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PHYSICOCHEMICAL AND SENSORY CHARACTERISTICS OF *KEMANG* (*Mangifera caesia*) AND MACHETE GOURD (*Cucurbita moschata Durch*) FRUIT LEATHER

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ABSTRACT

Kemang fruit is a seasonal fruit that can only be enjoyed in certain seasons and has yet to be used optimally. Processing *Kemang* fruit into fruit leather is one of the efforts to optimize the consumption of *Kemang* fruit. This study aims to determine Kemang and machete gourd fruit leather's physical, chemical, and sensory qualities. It used a completely randomized design (CRD) in which the proportion of *Kemang* and machete gourd puree was the factor. It consisted of three treatment levels (2:3, 1:1, 3:2). Data analysis used ANOVA and DMRT as the further test with a 95% confidence level. The results showed the proportion of *Kemang* and machete gourd puree affected physical characteristics (strong), chemical characteristics (water content and crude fiber content), and sensory quality tests (taste, color, texture). The selected fruit leather was fruit leather with a ratio of *Kemang* and machete gourd A1 (2:3), which has an average value of physical and chemical characteristics, namely tensile strength of 0.06 N/mm2, elongation of 9.484%, moisture content of 26.48 %, water activity (Aw) 0.78, fiber content 4.34%, and crude level (pH) 4.2. The average value of the sensory quality test, namely taste 4,940, color 7,200, aroma 5.8, texture 4.5, and the hedonic test, namely taste 6.3, color 7.0, aroma 6.5, texture 6.6, and overall 7.2. It can be concluded that the less proportion of *Kemang* puree compared to the machete gourd puree (2:3) will give the best characteristics of fruit leather.

1. INTRODUCTION

Kemang fruit, with the Latin name Mangifera caesia, is a fruit native to West Java Province, especially Bogor Regency, Indonesia, which has micronutrient potential but is not yet known and is not used optimally by the people. *Kemang* fruit has the advantage of having a robust fragrant aroma. According to Hadistiani (2015), the other characteristics of *the Kemang* fruit are its sour taste with a small sweetness and astringent because it contains tannins, so consumers like it. However, its use is limited because this fruit is seasonal. In efforts to increase consumer attractiveness and the quality of *Kemang* fruit, it is necessary to diversify food based on *Kemang* fruit into fruit leather with a long shelf life to produce food that consumers can enjoy at any time. Gayo (1997) states that *Kemang* fruit contains 8.55% pectin pH 3.08 (Wati, 1998). Some previous research in using *Kemang* as the main ingredient of food were making *kemang* into a puree, sweet sticky rice with coconut milk, and ice cream (Rahmi, 1998); *kemang* juice, *kemang* jam, *kemang* jelly (Wati, 1998); and *kemang* velva (Hadistiani, 2015).

The flesh of the *Kemang* fruit, which is easy to undergo enzymatic browning reaction, will produce a less attractive color when processed into fruit leather. So an alternative that can be done to improve the color of the fruit leather of the *Kemang* fruit is to add a machete gourd puree into the formulation. The machete gourd (Cucurbita moschata Durch) has a characteristic round shape, is orange, and has a long shelf life. Machete gourd contains pectin, fiber, and st, which formn of gels (Ardanti et al., 2017). The pectin content in machete gourd is 1.2 g per 100g, while the fiber content is 0.5g (Fishman et al., 1996). The use of a machete gourd is expected to help in the process of forming gels in the manufacture of fruit leather. Machete gourd also contains 1.18 mg/100 g of β-carotene (Kandlakunta et al., 2008). The carotene or carotenoid pigment in the machete gourd is an orange pigment, so using a machete gourd can give color to fruit leather. Based on this, the machete gourd also has the potential to be processed into fruit leather.

Fruit leather is one of the processed foods whose raw materials use pureed and then dried. According to Sidi et al. (2014), fruit leather products are sheet-shaped with a thickness of 2-3 mm, contain a moisture content of 10-20%, and the taste formed varies depending on the characteristics of the fruit used in its manufacture. The criteria for the desired fruit leather consist of having an attractive color, dense texture, and fine clay, as well as plastic or easy to roll, not easily torn or broken (Yenrina et al., 2009). The raw material of fruit leather should have high fiber, 0.75%-15% pectin content, and pH 3.2 (Asben, 2007).

According to the characteristics of *Kemang* and machete gourd, those materials were suitable to be processed into fruit leather. This research aimed to study the effect of the proportions of *Kemang* puree and machete gourd on chem, physical tics, and sensory characteristics and to obtain the selected treatment from the treatment performed.

2. METHODS

This study used *Kemang* fruit, *bokor,* or *cerme* variety machete gourd, granulated sugar, citric acid, and gum arabic. The *Kemang* fruits were washed and then combed for 10 minutes, peeled, and cut into small pieces. The cut *Kemang* fruits are mashed using a blender into *Kemang* puree (Wati, 1998). The making of machete gourd puree refers to Rosa (2019). The machete gourds were cleaned of seeds, and the flakes were cut into several pieces. Then the machete gourds were washed and steamed for 15 minutes at a temperature of 100^{o}C and then cooled at room temperature. The machete gourds were peeled off the skin and then mashed using a blender by adding water with a ratio of machete gourd flesh: water was 2: 1 to produce machete gourd puree (Rosa, 2019). The puree of each fruit was weighed by weight according

to the ratio of *Kemang* fruit puree and machete gourd puree 2:3 (A1), 1:1 (A2), and 3:2 (A3). Then 20% granulated sugar, 1.5% gum arabic, and 0.2% citric acid was added into the purees and mixed with the purees. The ingredients that had been mixed were then stirred in a container until all the ingredients were perfectly mixed and heated at a temperature of 70-80ºC for 2 minutes. The mixed ingredients were printed onto a baking sheet covered with baking with a thickness of 2-3 mm. Then, drying was carried out using an oven with a temperature of 60ºC for 9 hours. The dried material was then cut to a size of 5x5 cm and then rolled up.

This study used a Complete Randomized Design (RAL) with one primary fa: the proportion of *Kemang* fruit puree and machete gourd puree. This factor has three level treatments, namely A1 (proportion of *Kemang* fruit puree and machete gourd puree was 2:3), A2 (proportion of *Kemang* fruit puree and machete gourd puree was 1:1), and A3 (proportion of *Kemang* fruit puree and machete gourd puree was 3:2). Each treatment was carried out in two times of replications. The model for a completely randomized design used in this research was

$$\mathbf{Yij = \mu + \tau i + \varepsilon ij}$$

with

$\hat{Y}_{ij}$:being any observation on the proportion of *Kemang* puree and machete gourd puree (i and j denote the level of the factor and the replication within the level of the factor, respectively)

μ : the general location parameter

τi : the effect of comparison treatment of *Kemang* fruit puree and machete gourd puree for the first the effect of giving a proportion of *Kemang* puree and machete gourd puree treatment level i

ε_{ij} : random error

i : number of treatment levels (1,2,3)

j : number of replication (1,2)

The Analysis carried out in this study was tensile strength testing (ASTM, 1995) and elongation using the Universal Testing Machine tool (ASTM, 1995), sensory analysis (sensory and hedonic quality test) taste, color, aroma, and texture (Setyaningsih et al., 2010), I water content (AOAC, 2005), acidity degree (BSN, 1992), crude fiber content gravimetric method (AOAC, 2005), Water activity (Aw) using Aw-meter (Apriyantono et al., 1989). The resulting data were processed using the Statistical Product and Service Solution (SPSS) program. Then it was analyzed using Analysis of variance (ANOVA). If the results of the ANOVA variance are significant ($p < 0.05$), then the DMRT (Duncan Multiple Range Test) is performed at a 95% level of confidence.

3. RESULTS AND DISCUSSION

3.1. Results

Kemang fruit leather and gourd machetes production begins with making *kemang* fruit puree and gourd machetes puree. Previously, the *kemang* fruit was washed and blanched for 10 minutes. Blanching aims to inactivate enzymes such as polyphenol oxidase and peroxidase enzymes which can cause the browning of the material (Herawati, 2020). Blanching was done using different temperatures and heating times depending on the nature of the food to be processed. Usually, the temperature used in the blanching process is 82-93°C with a time of 3-5 minutes (Winarno et al., 1980). The more ingredients and the thicker of the slices, the longer it will take. The type of fruit can also affect the blanching time if the fruit with dense fruit flesh takes longer than the fruit with

a lot of water and flesh. Also, blanching treatment of *kemang* fruit for 5-10 minutes can reduce the levels of tannin compounds contained in *kemang* fruit by up to 21.46% (Wati, 1998). The tannin compounds in *kemang* fruit make the fruit taste astringent. Blanched *kemang* fruit was peeled, which aims to remove the skin and seeds from the fruit flesh and then proceed with size reduction to facilitate the crushing of the fruit to produce a fine fruit puree (Rosa, 2019).

There were three levels of treatment, including A1 (2:3), A2 (1:1), and A3 (3:2). Then proceed by adding sugar, gum arabic, and citric acid. Mixing was done to form a good consistency in the fruit leather product to be produced. Then heating is carried out to speed up the mixing of the ingredients and deactivate microorganisms that can cause damage under normal storage conditions (Buckle et al., 2009). The prepared formulation was then printed on a baking sheet covered with baking paper for drying in an oven. Drying was carried out to remove some of the water content contained in the material by using heat below the boiling point (Heldman & Singh, 1981). Drying in this study used a temperature of 60°C with a duration of time 9 hours. According to Alvina (2015), drying can be done in the sun or with a dryer with temperatures ranging from 50-60°C. The drying process using high temperatures can cause case hardening, where the outside of the material is dry while the inside material is still wet. The occurrence of case hardening can hinder the further drying process. Microorganisms that are present in wet materials can reproduce, causing rot. The use of baking paper as a base facilitates the process of removing the fruit skin from the pan. Dough that has dried then cut into pieces and then rolled.

Figure 6 shows a picture of Fruit Leather *Kemang* Fruit and machete gourd with a ratio of the ratio of *Kemang* fruit puree and machete gourd puree A1 (2:3), A2 (1:1), and A3 (3:2).

A1 A2 A3

The test of physical characteristics of fruit leather *kemang* fruit and machete gourd consists of the tensile strength test (tensile strength) and elongation. The results of the test analysis of the physical characteristics of fruit leather *kemang* fruit and machete gourd can be seen inTable 6.

Table 6 Physical Test Results of *Kemang* Fruit and Machete Gourd Fruit Leather

The proportion of *Kemang* Puree and Machete Gourd Puree	*Tensile Strenght* (N/mm^2)	Elongation (%)
A1 (2:3)	$0,06 \pm 0,008^{a}$	$9,484 \pm 0,01^{b}$
A2 (1:1)	$0,02 \pm 0,007^{a}$	$7,359 \pm 0,86^{a,b}$
A3 (3:2)	$0,009 \pm 0,0001^{b}$	$5,611 \pm 1,11^{a}$

Note: - All values in the table are the mean (mean) ± standard deviation
- Different letter notations in the same column show significantly different α = 0.05

Table 6 shows that the proportion of *kemang* puree and machete gourd puree makes different results of the fruit leather physical parameters including tensile strength and elongation. It shows that the proportion of *kemang* puree to machete gourd significantly affected tensile strength and elongation parameters. The chemical characteristics of fruit leather *kemang* fruit and machete gourd consist of moisture content, water activity, crude fiber content, and acidity (pH). The results of the test analysis of the chemical characteristics of fruit leather *kemang* fruit and machete gourd can be seen in Table 7.

Table 7 Result of Chemical Analysis of *Kemang* Fruit and Machete Gourd Fruit Leather

The proportion of *Kemang* Puree and Machete Gourd Puree	Water Content (%)	Water Activity (aw)	Crude Fiber Content (%)	pH
A1 (2:3)	26,48±0,4^{a}	0,78±0,02^{a}	4,34±0,4^{a}	4,2±0,02^{a}
A2 (1:1)	29,04±0,2^{b}	0,79±0,03^{a}	6,33±0,3^{b}	4,3±0,06^{a}
A3 (3:2)	37,90±0,6^{c}	0,80±0,02^{a}	8,63±0,1^{c}	4,2±0,02^{a}

Table 7 shows that the proportion of *kemang* puree and machete gourd puree results in various fruit leather chemical parameters, including water content, water activity, crude fiber content, and pH. It shows that the proportion of *kemang* puree to machete gourd significantly affected the water content and crude fiber parameters. In contrast, the rest parameters were not affected significantly by the treatment. The sensory quality characteristics test consists of four parame: tasteaste, color,aroma, and texture. The results of the sensory quality test fruit leather of *Kemang* fruit and machete gourd can be seen in Table 8.

Table 8 Result of Sensory Quality Analysis of *Kemang* Fruit and Machete Gourd Fruit Leather

The proportion of *Kemang* Puree and Machete Gourd Puree	Taste	Color	Aroma	Texture
A1 (2:3)	4,940±2,1^{b}	7,200±1,5^{b}	5,890±1,7^{a}	4,563±2,1^{b}
A2 (1:1)	3,613±1,6^{a}	5,237±2,5^{a}	6,207±1,8^{a}	2,827±1,5^{a}
A3 (3:2)	3,830±1,9^{a}	6,620±1,6^{b}	5,797±2,3^{a}	3,843±2,1^{b}

Note: - All values in the table are the mean (mean) ± standard deviation
- Different letter notations in the same column show significantly different α = 0.05

Terms of sensory quality characteristics, there were four parameters: taste, color, aroma, and texture. This result was obtained by examining the panelists for the treatments using an unstructured score sheet. In this score sheet, we used 0 to 10 scale, which indicates sour to sweet in taste parameter, yellow to orange in color parameter, specific to machete gourd to specific to *kemang* in aroma parameter, and soft to hard in texture parameter. Table 8 shows that the proportion of *kemang* puree and machete gourd puree makes the quality sensory values of the fruit leather fluctuate. It shows that the treatment had a significant effect on all parameters. The hedonic test consists of taste, color, aroma, texture, and overall. The results of the hedonic evaluation of *kemang* fruit and machete gourd fruit leather can be seen in Table

9.

Table 9 Result of Hedonic Analysis of *Kemang* Fruit and Machete Gourd Fruit Leather

The proportion of *Kemang* Puree and Machete Gourd Puree	Taste	Color	Aroma	Texture	Overall
A1 (2:3)	6,357±1,6[a]	7,067±1,3[a]	6,560±1,3[a]	6,620±1,7[a]	7,227±1,1[a]
A2 (1:1)	6,113±1,6[a]	6,617±1,1[a]	6,510±1,2[a]	6,360±1,9[a]	6,977±1,2[a]
A3 (3:2)	5,567±1,5[a]	6,483±1,2[a]	6,547±1,5[a]	6,437±1,7[a]	6,740±1,3[a]

Note: - All values in the table are the mean (mean) ± standard deviation
- Different letter notations in the same column show significantly different α = 0.05

In terms of the hedonic evaluation test, five parameters were measured: taste, color, aroma, texture, and overall. This result was obtained by examining the panelists for the treatments using an unstructured score sheet. In this score sheet, we used 0 to 10 scale, which indicates dislike to like. Table 9 shows that the proportion of *kemang* puree and machete gourd puree did not significantly affect the hedonic value of the treatments. However, the products were liked by the panelists described in the value > 5.

3.2. Discussion

3.2.1. *Physical Test Results of Fruit leather Kemang Fruit and Machete Gourd*

Tensile strength or tensile strength is the maximum voltage the sample material can withstand before breaking or breaking; the magnitude of that maximum load is then divided by the cross-sectional area of the initial latitude of the sample (Beliu et al., 2016). Thetensile test is the application of tensile force or stress to a sample which aims to determine thestrength of a sample. Fruit leather with high tensile strength has better resistance to tensileforce, so it is not easy to break and tear. The average value of tensile strength analysis (tensilestrength) of fruit leather of *Kemang* fruit and machete gourd can be seen in Table 6. The resultsof the ANOVA fingerprint test analysis showed that the ratio of *Kemang* fruit puree and machete gourd puree had a significant effect ($p<0.05$) on the tensile strength value (tensile strength) of fruit leather. The more use of machete gourd puree, the greater the tensile strength value of fruit leather; this is because machete gourd contains starch that can help form gels, so plastic fruit leather is obtained. According to Meyer (1973), the carbohydrates contained in the machete flask consist of starch, pectin, cellulose, and hemicellulose. In general, machete gourd has a reasonably high starch content, but some of it decreases after the fruit ripening process, which causes the texture of the resulting product to vary (Achyadi & Hidayanti, 2004). When heating, the carbohydrate content in the machete gourd will undergo a gelatinization process that causes the texture of the leather mix to become plastic (Achyadi & Hidayanti, 2004).

Elongation, commonly called elongation, is the difference between the length at break (after being pulled by the tool) and the initial length of a sample (Herlina et al., 2020). The higher the elongation value, the more elastic the material. The average value of the fruit leather elongation analysis of *kemang* and machete gourd can be seen in Table 6. The results of the Analysis of the variance ANOVA test showed that the ratio of *kemang* puree and machete gourd puree had a significant effect ($p<0.05$) on the elongation value of fruit leather.

Elongation is directly proportional to tensile strength (Herlina et al., 2020). Basedon the results of the Analysis, the tensile strength value obtained is directly proportional to the elongation value of the fruit leather. In addition, this is also by the statement of Tethool (2011) that the higher the tensile strength value, the more compact the nature so that the elongation increases.

3.2.2. *Chemical Test Results of Fruit leather Kemang Fruit and Machete Gourd*

Moisture content is one of the most critical parameters affecting a food ingredient's appearance andtexture. The results of the Analysis of the variance ANOVA test showed that the ratio of *kemang* puree and machete gourd puree had a significant effect ($p<0.05$) on the moisture content of fruit leather. The average water content analysis results in the table show that the water content of fruit leather ranges from 26.48-37.90%. The high water contentof fruit leather is due to the material used having reasonably high water content. According to Gayo (1997), the water content of *the kemang* fruit is 86.5 g, while according to USDA (2018), the water content of the machete gourd is 91.6 g. The more *kemang* fruit used, the higher the water content of the fruit leather produced. According to Risti and Herawati (2017), the amount of water in fruit leather is also related to the fiber contained. The higher the fiber in the raw material, the higher the water content. Fibers have polar hydroxyl groups that can bind freely; inthis case, they can bind to water. So that the fiber can bind the water content in fruit leather (Estiari, 2016). In this study, the fiber obtained was relatively high, 4.34-8.63%. *Kemang* fruit also has a high fiber content of 11.9 grams (Gayo, 1997), so it can affect the high-water content obtained in *kemang* and machete gourd fruit leather.

Water activity (Aw) is the amount of free water contained in the food used by microorganisms as a growth medium (Anggraeni, 2011). The results of the Analysis of the variance ANOVA test showed that the ratio of *kemang* puree and machete gourd puree had no significant effect ($p<0.05$) on the water activity of fruit leather. The average results of the Analysis of water activity in the table show the activity of water fruit leather ranging from 0.78-0.80. Water activity in a food ingredient can be used to determine the shelf life of a product. The higher the water activity, the lower product's shelf life duct because it allows destructive microorganisms to thrive. According to Anggraeni (2011), microorganisms can live in different aw ranges. Bacteria live at aw > 0.9; yeast lives in the aw range of 0.8 – 0.9, while molds can live in the aw range of 0.6 – 0.7. This means that the potential for microbial contamination arises from the mold and yeast groups. Water activity (aw) indicates the amount of free water food microbes can useobes for growth. The higher the aw value, the greater the potential for microbial growth in the food (Kusnandar, 2019). The resulting fruit leather has a water activity value ranging from 0.7-0.8. Microbes that can grow are from the mold group that causes hair growth. However, food with an aw value is included in dry foodstuffs with a low enough aw to inhibit the growth of most microbes.

Crude fiber is a group of polysaccharides that cannot be digested and are found in foodstuffs (Widiawati, 2019). The results of the Analysis of the variance ANOVA test showed that the ratio of *Kemang* puree and machete gourd puree had a significant effect ($p<0.05$) on the fiber content of fruit leather. The results of Duncan's further test analysis showed that the comparison samples A1 (2:3), A2 (1:1), and A3 (3:2) were significantly different from each other. The crude fiber content in all treatments ranged from 4.34%-8.63%. The highest content of crude fiber was referred to as the 3:2 ratio of *Kemang* puree and machete gourd puree, followed by the 1:1 and 2:3 two ratios of *Kemang* puree and machete gourd puree, respectively. The more*Kemang* fruit is used, the higher the fiber content of the fruit leather. This is because the fiber content of *Kemang* fruit is relatively high compared to machete gourd. According to Gayo (1997)*Kemang* fruit contains a fiber of 11.9 g, while according to

Usmiati et al. (2005), the fiber content of machete gourd is 0.66-070%.

The degree of acidity (pH) aims to determine the pH of a food ingredient which can be measured using a pH meter. According to Primawidya (2017), the higher the acid content of a material, the lower the pH value. The results of the Analysis of variance ANOVA showed that the ratio of *Kemang* puree and machete gourd puree had no significant effect ($p<0.05$) on the acidity (pH) of fruit leather. Based on the results of the Analysis, the acidity (pH) of fruit leather produced was caused by the use of *Kemang* fruit and citric acid. This is because the pH value ofthe *Kemang* fruit is lower than that of the machete gourd, which the sour taste of the *Kemang* fruit can prove.

3.2.3. *Sensory Fruit Leather Quality Test Results for Kemang and Machete gourds*

Taste is a sensation caused by incorporating its constituent ingredients, so the resulting product is strongly influenced by its constituent components (Hamidi et al., 2016). Theresults of the Analysis of the variance ANOVA test showed that the ratio of *Kemang* puree and machete gourd puree had a significant effect ($p<0.05$) on the sensory quality of fruit leather. This taste is influenced by the taste of the raw materials used, where the taste of the *Kemang* fruit has a distinctive and sour taste. Color is one of the sensory parameters that will give the first impression that the sense of sight will appreciate. The results of the Analysis of variance ANOVA showed that the ratio of *Kemang* puree and machete gourd puree had a significant effect ($p<0.05$) on the sensory quality of fruit leather color. The color of the fruit leather produced is obtained from thebeta-carotene content in the gourd. The gourd is bright yellow, indicating that the machete has one of the carotenoid pigments, Beta-carotene (Igfar, 2012).

Aroma is a characteristic of a material that can be observed with a sense of smell and plays an essential role in product quality because it can be a benchmark for the acceptance of a product (Surawan, 2012). The results of the Analysis of the variance ANOVA test showed that the ratio of *Kemang* puree and machete gourd puree had a significant effect ($p<0.05$) on the sensory quality of fruit leather aroma. This aroma is influenced by the raw materials used, where the *Kemang* fruit and the machete gourd both have a distinctive aroma, but the *Kemang* fruit has a more pungent aroma than the machete gourd. The more use of *Kemang* fruit, the aroma of the machete gourd will be covered by the distinctive aroma of *Kemang* fruit. The texture is the sensation of pressure on a product that can be observed during biting, chewing, and swallowing or through the sense of touch. The results of the Analysis of the variance ANOVA test showed that the ratio of *Kemang* puree and machete gourd puree had a significant effect ($p<0.05$) on the sensory quality of fruit leather texture. The sensory quality values in texture parameters ranged from 2.827 to 4.563. It means that the fruit leathers have a soft texture. The more machetes used, the softer the fruit leather sheets obtained but still easy to roll or plastic. The fruit leather texture is formed due to differences in the water content contained in the raw materials used.

3.2.4. *Fruit Leather Hedonic Test Results for Kemang and Machete gourds*

Taste is the most dominant factor in a product that can affect consumer preference. The results of the Analysis of the variance ANOVA test showed that the ratio of *Kemang* puree and machete gourd puree had no significant effect (p.0.05) on the hedonic tasteof fruit leather. This kind of sensory evaluation uses an unstructured scale score sheet that starts from 0 scales (indicates dislike) to 10 scales (indicates like) of specific parameters. The results of the hedonic taste test in the table show that the average fruit leather taste assessment ranges from 5.567 to 6, which indicates that panelists liked the taste of the fruit leather. Color serves

as an attraction, identification, and quality attribute. The results of the Analysis of the variance ANOVA test showed that the ratio of *Kemang* puree and machete gourd puree had no significant effect ($p>0.05$) on the hedonic color of the fruit leather. The color hedonic test results in the table show that the average fruit leather color assessment ranges from 6.483 to 7.067, which indicates what the color of the fruit leather produced is like.

Aroma is critical in determining the delicacy of taste and consumer acceptance of food products (Noviyanti et al., 2016). The Analysis of variance ANOVA results showed that the ratio of *Kemang* fruit puree and machete gourd puree had no significant effect ($p >0.05$) on the hedonic aroma of fruit leather. The results of the hedonic aroma test in the table show that the average fruit leather texture assessment ranges from 6.510 to 6.560, indicating that the panelists like the fruit leather aroma. Texture is one of the properties of materials that can be felt through touch and the sense of taste (Midayanto & Yuwono, 2014). The Analysis of variance ANOVA results showed that the ratio of *Kemang* puree and machete gourd puree had no significant effect($p>0.05$) on the hedonic texture of fruit leather. The results of the hedonic texture test in thetable show that the average fruit leather texture assessment ranges from 6,360-6,620, which indicates the fruit leather texture obtained is like by the panelists.

Testing a product is not only about the sensory attributes of the product, but there is also a preference test that is carried out as a whole. The results of the Analysis of variance ANOVA test showed that the ratio of *Kemang* puree and machete gourd puree had no significant effect ($p>0.05$) on the overall hedonic parameter of fruit leather. The overall hedonic test results in the table show that the average overall fruit leather rating ranges from 6.740 to 7.227, which indicates that the overall fruit leather produced is liked by the panelists. Panelists may give the score of the hedonic test between 0 (indicates dislike) to 10 (indicates like) in overall parameters. They have given a score of more than 5. It means the preference of the panelists is tend to like the overall parameter or the fruit leather.

The comparison of the composition of *Kemang* fruit and machete gourd affects the tensile strength, elongation, moisture content, crude fiber content, taste sensory, color, texture, and hedonic quality test of taste, color, texture, and overalls. Fruit Leather with a composition of the ratio of *Kemang* fruit and yellow gourd 2: 3 (A1) gives the highest yield with a tensile strength of 0.06 N / mm2, elongation of 9.484%, moisture content of 26.48%, water activity (Aw) of 0.78, the crude fiber content of 4.34%, and acidity degree (pH) of 4.2. The average value of the sensory quality test, namely tastes 4.9, color 7.2,aroma 5.8, texture 4.5, and hedonic test, taste 6.3, color 7.0, aroma 6.5, texture 6.6, and overall 7.2. It was concluded that the ratio of 2:3 of *Kemang* puree and machete gourd puree gave fruit leather's best chemical, physical, and sensory characteristics.

4. CONCLUSION

The comparison of the composition of *kemang* fruit and machete gourd affects the tensile strength, elongation, moisture content, crude fiber content, the quality test of taste sensory, color, texture, and hedonic quality test of taste, color, texture, and overalls. Fruit Leather with a composition of the ratio of *kemang* fruit and yellow gourd 2: 3 (A1) gives the highest yield with a tensile strength of 0.06 N / mm2, elongation of 9.484%, moisture content of 26.48%, water activity (Aw) of 0.78, the crude fiber content of 4.34%, and acidity degree (pH) of 4.2. The average value of the sensory quality test, namely tastes 4.9, color 7.2, aroma 5.8, texture 4.5, and hedonic test, taste 6.3, color 7.0, aroma 6.5, texture 6.6, and overall 7.2. It was concluded that the ratio of 2:3 of *kemang* puree and machete gourd puree gave fruit leather's best chemical, physical, and sensory characteristics.

REFERENCES

Achyadi, N. S., Hidayanti, A. (2004). Pengaruh Konsentrasi Bahan Pengisi dan Konsentrasi Sukrosa Terhadap Karakteristik Fruit Leather Cempedak (Artocarpus Champeden Lour). Infomatek, 6 (3).

Alvina. (2015). Fruit leather, cemilan pengganti permen [Internet].Retrieve from https://nuragnialvina.wordpress.com/2015/07/27/fruit-leather/ [13 Oktober 2021].

Anggraeni, A. A. (2011). Aktivitas Air dan Aktivitas Mikrobia. Jakarta : PT Gramedia Pustaka.

Association of Official Analytical Chemist (AOAC). (2005). Methods of Analysis. Asssociation of Official Analytical Chemists, Washington, D.C.

American Standard Testing and Material Internasional (ASTM). (1995). Standard Test Method for Materials Finer than 75-μm (No.200) Sieve in Mineral Aggregates by Washing. ASTM International, United States.

Beliu, H. N., Pell, M. Y., & Jasron, J. U. (2016). Analisa kekuatan tarik dan bending pada komposit widuro-polyester. LONTAR Jurnal Teknik Mesin Undana, 03 (02), 11-20.

Buckle, K . A., Buckle, K. A., Edward, A. R., Fleet, G. H., Wooton, W. (2009). Ilmu Pangan. Jakarta: UI-Press.

Badan Standar Nasioanl. (BSN) (1992). SNI 01-2891-1992. Cara Uji Makanan dan Minuman. Badan Standarisasi Nasional.

Estiari. (2016). Pengaruh perbandingan campuran labu siam (*Secheum edule*) dan brokoli (*Brassica oleracea var italica*) terhadap karakteristik fisik, kimia dan organoleptik mix fruit and vegetable leather [thesis]. Universitas Sebelas Maret, Surakarta.

Fishman, M. L., Coffin, D. R., Unruh, J. J., & Ly, T. (1996). Pectin/starch/glycerol edible film. J. Macromolec. Sci-Pure Appl. Chem, A33, 639-654.

Gayo, I. (1997). Buku Pintar Senior. Jakarta : Upaya Warga Negara.

Hamidi, F., Efendi, R., & Hamzah, F. (2016). Penambahan sari jeruk nipis (*Citrus aurantifolia*) terhadap mutu sirup buah kundur (*Benincasahispida*). Jurnal Faperta, 3 (2), 1-15.

Igfar, A. (2012). Pengaruh penambahan tepung labu kuning (*cucurbita moschata*) dan tepung terigu terhadap pembuatan biskuit [skripsi]. Universitas Hasanudin, Makasar.

Meyer, L. H. (1973). Food Chemistry. Rainhold Publishing Co., New York.

Midayanto, D., & Yuwono, S. (2014). Penentuan atribut mutu tekstur tahu untuk direkomendasikan sebagai syarat tambahan dalam standar nasional Indonesia. Jurnal Pangan dan Agroindustri, 2 (4), 259-267.

Noviyanti., Sri, W., & Syukri, M. (2016). Analisis penilaian organoleptik cake brownies subtitusi tepung wikau maombo. Jurnal Sains Dan Teknologi Pangan 1(1), 58-66.

Primawidya, N. F. S. (2017). Pemanfaatan bubur buah jambu biji putih dan bubur buah pepaya dalam pembuatan fruit leather. Jurnal Online Mahasiswa Faperta, 4(2), 1-14.

Rahmi, N. F. (1998). Pembuatan puree buah *kemang* (*Mangifera caesia*) dan aplikasinya pada dodol dan es krim [skripsi]. Fakultas Teknologi Pertanian, Institut Pertanian Bogor, Bogor.

Risti, A., & Herawati, N. (2017). Pembuatan fruit leather dari campuran buah sirsak (*Annoma muricata* L.) dan buah melon (*Cucumis melo* L.). JOM Fakultas Pertanian, 4 (2), 1-15.

Setyaningsih, D., Apriyantono, A., & Puspita, S.M. (2010). Analisis Sensori Untuk Industri Pangan dan Agro.Bogor : IPB Press.

Surawan, F. E. D. (2012). Penggunaan tepung terigu, tepung beras, dan tepung tapioka dan tepung maizena terhadap tekstur dan sifat sensori fish nugget ikan tuna [skripsi]. Universitas Bengkulu, Bengkulu.

Tethool, E. F. (2011). Pengaruh heat moisture treatment, penambahan gliserol monostearat serta rasio campuran tepung singkong dan pati sagu terhadap sifat fisikokimia sohun [tesis]. Program Pascasarjana, Universitas Gadjah Mada, Yogyakarta.

United States Department of Agriculture (USDA). (2018). Gourd. United States Department of Agriculture, United States.

Usmiati, S., Setyaningsih, D., Purwani, E.Y., Yuliani, S., & Maria, O.G . (2005). Karakteristik serbuk labu kuning (*Cucurbita moschata*). Jurnal Teknologi dan Industri Pangan, 16(2), 157-167.

Widiawati. (2019). Analis Karakteristik Fisikokimia dan Sensori Fruit Leather Pepaya *(Carica papaya L.)* dengan Penambahan Kolang-Kaling *(Arenga pinnata, Merr)* [tesis]. Fakultas Pertanian, Teknologi Hasil Pertanian, Universitas Andalas.