobically (without oxygen) for seven days. After the sticky rice tape is produced, then filtering and pressed manually with a filter cloth to obtain white sticky rice tape juice and separate it from the pulp.

2.2.3. *Solid Brem* with *Gedong Gincu* Mango Juice

The stages of making solid *brem* with *Gedong Gincu* mango juice are seen in Figure 1.

2.2.4. *Procedure of Analysis*

Sensory and hedonic quality testing using a line scale (0-10). Then the level of sensory characteristics and preferences of the panelists were given a cross on the line, then measured the panelists made the distance from the base of the line to the cross. The number of panelists used is 30 people, with untrained panelists. Sensory quality parameters tested are color (pale white to brownish white), aroma (does not smell typical of sticky rice tape to smell typical of sticky rice tape), taste (does not taste sweet acidity to taste sweet acidity), flavor (does not taste typical of mango fruit to taste typical of mango fruit), texture (hard and not easily soluble in the mouth to soft and easily soluble in the mouth), and appearance (crystalline and coarse porous to compact and porous fine/small) (modification of Sutrisno et al., 2017). The hedonic test parameters are color, aroma, taste, texture, and overall with a very dislike to very like assessment. Furthermore, the data obtained are analyzed and interpreted by statistical analysis.

The chemical test procedure used in this study used the Test of water content (AOAC, 2005), ash content (AOAC, 2005), carbohydrates (AOAC, 2005), and vitamin C (AOAC, 2005), acid degree (SNI 01-2559-1992) and water-insoluble part (SNI 01-2559-1992).

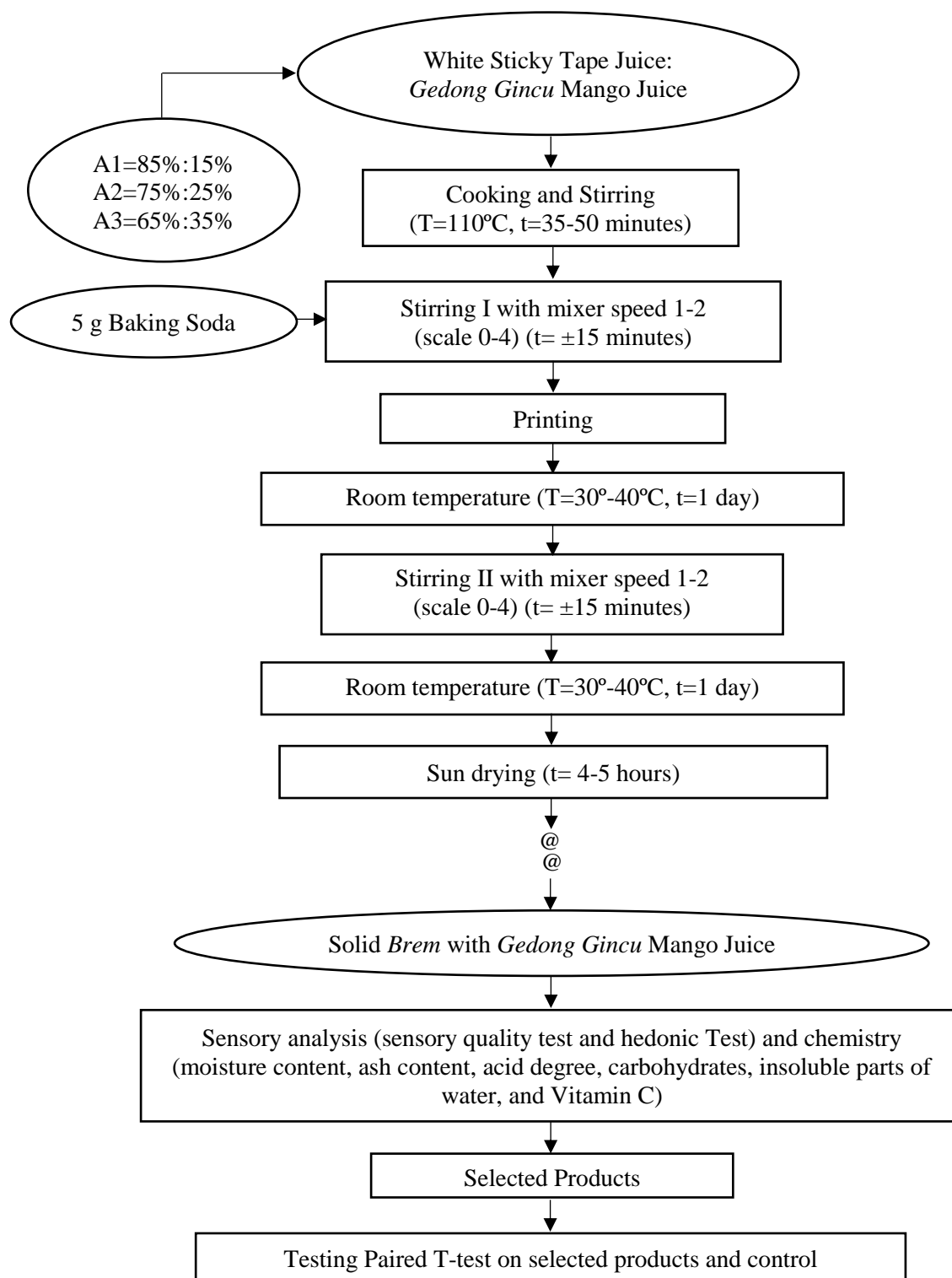


Figure 1 Flow Chart of Making Solid Brem Gedong Gincu Mango Juice (modification of Hapsari et al., 2004)

2.3. Design of Experiments

The experimental design is a complete randomized block design (CRD) of one factor with two repetitions. These factors are the ratio of white sticky rice juice and *Gedong Gincu*

mango juice with three treatment levels: A1=85%: 15%; A2=75%: 25%; and A3=65%: 35%. The mathematical model used is:

$$Y_{ij} = \mu + \alpha_i + \epsilon_{ij}$$

Description:

Y_{ij} : The value of observation on the factor of comparison of the amount of white sticky tape juice and *Gedong Gincu* mango juice at the level of-i, and the j-th repeat.

μ : General averages.

α_i : The effect of comparing the amount of white sticky tape juice and *Gedong Gincu* mango juice at the level of-i.

ϵ_{ij} : The effect of random (experimental error) on the treatment of comparison of the amount of white sticky tape juice and *Gedong Gincu* mango juice at the level of-i and the j-th repeat.

i : The multiplicity of factors A (1,2,3).

j : The number of repetitions (1,2).

The next experimental design is paired T-test of selected and control products. The hypothetical Model used is:

H₀: Adding *Gedong Gincu* mango juice does not affect sensory (sensory and hedonic quality) and chemicals in solid *brem* products.

H₁: The addition of *Gedong Gincu* mango juice has an influence on sensory (sensory and hedonic quality) and chemicals in solid *brem* products.

2.4. Data Analysis

Data analysis using SPSS 23. Sensory, hedonic, and chemical quality test data using Anova to determine the real effect of treatment or not. If the value of $p < 0,05$, then the treatment has a significant effect and continued Duncan Test at a 95% confidence interval ($\alpha = 0,05$). Selected samples and control will be analyzed using paired T-tests. Data analysis using SPSS 23, where paired T-test will produce the average value (mean) and GIS.2 tailed to determine the significance of the tested product (Wahyuningtias et al., 2014). From the design hypothesis that has been made, when Sig.2 tailed $< 0,05$, then H₀ is rejected, and if Sig.2 tailed $> 0,05$, then H₀ is accepted.

3. RESULTS AND DISCUSSION

Solid *brem Gedong Gincu* mango juice products produced in this study can be seen in Figure 2.

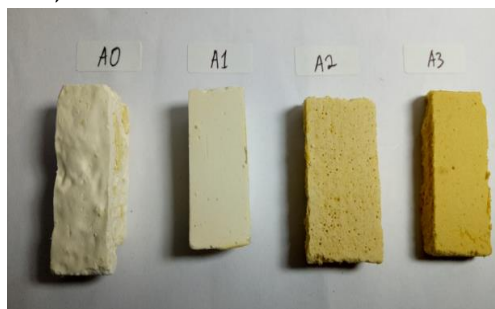


Figure 2 Products Solid *Brem Gedong Gincu* Mango Juice

Based On Figure 2. presented above, consists of a control solid *brem* sample (A0) with the use of 100% white sticky tape juice and three treatment samples, namely A1 with the use of 15% *Gedong Gincu* mango juice and 85% white sticky tape juice, A2 with the use of 25% *Gedong Gincu* mango juice and 75% white sticky tape juice, and A3 with the use of 35% *Gedong Gincu* mango juice and 65% white sticky tape juice.

The results of sensory quality testing (color, aroma, taste, flavor, texture, and appearance), hedonic testing (color, aroma, taste, texture, and overall), and chemical testing (water content, ash content, carbohydrates as starch, acid degree, water-insoluble parts, and vitamin C) in the study of solid *brem Gedong Gincu* mango juice can be seen in Table 1.

Table 1 Results of the sensory quality test, hedonic Test, and chemical Test of solid *brem Gedong Gincu* mango juice

Test Type	A1 (85%:15%)	A2 (75%:25%)	A3 (65%:35%)
Sensory Quality Test			
Color	3,53±2,04 ^a	7,81±1,63 ^b	8,44±1,15^b
Aroma	6,45±1,94 ^a	5,92±2,19 ^a	6,01±2,03 ^a
Taste	7,60±1,64 ^a	6,77±2,38 ^a	7,23±1,79 ^a
Flavor	5,61±2,34 ^a	6,63±2,22 ^{a,b}	6,79±2,37^b
Texture	7,62±1,97 ^a	7,75±1,66 ^a	7,41±2,22 ^a
Appearance	7,85±1,89^b	5,44±2,85 ^a	7,07±2,53 ^{a,b}
Hedonic Test			
Color	7,29±2,05^a	6,26±1,85 ^a	4,97±2,42 ^b
Aroma	7,30±1,46^b	6,95±1,96 ^{a,b}	6,04±1,91 ^a
Taste	7,16±1,56 ^a	6,80±1,98 ^a	6,34±2,17 ^a
Texture	7,79±1,51^b	6,74±1,95 ^a	6,34±2,14 ^a
Overalls	7,53±1,56^a	6,53±2,01 ^b	6,41±1,86 ^b
Chemical Test			
Water Content (%)	18,31±0,51^b	19,53±0,47 ^{a,b}	20,71±0,53 ^a
Ash Content (%)	1,45±0,13 ^a	3,64±0,49 ^a	4,06±2,10 ^a
Carbohydrates as Starch (%)	2,63±0,39 ^c	4,77±0,18^b	9,17±0,05^a
Acid Degree (%)	17,85±0,38 ^a	12,49±0,02 ^b	9,51±0,40^c
Water Insoluble Part (%)	4,15±0,45 ^a	3,77±0,28 ^a	3,61±0,78 ^a
Vitamin C (mg/100g)	2,25±0,02 ^c	2,78±0,001 ^b	3,02±0,01^a

Note: Different letter notations in the same line show significantly different at $\alpha=0,05$

3.1. Sensory Quality Test

3.1.1. Color

The results of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on the sensory quality of solid *brem* color ($p<0,05$). The average rating ranges from 3,53 to 8,44, indicating a color towards pale

white, to what is expected is brownish white. Generally *brem* solid white. The higher the addition of *Gedong Gincu* mango juice, the higher the resulting color (yellow-brown). The intense color of *Gedong Gincu* mango flesh is caused by increased concentrations of carotenoids (β -carotene and lutein) in the fruit ripening process (Christ & Hörtensteiner, 2014)

3.1.2. Aroma

The results of the analysis of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango extract had no significant effect on the sensory quality of solid *brem* aroma ($p>0,05$). The average rating obtained ranges from 5,92 to 6,45, which indicates the aroma in the expected direction, namely the distinctive aroma of sticky tape. *Gedong Gincu* mango fruit has dominant volatile ester components such as ethyl butyrate, butyl acetate, and ethyl acetate, which produce aroma fruity (fruity aroma) and sweet (sweet fragrance) (Utami et al., 2020). Volatile compounds contained in *Gedong Gincu* mangoes are thought to evaporate due to the cooking process at high temperatures and during the drying process. It is supported by Lawalata and Tetelepta (2019) that the volatile compounds found in fruit juice are getting damaged and lost due to contact with heat.

3.1.3. Taste

The results of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had no significant effect on the sensory quality of solid *brem* taste ($p>0,05$). The average rating ranges from 6,77 to 7,60, indicating a taste in the expected direction, namely sweet and sour. *Gedong Gincu* mango fruit has a sweet, legit, and sour taste. The sour taste is the main characteristic of *Gedong Gincu* mango; even though the sugar content increases during the ripening process, the sour taste is still felt (Utami et al., 2020). Then the sweet and sour taste also arises from the fermented sticky rice tape. The primary process of tape fermentation is the breakdown of starch into simple sugars, which is carried out by yeast with amylase enzymes which can give rise to a sweet taste. The resulting sour taste is influenced by the presence of organic acids contained in the sticky rice.

3.1.4. Flavor

The results of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on the sensory quality of solid *brem* flavor ($p<0,05$). The average rating ranges from 5,61 to 6,79, indicating the expected flavor, namely, mango fruit taste. *Gedong Gincu* mango has a distinctive and strong aroma and taste. The sensory characteristics of the aroma of *Gedong Gincu* mango fruit consist of various volatile components that have aroma descriptions fruity (fruit scents), caramel (caramel aroma), cooked (ripe fruit aroma), fermented (fermented aroma), floral (floral scent), and sweet (sweet fragrance) (Utami et al., 2020).

3.1.5. Texture

The results of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango extract had no significant effect on the sensory quality of solid *brem* texture ($p>0,05$). The average rating ranges from 7,41 to 7,75, showing the texture in the expected direction, which is soft and dissolves easily in the mouth. The texture produced by dense *brem* is affected during the stirring process. Stirring attaches the molecules of the crystallized material so that the longer the stirring, the more molecules stick to one another; this will harden the texture. solid *brem* (Saputra and Widjanarko, 2017). The stirring time for each treatment was the same, so the resulting solid *brem* texture had no significant effect.

3.1.6. Appearance

The results of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on the sensory quality of solid *brem* appearance ($p < 0,05$). The average rating obtained ranges from 5,44 to 7,85, which indicates the appearance in the expected direction, namely compact and smooth axis. The greater the proportion of *Gedong Gincu* mango juice, the more concentrated the yield, affecting the mixing process. The less yield produced, the better the mixing process will be because the mixing will occur more evenly, and air penetration into the *brem* dough will be better (Margaretha & Widjanarko, 2015).

3.2. Hedonic Test

3.2.1. Color

The results of the analysis of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on the panelist's preference level for the solid *brem* color parameter ($p < 0,05$). The range of panelist preferences ranged from 4,97 to 7,29 or was in the range from dislike to like. Adding *Gedong Gincu* mango juice produces a reddish-yellow dense *brem* color that resembles the original color of the *Gedong Gincu* mango flesh. The resulting dark and brownish colors can reduce and affect the panelist's preference level.

3.2.2. Aroma

The results of the analysis of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on the panelist's preference level for the solid *brem* aroma parameter ($p < 0,05$). The level of the panelist's favorite range ranged from 6,04 to 7,30 or was in the like range. The more significant addition of *Gedong Gincu* mango juice resulted in a decrease in panelist preference for aroma parameters. The addition of *Gedong Gincu* mango juice will reduce the distinctive aroma of the sticky tape produced. The characteristic aroma of sticky tape, which gets stronger, will be preferred by the panelists who make the product characteristic of solid *brem*.

3.2.3. Taste

The results of the analysis of variance (ANOVA) showed that the comparison between white sticky rice tape and *Gedong Gincu* mango juice had no significant effect on the panelist's preference for the solid *brem* taste parameter ($p > 0,05$). The range of panelist preferences ranged from 6,34 to 7,16 or was in the like range. *Brem* has a distinctive taste (sweet acidity) derived from fermented sticky rice. The addition of *Gedong Gincu* mango juice also gives a sweet and sour taste to the solid *brem* product. According to Sari et al. (2016) that the content of acidic compounds in mangoes is related to organic acids (citric acid, malic acid, and ascorbic acid), and the sweet taste of mangoes is due to the sugar content that is formed such as fructose, glucose, and sucrose.

3.2.4. Texture

The results of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on the panelist's preference level for the solid *brem* texture parameter ($p < 0,05$). The range of panelist preferences ranged from 6,34 to 7,79 or was in the range of like to like very much. The greater addition of *Gedong Gincu* mango juice decreased the panelist's preference level for texture parameters. The high water content of the *Gedong Gincu* mango causes the texture of the dense *brem* to be rather soft.

Based on research by Margaretha and Widjanarko (2015), the more cassava tape water added, the greater the value of the water content in the solid *brem* so that the texture of the solid *brem* becomes softer.

3.2.5. Overalls

The results of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on the panelist's preference level for the parameter overall solid *brem* ($p < 0,05$). The range of panelist preferences ranged from 6,41 to 7,53 or was in the range of like to like. The highest level of panelist preference is found in sample A1 (85%:15%) with a value of 7.53, sample A2 (75%:25%) at 6.53, and sample A3 (65%:35%) at 6.41. The greater addition of *Gedong Gincu* mango juice resulted in a decrease in the panelist's preference level. The scale value decreases due to the porous appearance and texture of the solid *brem*. The mixing process is presumably uneven, so the penetration of air into the dough is not optimal for the formation of crystallized material molecules. When the developer (baking soda) is added to the dough, it appears to have a dense *brem* texture that looks porous (less compact) or crystalline.

3.3. Chemical Test

3.3.1. Water Content

The results of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on the water content of solid *brem* ($p < 0,05$). The water content value obtained for each treatment exceeds the maximum limit of SNI 01-2559-1992, which is a maximum of 16%. The results of the water content analysis showed that the greater the addition of *Gedong Gincu* mango juice, the higher the water content of solid *brem* produced. It is in line with the reduced proportion of white sticky tape juice. The high level of reduced sugar in the water of white sticky rice causes the water content of the resulting solid *brem* to be low because the reducing sugar will bind water during the concentration process. Ripe fruit tends to have a higher water content than unripe fruit. Based on research by Sari et al. (2016), the high water content in *Gedong Gincu* mango is visible in the NIR reflectance spectral characteristics.

3.3.2. Ash Content

The results of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango extract had no significant effect on the solid *brem* ash content ($p > 0,05$). The ash content value obtained for each treatment exceeds the maximum quality limit of SNI 01-2559-1992, which is a maximum of 0,5%. Ash content can be affected by the type of material, method of ashing, time, and temperature during drying. In making solid *brem* in each treatment, the heating temperature and drying time are the same, so the ash content in the resulting product has no significant effect. According to Sutrisno et al. (2018), the high ash content indicates a high mineral component. The mineral content contained in *Gedong Gincu* mango includes 156 mg of potassium, 0.13 mg of iron, 0.6 mcg of selenium, 10 mg of calcium, and 11 mg of phosphorus (Istianto & Muryati, 2014)—the high mineral content of *Gedong Gincu* mango results in a high solid *brem* ash content.

3.3.3. Carbohydrates as Starch

The results of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on solid *brem* carbohydrates ($p < 0,05$). The value of carbohydrates obtained for each treatment was much different and lower than the

quality of SNI 01-2559-1992, 60% -70%. The carbohydrate content calculated as starch produced in this study was shallow compared to the quality requirements of SNI 01-2559-1992. It is suspected that the amount of dilution factor performed during carbohydrate testing is very low, amounting to 10 times the dilution factor so that in the calculation with the formula produces a value of very low carbohydrate levels. The dilution factor (fp) is usually used to multiply the calculation results of a test analysis by setting the amount of dilution of an original solution to a lower concentration. Sample dilution techniques are often used to reduce the sample concentration so that the titration time is relatively short and the amount of secondary solution is also relatively small (Mardiyah et al., 2019). Based on the testing results of solid *Brem* carbohydrates obtained low titration volume. So the amount of dilution factor used affects the final result of the volume of titration testing and calculation. In addition, it is suspected that the mangoes used in the study were still not fully ripe, so it is possible starch in them. Green and immature fruits contain starch, such as mangoes and bananas, up to 70% of their dry weight (Ifmaily, 2018).

3.3.4. Acid Degree

The results of the analysis of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on the degree of solid *brem* acid ($p < 0,05$). The acid degree value obtained in the A1 treatment exceeds the maximum quality limit of SNI 01-2559-1992, a maximum of 15%. The greater the addition of *Gedong Gincu* mango juice, the lower the acidity of the solid *brem* product. It is similar to Permana et al. (2021) that overall the pH value of Etawa goat milk curd with the addition of *Gedong Gincu* mango juice has decreased. Decreasing the value of the degree of acid in solid *brem*, the higher the acidity level. The organic acid content in mango fruit (*Gedong Gincu*) consists of citric acid, malic acid, and ascorbic acid (Fahri et al., 2016).

3.3.5. Water Insoluble Part

The results of the analysis of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had no significant effect on the value of the water-insoluble part of the solid *brem* product ($p > 0,05$). The water-insoluble portion obtained in each treatment exceeds the maximum quality limit of SNI 01-2559-1992, a maximum of 1%. It is suspected that the content of insoluble solids in *Gedong Gincu* mango is high. The content decreases with high-temperature heating so as not to affect the value of the insoluble part of the water with an increase in the addition of *Gedong Gincu* mango juice. According to Sari et al. (2016), *Gedong Gincu* ripe mango contains a lot of insoluble solids (coarse fiber). With a long cooking time due to high temperatures during the manufacturing process, insoluble solids are suspected to be reduced. Research from Sutrisno et al. (2018) stated that the decrease in coarse fiber in campolay flour, along with the increase in blanching temperature, is caused by changes in the cell wall of the material during the blanching process, which causes a decrease in the content of coarse fiber in the material.

3.3.6. Vitamin C

The results of the analysis of variance (ANOVA) showed that the comparison of white sticky rice tape with *Gedong Gincu* mango juice had a significant effect on vitamin C levels of solid *brem* ($p < 0,05$). The greater the addition of *Gedong Gincu* mango juice, the higher the vitamin C content of the solid *brem* product. It is known that 100g of *Gedong Gincu* mango fruit produces 41 mg of vitamin C (Istianto & Muryati, 2014). Sari et al. (2016) stated that the content of acidic compounds found in mangoes is related to organic acids such as citric acid, malic acid, and ascorbic acid. The content of ascorbic acid or vitamin C in *Gedong Gincu* mangoes increases the levels of vitamin C in the product.

3.4. Determination Of Selected Products

Based on the research results in Table 1. showed that sample A1 (85% white sticky tape juice: 15% *Gedong Gincu* mango juice) was selected for further testing with a control sample (100% white sticky tape extract : 0% *Gedong Gincu* mango juice). A1 samples received the best average assessment with several 6 (1 sensory quality, four hedonic, and 1 Chemical), while A2 was 1 (1 hedonic), and A3 was 5 (2 sensory quality, and three chemical). Then the selected product is further tested with Paired T-test Test with control.

3.5. Selected Product T-Test Analysis

Test analysis results Paired T-test in the A1 and control samples can be seen in Table 2.

Table 2 Test results paired T-Test

Test Type	A1 (85%:15%)	Control (100%:0%)
Sensory Quality Test		
Color	3,53±2,04 ^a	3,30±2,21 ^a
Aroma	6,45±1,94 ^a	6,21±2,19 ^a
Taste	7,60±1,64 ^a	6,26±2,00 ^b
Flavor	5,61±2,34 ^a	4,02±1,88 ^b
Texture	7,62±1,97 ^a	7,17±1,74 ^b
Appearance	7,85±1,89 ^a	6,84±2,28 ^a
Hedonic Test		
Color	7,29±2,05 ^a	6,61±2,05 ^a
Aroma	7,30±1,46 ^a	6,75±1,61 ^a
Taste	7,16±1,56 ^a	6,44±1,81 ^a
Texture	7,79±1,51 ^a	6,99±1,72 ^b
<i>Overalls</i>	7,53±1,56 ^a	6,84±1,55 ^b
Chemical Test		
Water Content (%)	18,31±0,51 ^a	18,85±0,23 ^a
Ash Content (%)	1,45±0,13 ^a	1,77±0,01 ^a
Carbohydrates as starch (%)	2,62±0,39 ^a	3,56±0,22 ^a
Acid Degree (%)	17,85±0,38 ^a	12,44±0,54 ^a
Water Insoluble Part (%)	4,15±0,45 ^a	3,61±0,49 ^b
Vitamin C (mg/100g)	2,25±0,02 ^a	2,07±0,03 ^a

Note: Different letter notations in the same line show significantly different at $\alpha=0,05$

3.5.1. Sensory Quality T Test

The results of the T-test for sensory color quality were accepted H0 or had no significant effect on the addition of *Gedong Gincu* mango juice to solid *brem*. The low proportion of mango juice in sample A1 produces a white color that resembles the original color of the solid control *brem*. The results of the T-test for sensory aroma quality were accepted H0 or had no significant effect on adding *Gedong Gincu* mango juice to solid *brem*. Sample A1 has a distinctive aroma of sticky tape and a low specific aroma of mango fruit, so the results are similar to the control.

The results of the T-test for sensory taste quality were rejected H0, or there was a significant effect on adding *Gedong Gincu* mango juice to solid *brem*. *Gedong Gincu* mango juice adds a sweet and sour taste to the product. According to Sari et al. (2016), the *Gedong Gincu* mango is a unique fruit with a distinctive sweet and sour taste when ripe. The results of the T-test for sensory flavor quality were H0 rejects, or there was a significant effect on adding

Gedong Gincu mango juice to solid *brem*. Sample A1 has a higher flavor value which leads to a distinct taste of mango fruit, while the control solid *brem* leads to no taste of mango fruit flavor.

The results of the T-test for sensory texture quality were rejected H₀, or there was a significant effect on the addition of *Gedong Gincu* mango juice to solid *brem*. The sugar content influences this in it. According to Liztari (2017), the total sugar content of *Gedong Gincu* mango is 18,60%. Meanwhile, the total prebiotic glutinous tape sugar was 8,17% (Dede et al., 2018). The high sugar content will harden the texture of the dense *brem*. The results of the T-test for sensory quality of appearance were received H₀ or had no significant effect on adding *Gedong Gincu* mango juice to solid *brem*. The low proportion of *Gedong Gincu* mango juice produced a yield almost the same as the control, and the results of the stirring process had no significant effect on the product's appearance.

3.5.2. Hedonic T Test

The color hedonic T-test results were accepted H₀ or had no significant effect on adding *Gedong Gincu* mango juice to solid *brem*. The color of the solid *brem* with the addition of *Gedong Gincu* mango juice had a white color, almost the same as the solid control *brem*, so the panelist's preference level was not significantly different. The results of the hedonic aroma T-test were accepted H₀ or had no significant effect on adding *Gedong Gincu* mango juice to solid *brem*. Sample A1 has an odor. The characteristics of tape ketan and mango were low, so they did not affect the product's aroma, and the panelist's preference level was not significantly different. The hedonic taste T-test results were accepted H₀ or had no significant effect on adding *Gedong Gincu* mango juice to solid *brem*. The proportion of adding *Gedong Gincu* mango juice was low, so it did not significantly affect the taste (sweet and sour) and did not affect the panelist's preference level.

The textural hedonic T-test results were H₀ rejection or the presence of a significant effect on adding *Gedong Gincu* mango juice to solid *brem*. The sugar content influences this in it. The better the texture of the *brem*, the panelist's preference level will increase. Hedonic T-test results are the rejection of H₀ or the presence of a significant effect on adding *Gedong Gincu* mango juice to solid *brem*. Assessment of the overall parameters of solid *brem* can subjectively affect the level of preference overalls. It means that adding *Gedong Gincu* increases the level of preference of panelists for solid *brem* products.

3.5.3. Chemical T Test

The results of the chemical T test for water content were received as H₀, or the addition of *Gedong Gincu* mango juice did not affect solid *brem*. The results of the control solid *brem* test were found to exceed the SNI quality limit. It is suspected that the manufacturing process, which is left at room temperature before the second mixing, affects the moisture condition of the dough. The results of the chemical T test for ash content were received as H₀, or the addition of *Gedong Gincu* mango juice did not affect solid *brem*. The control solid *brem* test results showed that the ash content value exceeded the SNI quality limit. It is suspected that the use of the drying method with sunlight makes the drying temperature unstable and uncontrolled.

The results of the chemical T-test for the content of carbohydrates as starch were accepted H₀, or the addition of *Gedong Gincu* mango juice did not affect solid *brem*. The control solid *brem* test results showed that the value of carbohydrates as starch was not in accordance with SNI quality. It is suspected that the amount of diluent factor used is low, thus affecting the calculation process and the value of the carbohydrate content in the product. The acid degree chemical T-test results have received H₀, or the addition of *Gedong Gincu* mango juice did not affect solid *brem*. The proportion of mango juice is low, so it does not affect the degree of acidity. The results of the chemical T-test of the water-insoluble part were H₀ reject,

or the addition of *Gedong Gincu* mango juice had a significant effect on solid *brem*. The results of the control solid *brem* test were found to exceed the maximum limit of SNI. Making more solid *brem* for a long time affects the high water insoluble part. It is suspected of causing dust or dirt particles from the air and equipment to enter, contaminate the product, and increase product insolubility. The results of the chemical T test for vitamin C were received H₀, or the addition of *Gedong Gincu* mango juice had no effect on solid *brem*. The proportion of mango juice is low, so the yield is similar. The solid *brem* vitamin C test results with the addition of *Gedong Gincu* mango juice were higher than the control.

4. CONCLUSION

The results of solid *brem* research with a comparison of white sticky rice tape and *Gedong Gincu* mango extract significantly affected the sensory quality of color parameters (3,53-8,44), flavor (5,61-6,79), and appearance (5,44-7,85), then hedonic parameters of color (4,97-7,29), aroma (6,04-7,30), texture (6,34-7,79), and overalls (6,41-7,53), and chemical test for water content (18,31%-20,71%), the number of carbohydrates as starch (2,63%-9,17%), degree of acidity (9,51%- 17,85%), and vitamin C (2,25 mg/100g-3,02 mg/100g). However, the addition of *Gedong Gincu* mango juice did not significantly affect the sensory quality parameters of aroma (5,92-6,45), taste (6,77-7,60), and texture (7,41-7,75), then hedonic taste parameters (6,34-7,16), as well as chemical tests for ash content (1,45%-4,06%), and water-insoluble portion (3,61%-4,15%).

The selected Test obtained sample A1 (85% white sticky rice tape extract: 15% *Gedong Gincu* mango juice). Further test results T-test sample A1 and control showed that the parameters of color, aroma, and appearance (sensory quality), parameters of color, aroma, and taste (hedonic), and the values of water content, ash content, carbohydrates, degree of acidity, and vitamin C had no significant effect with the addition *Gedong Gincu* mango juice on solid *brem* products. At the same time, the parameters of taste, flavor, and texture (sensory quality), texture parameters and overalls (hedonic), as well as the value of the water-insoluble portion, had a significant effect with the addition of *Gedong Gincu* mango juice to the solid *brem* product.

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