

Physicochemical and sensory characteristics of Jicama (*Pachyrhizus erosus*) and Sweet Orange (*Citrus sinensis*) Velva

[Karakteristik fisiko-kimia dan sensori velva bengkuang dan jeruk manis]

Emma Riftyan, Dewi Fortuna Ayu*, dan Jeplin Sitohang

Department of Agricultural Technology, Faculty of Agriculture, Universitas Riau, Kampus Bina Widya Km 12,5 Simpang Baru Pekanbaru, Riau

*Correspondence Email: Fortuna_ayu2004@yahoo.com

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ABSTRACT

Velva is a frozen food made from fruit puree, sugar, and stabilizers. Jicama contains a high fiber content, but the flavor is less preferred. The addition of Sweet Orange juice can produce velva high in fiber, vitamins, and flavors liked by the panelist. This study aimed to obtain the best ratio of velva from Jicama puree and Sweet Orange juice. The research used a complete randomized design (CRD) with five treatments and four repetitions to obtain 20 experimental units. The treatment in this study was the ratio of Jicama puree and Sweet Orange juice, namely BJ1 (70:30); BJ2 (60:40); BJ3 (50:50); BJ4 (40:60); and BJ5 (30:70). The data obtained were statistically analyzed using analysis of variance and continue with Duncan's multiple range test at the level of 5%. The results showed that the ratio of Jicama puree and Sweet Orange juice had a significant effect on crude fiber content, total dissolved solids, overrun, melting rate, vitamin C, and descriptive and hedonic sensory assessments such as color, aroma, taste, texture, and overall acceptance. The best ratio of velva was BJ4 with the ratio of Jicama puree and Sweet Orange juice (40:60). BJ4 treatment had crude fiber of $2.39\% \pm 0.25$; total dissolved solids of $34.26\%, \pm 0.98$; overrun of $8.88\% \pm 0.99$; melting rate of $10.01 \text{ ml/min} \pm 0.60$, and vitamin C of $34.32 \text{ mg} \pm 1.76$. The BJ4 treatment had a yellow color, orange aroma, flavor, and soft texture.

Keywords: Jicama, Sweet Orange, sensory, velva

ABSTRAK

Velva adalah salah satu jenis makanan beku yang terbuat dari campuran bubur buah, gula, dan bahan penstabil yang dibekukan. Bengkuang mengandung kadar serat yang tinggi, tetapi flavor kurang disukai. Penambahan jeruk manis berpotensi menghasilkan velva tinggi serat, vitamin, dan flavor yang disukai. Tujuan penelitian ini untuk memperoleh rasio terbaik velva dari bengkuang dan jeruk manis. Penelitian ini menggunakan rancangan acak lengkap dengan lima perlakuan dan empat ulangan, perlakuan merupakan perbandingan bubur bengkuang serta sari jeruk manis yaitu: BJ1 (70:30), BJ2 (60:40), BJ3 (50:50), BJ4 (40:60), serta BJ5 (30:70). Data yang diperoleh dianalisis secara statistik menggunakan ANOVA uji lanjut menggunakan *Duncan's Multiple Range Test* (DMRT) pada taraf 5%. Hasil penelitian menunjukkan bahwa rasio bubur bengkuang dan sari jeruk manis berpengaruh nyata terhadap kadar serat kasar, daya leleh, overrun, vitamin C, dan uji sensori velva. Velva terbaik didapatkan adalah BJ4 (puree bengkuang dan sari jeruk manis 40:60) dengan kadar serat kasar $3,23\% \pm 0,25$, total padatan terlarut $34,26\% \pm 0,98$; overrun $8,88\% \pm 0,99$; daya leleh $10,01 \text{ ml/menit} \pm 0,60$; dan vitamin C $34,23 \text{ mg} \pm 1,76$. Secara hedonik velva BJ4 disukai panelis yang mempunyai warna kuning, beraroma jeruk, berasa jeruk, dan tekstur lembut.

Kata kunci: bengkuang, jeruk manis, sensori, velva

Introduction

Indonesia is a tropical country with abundant agricultural resources. Geographical conditions and tropical climate are two main factors contributing to the growth of agricultural products such as tubers, fruits, and vegetables. Jicama is a type of tuber that has been cultivated in various regions of Indonesia. According to Statistics Indonesia (2020), the production of Jicama in Indonesia in 2019 was 31,101.10 tons.

Jicama (*Pachyrhizus erosus*) is one of the tubers that has been cultivated in various regions in Indonesia. Jicama has pale yellow skin and thick white flesh. According to Mahmud et al. (2018), 100 g of Jicama

contains 85.1 g of water, 12.8 g of carbohydrates, 1.4 g of protein, and 20 mg of Vitamin C, which also contains inulin. This prebiotic fiber has benefits for the body. Inulin fiber has water-binding properties, making it suitable for processing into frozen desserts because it can produce products with a soft texture and increase resistance to the melting rate (Sylvi et al., 2020). Anwar et al., (2021) reported that Jicama contained fiber at a preceivable amount (8.23%); this fiber can improve the functional properties of velva produced. Product diversification is needed to produce derivative products with higher product selling value. Research on Jicama as a raw material in various food products has been conducted, including making jelly candy (Attahmid et al., 2020) and making chips (Ega, 2017). One of the frozen desserts that can be made from Jicama is velva.

Velva is a frozen food generally made from fruit puree, sugar, and stabilizers (Woodroof dan Luh, 2012). velva has fiber and vitamin content derived from fruits as the primary raw material for making velva. According to Waliyurahman et al. (2019), velva from Jicama has a white color and a slightly bland taste. The Jicama velva with 0.5% carboxymethyl cellulose as stabilizer has an overrun of 15.27%, melting rate of 16.49%, total solids of 22.83%, and has taste that is less preferred by panelists, there fore the addition of other fruits is needed to improve the velva flavor. One of the fruits that can be used is Sweet Orange.

Sweet Oranges have many types based on their production location, such as Pontianak oranges, grapefruit, and Berastagi oranges. One of the Sweet Oranges widely consumed by the public is Berastagi Sweet Oranges. According to the North Sumatra Central Statistics Agency (2022), the most significant production of Berastagi oranges in 2021 was in Karo Regency, North Sumatra, at 244,889.5 tons. Sweet Orange (*Citrus sinensis*) contains carotenoid pigments that produce yellow citric acid and sugar, giving citrus a distinctive aroma and taste (Ulya et al., 2019). According to Mahmud et al. (2018), Sweet Oranges per 100 g of material contain 87.2 g of water, 11.2 g of carbohydrates, 0.9 g of protein, and 49 mg of vitamin C. Sweet Oranges are grouped into many types based on their production location, one of which is *Berastagi* Sweet Orange. According to Statistics Indonesia (2022), the most prominent North Sumatra *Berastagi* orange production came from Karo Regency in 2021, as much as 244,889.5 tons.

Several researchers have studied the addition of orange juice to frozen desserts. Ulya et al. (2019) have studied the addition of 40% orange juice with carboxymethyl cellulose stabilizer in carrot velva, giving an overrun value of 13.18%, melting rate of 5.18 ml/min, and vitamin C content of 39.6 mg/100g. According to Chodijah et al. (2019), carrot and *Kasturi* orange ice cream with a ratio of 70% carrot juice and 30% *Kasturi* orange juice produced an overrun of 20.41%, melting rate of 8.07 ml/min, and had a yellowish color and citrus aroma that the panelists liked. Jicama is suitable for velva production, however, it has less flavor, and thus needs other ingredients to improve the taste and aroma. Therefore, this study aims to assess the physicochemical and sensory characteristics of Jicama puree and Sweet Orange juice in velva making.

Material and method

The material used to produce velva was Jicama (*Pachyrhizus erosus*) with yellow-brown peel with a diameter of 8–13 cm; and yellow *Berastagi* Sweet Oranges (*Citrus sinensis*) with a diameter of 4–7 cm, sugar (*Gulaku*) and carboxymethyl cellulose (*koepoe-koepoe*). The chemicals used for analysis were distilled water, 1% amylum, 0.01N iodine (Merck), 1.25% H₂SO₄ (Merck), 1.25% NaOH (Merck), and 10% K₂SO₄ (Merck).

The treatment in the study was the ratio of puree Jicama and Sweet Orange juice, namely BJ1 (70:30); BJ2 (60:40); BJ3 (50:50); BJ4 (40:60); and BJ5 (30:70). Each treatment was carried out four times to obtain 20 experimental units. The data obtained were analyzed statistically using analysis of variance and Duncan New Multiple Range Test at a 5% level. The statistical program IBM®SPSS® version 26.0 was used to examine the data.

The research consisted of several stages: producing Jicama puree, Sweet Orange juice, and velva. The first step of making Jicama puree was to select Jicama based on wholesomeness. Jicama was then washed,

split into two parts, peeled, and cut into small pieces. The Jicama puree was prepared by mixing Jicama and water in a ratio of 1:1 and then mashed in a blender for ± 3 minutes. Sweet Orange juice was made as follows: Sweet Orange fruits were sorted and washed, then squeezed using an orange squeezer until orange juice was obtained, then filtered.

The production of velva. The Jicama puree and Sweet Orange juice were weighed according to the treatment. The sugar 30% and CMC 0.50% were then added. The dough was stirred using a mixer for 15 minutes until homogeneous. The velva dough that had been homogenized was then allowed to stand for 1 hour in a refrigerator at a temperature of 4°C. Velva was put into an ice cream maker for 30 minutes, then velva was packaged in cups and stored in a freezer (-18°C) for 24 hours (Djali et al., 2015).

Parameters of observation

a. Total crude fiber

Analysis of total crude fiber refers to Indhayu et al. (2023). Samples as much as ± 10 g were put into a 500 ml Erlenmeyer. 1.25% H_2SO_4 solution of 200 ml was added to the Erlenmeyer and then boiled on a hot plate for 30 minutes. The Erlenmeyer was shaken to remove the sample stick to the Erlenmeyer wall. Sample in the Erlenmeyer was filtered using filter paper until the residue was obtained. The filter paper containing the residue was rinsed with 50 ml of hot water three times. The residue was transferred into an Erlenmeyer, and then 200 ml of 1.25% NaOH was added and boiled on a hot plate for 30 minutes. The residue was filtered again with dry filter paper of known weight. The filter paper containing the residue was rinsed three times with 50 ml of hot water, then rinsed again with 10 ml of 10% K_2SO_4 solution and 25 ml of 95% alcohol. The residue was then placed in an oven for 3 hours at 105°C, cooled in a desiccator for 15 minutes, and weighed. This drying was repeated until a constant weight was obtained. This formula was used to calculate crude fiber content :

$$\text{Crude Fiber (\%)} = \frac{W_1 - W_2}{W_0} \times 100$$

Where:

W_0 = initial weight of the sample (g)

W_1 = weight of the sample after acid and alkali treatments (g)

W_2 = weight of the ash residue after ashing (g)

b. Total dissolve solids

Determining total velva solids refers to Putri et al. (2021). Porcelain cups were cleaned and dried in an oven at 105°C for 1 hour. The porcelain cup was cooled in a desiccator for 15 minutes and weighed. Velva samples as much as ± 5 g were placed in a porcelain cup. The sample in the porcelain cup was then dried in an oven at 105°C for 3 hours, then cooled in a desiccator for 15 minutes and weighed. This drying was repeated until a constant weight was obtained. The remaining sample is then calculated as total solids and the weight lost as water content. The calculation of water content using the formula :

$$\text{Total dissolve solid(\%)} = 100\% - \left(\frac{W_2 - W_1}{W_1} \times 100 \right)$$

Where:

W_2 = weight of final sample

W_1 = weight of the initial sample

c. Overrun

Determining the overrun of velva refers to Goof dan Hartel (2013). Velva sample (100 g) was shaken using a mixer for 15 minutes. Then the height was measured, and after being processed in an ice cream maker, the height was measured again using a ruler. Overrun can be calculated using the formula:

$$\text{Overrun(\%)} = \frac{V_2 - V_1}{V_1} \times 100$$

Where:

V_2 = volume after mixing

V_1 = volume before mixing

d. Melting rate

Velva which had been frozen for 24 hours was removed and placed in a cup or plastic cup as much as ± 10 g. The plastic cup containing the velva was then placed at room temperature ($\pm 30^\circ\text{C}$). Velva melting speed was calculated with a stopwatch. The time required for the velva to melt entirely into puree or porridge at room temperature is counted for the melting rate of the velva (Rahmasari et al., 2019).

e. Analysis of vitamin C

Vitamin C determination refers to Putri et al. (2021). Samples of ± 10 ml were put into a 100 ml volumetric flask, then distilled water was added to make up the volume. The sample in the volumetric flask was stirred until homogeneous, then a 25 ml sample was pipetted from the volumetric flask and poured into an Erlenmeyer. Amylum (1%) solution was added to the Erlenmeyer as much as 1-2 drops. Erlenmeyer containing the sample was titrated with 0.01 N iodine until a purple-blue color appeared that did not disappear for 10 seconds. Each ml of iodine is equivalent to 0.88 mg of ascorbic acid, so the formula can calculate the vitamin C content of the sample:

$$\text{Vitamin C (mg)} = \frac{\text{Iodine solution volume} \times \text{vitamin C molecular weight}}{\text{sample weight}}$$

f. Sensory evaluation

Evaluation conducted according to Setyaningsih et al. (2010) designed a four-point descriptive and five-point hedonic rating system for the sensory evaluation of velva Jicama puree and Sweet Orange juice. Thirty panelists were semi-trained in descriptive sensory qualities (color, aroma, flavor, and texture). Eighty participants rated color, aroma, flavor, texture, and general acceptability for hedonic analysis.

Sensory assessment of velva Jicama puree and Sweet Orange juice refers to Setyaningsih et al. (2010). The panelists for the descriptive test consisted of 30 people who had passed the sensory evaluation course, and the hedonic test used 80 untrained panelists. The descriptive test was aimed to determine the characteristics of the ratio of yam bean velva with Sweet Orange in each treatment against the attributes of color, aroma, taste, and texture. Whereas the hedonic test was meant to determine the level of panelist preference, which includes color, aroma, taste, and overall assessment, with a range of assessments ranging from very like to dislike immensely.

The sensory assessment was carried out by presenting velva samples of ± 15 g according to treatment and served in plastic cups that had been given random number codes. Each panelist was asked to assess the color, aroma, texture, and taste of the velva for the quality attributes of the descriptive and overall hedonic tests. Panelists were asked to assess the color, aroma, texture, and taste for the quality attributes of the descriptive test and the hedonic test on the questionnaire sheet that had been provided.

Analysis data

Data obtained from the observation results were analyzed statistically using analysis of variance (ANOVA). When the value of counted F was equal or higher compared to the value of F Table, then further testing was carried out using the Duncan Multiple Range Test (DMRT) at the 5% level using the Statistical Program for Social Science (SPSS) software to determine the differences among treatments.

Result and discussion

Physico-chemical characteristics

Figure 1 shows that, based on statistical analysis, the crude fiber content in Jicama and Sweet Orange Velva exhibited a significant decrease with a reduction in the proportion of Jicama puree and an increase in the proportion of Sweet Orange juice. The average crude fiber content ranged from $2.15\% \pm 0.12$ to $3.23\% \pm 0.46$, indicating a notable inverse relationship between using Jicama puree and incorporating Sweet Orange juice in the formulation. This range reflects the varying contributions of Jicama and Sweet Orange juice to the overall crude fiber content, with higher levels of Jicama puree associated with increased crude fiber. In comparison, higher levels of Sweet Orange juice correspond to lower crude fiber content, thereby highlighting the importance of ingredient ratios in optimizing the nutrition profile of velva. The differences in the crude fiber content of each raw material are thought to have caused differences in the crude content of the velva produced. The crude fiber content of Jicama puree was higher than that of Sweet Orange. The fiber content of Jicama puree was 4.15%, while that of orange juice was 0.25%. According to Violalita et al. (2019), the fiber content of Jicama was 4.46%. Otherwise, Kristiandi et al. (2021) state that the fiber in *Siamese* orange juice is 0.3%. According to Dewanti (2013), regarding the addition of Jicama to ice cream, it was found that the higher the amount of Jicama added, the higher the fiber content in the ice cream. The ice cream has a low overrun and a dense texture, thus reducing the panelists' preference.

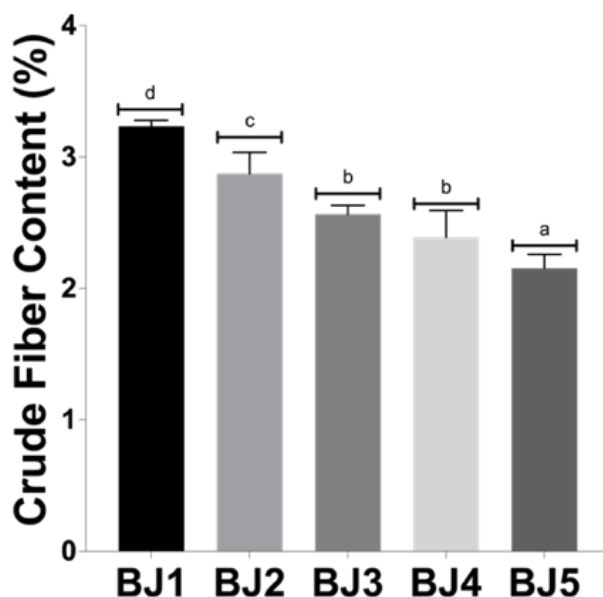


Figure 1. Crude fiber content of velva

^{abcd} Different superscripts are significantly different ($P < 0.05$). The ratio of Jicama puree and Sweet Orange juice: BJ1 (70:30); BJ2 (60:40); BJ3 (50:50); BJ4 (40:60); BJ5 (30:70).

Carboxymethyl cellulose (CMC) is a stabilizing agent that influences fiber content during Velva production. In this study, the addition of CMC was maintained at a constant level of 0.5%. Waliyurahman et al. (2019) state that incorporating CMC into velva can enhance the crude fiber content by binding various components within the material. This binding phenomenon occurs due to the ability of CMC to form hydrogen bonds with hydroxyl groups present in cellulose and other polysaccharides, forming a more stable matrix that retains water and nutrients. Furthermore, CMC comprises cellulose molecules that contribute to the overall fiber content of the material (Safitri et al., 2017). The enhanced viscosity imparted by CMC can also improve the texture of velva, rendering it creamier and more palatable while facilitating the incorporation and dispersion of other ingredients. The average crude fiber content of this velva is 2.15–3.23%. The results of crude fiber content are lower when compared to Jicama and eggplant velva in the

research of Sylvi et al. (2020), which amounted to 4.10%. Based on the analysis of raw materials, Sweet Orange juice has a fiber content of 0.3%, while the research of Sylvi et al. (2020) used eggplant with 3% fiber content.

Figure 2 shows that the total Jicama and Orange Velve solids produced ranged from 33.27–36.35%. BJ1 treatment was not significantly different from BJ2 but significantly different from BJ3, BJ4, and BJ5. The total solids content of the produced velve decreases as the quantity of Jicama puree is reduced and the quantity of Sweet Orange juice increases. The Jicama puree contains higher total solids than the total solids of Sweet Orange juice. Based on the raw materials analysis, the total solids of Jicama pulp was 12.82%, and orange juice was 10.04%. This data aligns with Mahmud et al. (2018). The total solids in Jicama amounted to 14.90%, and orange solids amounted to 12.8%.

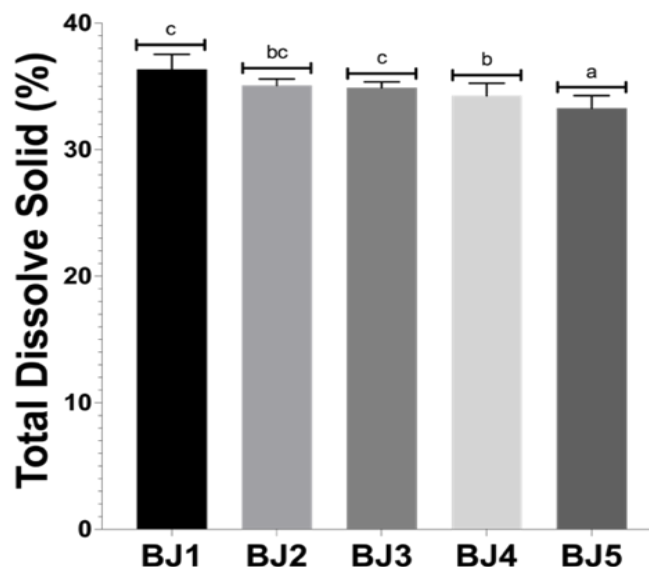


Figure 2. The total dissolved solids of velve

^{abcd}Different superscripts are significantly different ($P < 0.05$). The ratio of Jicama puree and Sweet Orange juice: BJ1 (70:30); BJ2 (60:40); BJ3 (50:50); BJ4 (40:60); BJ5 (30:70).

The total dissolved solids content in Jicama and Sweet Orange velve is influenced by its constituent components, including carbohydrates, proteins, fats, vitamins, and minerals (Astuti and Rustanti 2014). Crude fiber enhances the product's health benefits as a prebiotic for gut microbiota (Sunarti, 2017). Furthermore, integrating these components significantly affects the physicochemical characteristics, such as viscosity and texture, which influence sensory attributes like mouthfeel and flavor acceptance among consumers. According to Juraini et al. (2020), velve from Nipah fruit and sweet potato increased the fiber content in velve and the total dissolved solids.

The total dissolved solids in this study were higher than the research of Mega et al. (2019) about Jicama velve with the addition of *kecombrang* flower juice (*Etlingera elatior*), which ranged from 25.7–30.83%. The difference in total dissolved solids obtained was due to this study using orange juice with a total dissolved solid of 10.04%. In comparison, the research of Mega et al. (2019) used *kecombrang* flower juice with a total dissolved solid of 9.64%. The use of sugar and stabilizers can also increase total dissolved solids in velve. According to Maria and Zubaidah (2014), the more sucrose and CMC are added, the higher the total solids of velve are produced. The total solids produced can affect the overrun, melting rate, and texture of the velve. According to Juraini et al. (2020), high total dissolved solids has caused thicker velve and an increasing the melting rate of the velve. Thicker velve dough causes (overrun) to decrease because air makes it difficult to enter the velve, and consequently the velve will be difficult to expand (Arbuckle, 2000). The total dissolved solids of velve meet standards according to SNI No. 01-3713-1995, which has a minimum content of 3.4%.

Overrun is the development of velva volume due to air entering or trapped in velva dough due to the stirring process when cooling in an ice cream maker. Figure 3 shows that based on statistical analysis, the overrun of Jicama and Orange Velva increased with the decrease in the use of Jicama puree and the increase in the use of Sweet Orange juice. The overrun of Jicama and Sweet Orange Velva ranged from 6.57–10.53%.

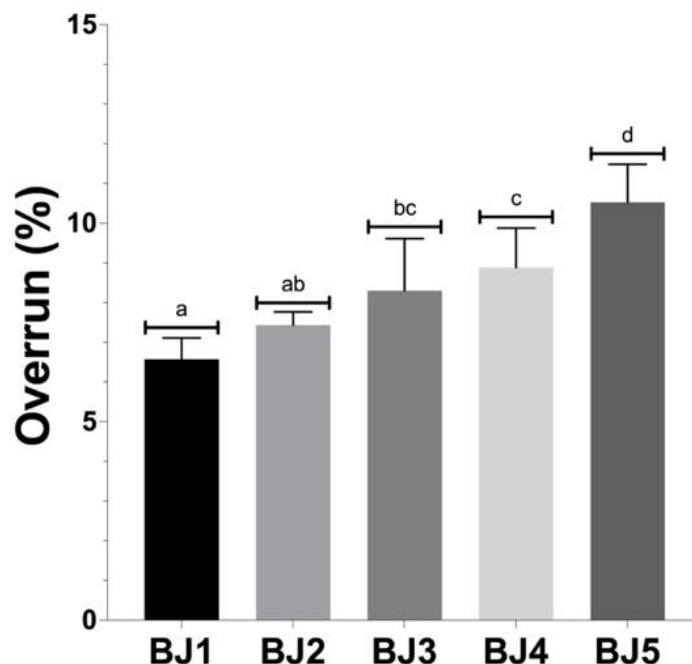


Figure 3. Overrun of velva

^{abcd} Different superscripts are significantly different ($P < 0.05$). The ratio of Jicama puree and Sweet Orange juice: BJ1 (70:30); BJ2 (60:40); BJ3 (50:50); BJ4 (40:60); BJ5 (30:70).

The overrun in velva is significantly influenced by the total dissolved solids and crude fiber content in the raw materials. The total dissolved solids of Jicama are 14.9%, which is higher than the total dissolved solids of Sweet Oranges, 12.8% (Mahmud et al., 2018). In conclusion, the higher total dissolved solids content in Jicama compared to Sweet Oranges indicates that Jicama may contribute more significantly to the overrun in velva, affecting the final product's texture and overall quality. Jalukhu et al. (2021) found that elevated levels of total dissolved solids result in a thicker dough with a denser particle arrangement, leading to reduced air penetration and lower dough development compared to the present study. According to a study by Juraini et al. (2020), the dough's viscosity is elevated, resulting in increased surface tension.

Consequently, it becomes challenging for air to enter the surface of the velva dough. The mean excess of this velva is 6.57–10.53%. The overrun seen in this study is lower compared to the carrot and Orange Velva investigated by Ulya et al. (2019), which ranged from 7.98–13.18%. The variation can be attributed to disparities in the total solids of the source components. Chodijah et al. (2019) found a positive correlation between the total dissolved solids in the raw material and the overrun of velva produced.

Melting rate is the ability to melt velva at room temperature within a specific time. Figure 4 shows that the melting rate of velva decreased with a decreasing amount of Jicama puree and an increasing amount of Sweet Orange juice. Velva melting rate is influenced by overrun and crude fiber content in velva. The higher the overrun, the slower the velva will melt. According to Juraini et al. (2020), velva with high overrun indicates the number of air bubbles entering the dough during agitation.

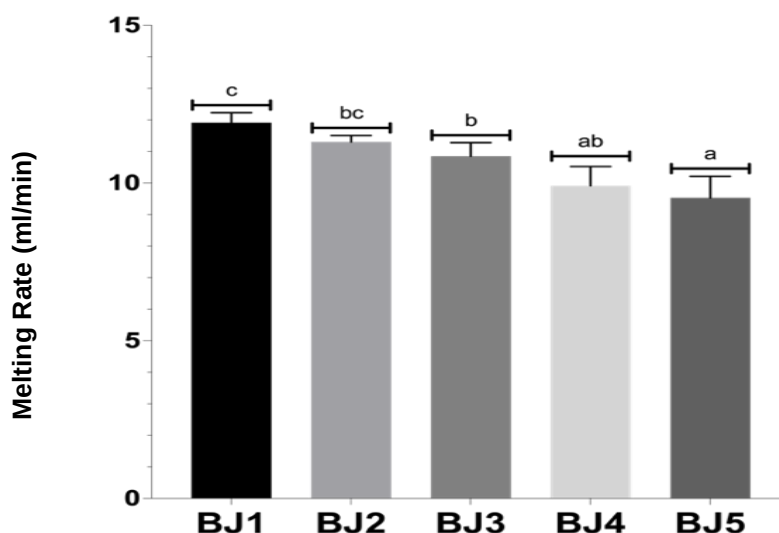


Figure 4. The melting rate of velva

^{abcd}Different superscripts are significantly different ($P < 0.05$). The ratio of Jicama puree and Sweet Orange juice: BJ1 (70:30); BJ2 (60:40); BJ3 (50:50); BJ4 (40:60); BJ5 (30:70).

Crude fiber content also affects the melting rate of the velva. The presence of crude fiber in the Jicama puree may improve the total amount of solids in the velva dough, increasing its viscosity. Due to its increased thickness, a denser dough will result in a lower freezing point and a more prolonged melting process (Satrio et al., 2018). The average melting rate of this velva ranged from 9.41 to 12.01 ml/minute. This melting rate is lower than that of Jicama velva with CMC stabilizer in the study of Waliyurahman et al. (2019), which was in the range of 13.44–18.52 ml/minute. This difference is due to differences in overrun and crude fiber content in the raw materials used. Arbuckle (2000) states, that high fiber content causes higher than the total solids in the current study. High total solids cause the dough to be thicker so that the overrun is low and the melting rate of velva is increased.

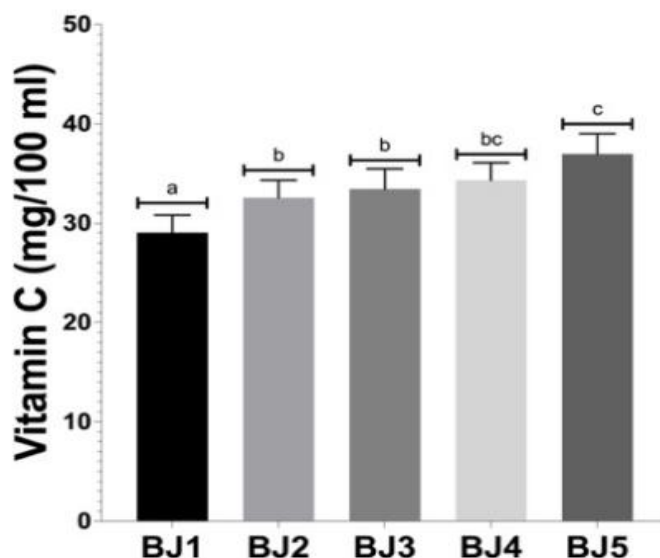


Figure 5. Vitamin C of velva

^{abcd}Different superscripts are significantly different ($P < 0.05$). The ratio of Jicama puree and Sweet Orange juice: BJ1 (70:30); BJ2 (60:40); BJ3 (50:50); BJ4 (40:60); BJ5 (30:70).

The ratio of Jicama and Sweet Orange significantly affects the vitamin C of the velva. The results showed that the ratio of Jicama to Sweet Orange juice significantly influenced the vitamin C content of velva, indicating that an increase in the proportion of Sweet Orange juice enhances the nutritional value of the

final product. This finding is of particular significance for consumers seeking to improve their health and for manufacturers aiming to enhance their products' quality and nutritional value. Based on the analysis, Jicama fruit has vitamin C 25.9 mg/100g, while Sweet Orange has 43.29 mg/100g. The data align with Mahmud et al. (2018), vitamin C of Jicama 20 mg and vitamin C Sweet Orange 49 mg. The average vitamin C in this study ranged from 29.04 to 36.96 mg/100g. Alfadila et al. (2020) reported that soybean juice contained about 40 mg/100g of vitamin C, while this study used Jicama with about 20 mg/100g.

Sensory characteristics

The results of the sensory assessment of the color, aroma, taste, and texture attributes of the combination of Jicama and Sweet Orange fruit descriptively and hedonically are shown in Figure 6.

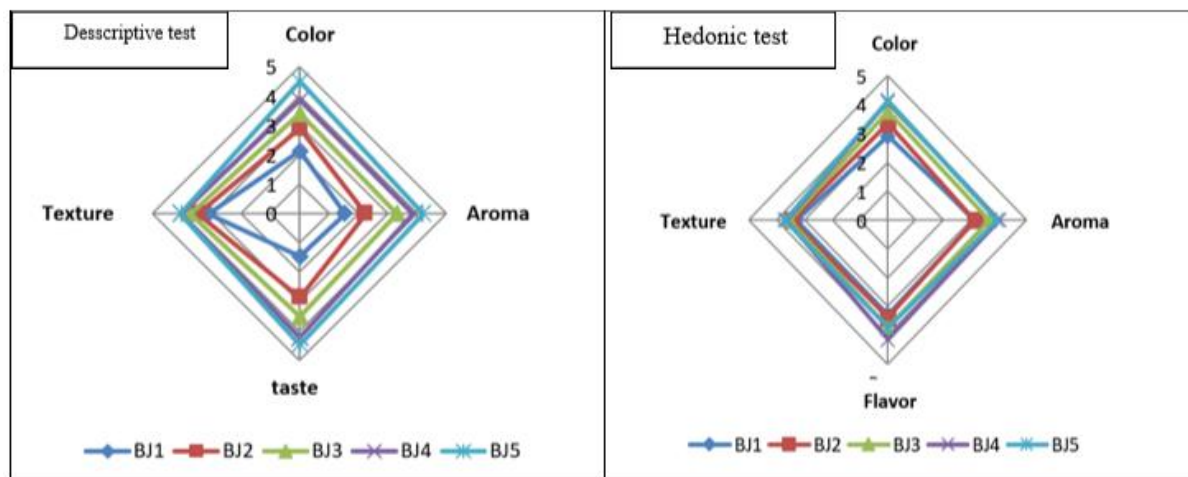


Figure 6. The assessment of the sensory attributes of velva

Color descriptive score : 1. white; 2. yellowish white; 3. slightly yellow; 4. yellow; 5. very yellow.

Aroma descriptive score : 1. Pomelo-scented; 2. Somewhat pomelo-scented; 3. Pomelo and orange-scented; 4. Orange-scented; 5. Very orange-scented.

Taste descriptive score : 1. Pomelo flavored; 2. Somewhat pomelo flavored; 3. Pomelo and orange flavored; 4. Orange flavored; 5. Very orange-flavored.

Texture descriptive score : 1. rough; 2. somewhat rough; 3. somewhat soft; 4. soft; 5. very soft.

Hedonic score : 1. strongly dislike; 2. dislike; 3. somewhat like; 4. like; 5. very like.

The ratio of Jicama puree and Sweet Orange juice: BJ1 (70:30); BJ2 (60:40); BJ3 (50:50); BJ4 (40:60); BJ5 (30:70)

Color

The color of velva in each treatment is significantly different. The average score of descriptive assessment by panelists ranged from 2.13–4.50 (yellowish white to very yellow). More Sweet Orange fruit resulted in a more yellow velva color due to the presence of yellow Sweet Orange color in the form of carotenoid pigments. Jayanti (2023) stated that the beta carotene content in Sweet Orange is 27.28 mg/100 mL. According to Alfadila et al. (2020), the higher the addition of Sweet Orange produces bright yellow ice cream.

The average hedonic panelist assessment of velva color ranged from 2.91–4.15 (somewhat like to like). The higher the addition of Sweet Orange, the more the panelists liked the color. Panelists preferred yellow velva products because they looked more attractive than other products. Alfadila et al. (2020) stated that yellow is more preferred than white in soy ice cream with the addition of orange. The appearance of Jicama and Sweet Orange velva is shown in Figure 7.

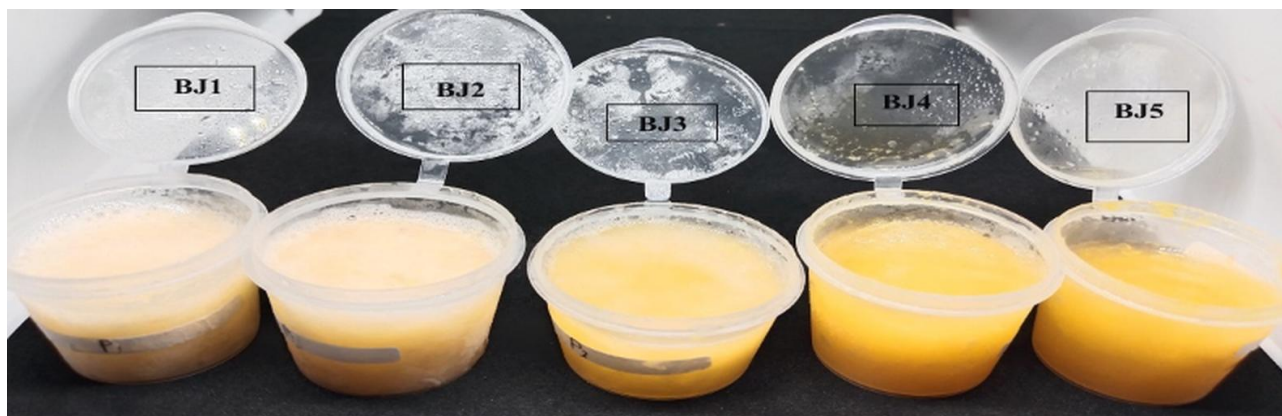


Figure 7. Appearance of Jicama and Sweet Orange velva

The ratio of Jicama puree and Sweet Orange juice: BJ1 (70:30); BJ2 (60:40); BJ3 (50:50); BJ4 (40:60); BJ5 (30:70)

Figure 6 shows the results of the descriptive assessment of velva aroma ranging from 1.53–4.2 (slightly aromatic to orange flavored). The aroma of velva is influenced by the raw materials used. The lower the amount of Jicama and the increasing amount of Sweet Orange used, the velva will have more citrusy aroma. The aroma of orange is more dominant than the aroma of Jicama. According to Handayani and Retno (2021), Sweet Orange has d-limonene, hexanal, ocinal, decanal compounds, which are part of essential oils that play a role in producing a distinctive aroma in oranges. These essential oils can be extracted from the rind, pulp, and leaves (Jayanti, 2023).

The average hedonic assessment of velva aroma ranged from 3.17–4.01 (somewhat like to like). The difference in the amount of Jicama puree and Sweet Orange juice resulted in different aroma in each treatment. It affected the panelists preference for the aroma of velva produced. The lesser amount of Jicama and the higher amount of Sweet Orange used, the more the panelists liked the aroma produced. Panelists prefer citrus-scented velva. Chodijah et al. (2019) state that with the increasing number of *Kasturi* oranges used, the aroma of ice cream is more citrus-scented and favored by panelists.

The mean range of descriptive taste assessment scores of panelists on velva was 1.46–4.46 (Jicama flavored to orange flavored). The results showed that the lower the use of Jicama and the higher the Sweet Orange, the more orange-flavored the velva. Jicama has a sweet taste due to its oligosaccharide content, namely inulin. Inulin is a natural polymer of carbohydrates composed of fructose monomeric bonds that give sweetness to Jicama (Sylvi et al., 2020), while Sweet Orange contains glucose and citric acid, which give a sweet and sour taste to velva. According to Alfadila et al. (2021), Sweet Orange juice per 100 ml contained 7.57 g of sugar and 1.22 g of citric acid. In addition, the flavor of velva is influenced by the addition of sugar during the velva-making process.

The mean hedonic assessment of velva flavor ranged from 3.28–4.14 (somewhat like to like). Based on the hedonic test analysis, BJ5 treatment was not significantly different from BJ3 but significantly different from BJ4. The BJ5 treatment had a lower taste rating than the BJ4 treatment. It is suspected that the BJ5 treatment had too sweet taste, thus reducing the panelists liking.

The mean range of descriptive texture assessment by panelists on velva ranged from 3.10–4.06 (slightly soft to soft). These results showed that the lower the use of Jicama and the higher the Sweet Orange, resulted in softer texture. The velva texture is influenced by overrun and total solids in velva. The more Jicama, the higher the total solids, which caused the dough thicker, the air was difficult to enter the dough, and the dough is difficult to expand, as a result the texture of the velva was rough. Sylvi et al. (2020) state that the higher the total solids, the rougher the Jicama and eggplant velva texture.

The velva overrun also influences velva texture. According to Wulandari et al. (2014), a high overrun indicates that there are many air cavities in the velva so that when touched, it gives a soft texture, while a low overrun has few air cavities so that the velva is denser and rougher. In addition, the texture of velva is

influenced by the concentration of CMC used (Anira et al., 2019). According to Waliyurahman et al. (2019), CMC in velva can bind water and produce tiny ice crystals, resulting in a soft texture.

The average hedonic assessment of velva texture ranged from 3.29–to 3.71 (somewhat like to like). The level of liking of panelists increased with a decreasing amount of Jicama and an increasing amount of Sweet Orange. Sylvi et al. (2020), in their reseach on Jicama and eggplant velva, found that the higher the addition of eggplant gives a slightly rough texture, thus reducing the panelists assessment.

The overall assessment score of velva ranged from 3.13–3.83 (somewhat like to like) (Figure 8). The highest overall assessment of velva was produced by treatment BJ4, namely the ratio of Jicama and Sweet Orange (40:60%) with velva favored by panelists, which was significantly different from each treatment. The difference in assessment scores was due to differences in the amount of Jicama and Sweet Orange.

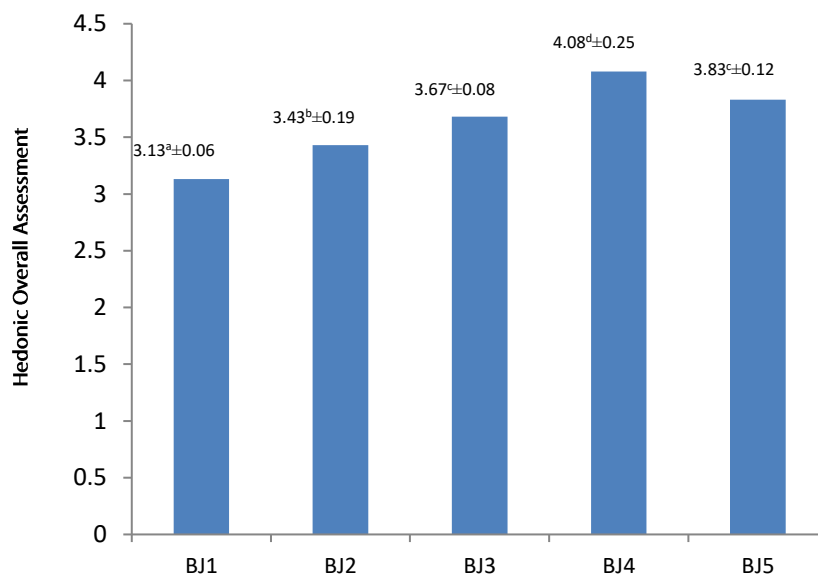


Figure 8. Hedonic overall assessment of Jicama and Sweet Orange velva

^{abcd} Different superscripts are significantly different ($P < 0.05$) The ratio of Jicama puree and Sweet Orange juice: BJ1 (70:30); BJ2 (60:40); BJ3 (50:50); BJ4 (40:60); BJ5 (30:70). Overall hedonic score: 1: strongly dislike; 2: dislike; 3: somewhat like; 4: like; 5: strongly like.

The combination of sensory attributes appearance, felt, touched, and smelled, including color, aroma, taste, and texture-became the overall velva assessment. Overall, the panelists velva ratings ranged from 3.13 to 4.08 (somewhat like to like). The level of liking for the sensory attributes of a product is relative, therefore, the difference in liking and disliking depends on the liking of each panelists treatment (Lamban et al., 2015).

Based on the physicochemical analysis and sensory assessment of velva, the best treatment was BJ4 (40:60). The selection of BJ4 as the selected treatment emphasized the sensory characteristics of the velva produced, namely based on the highest hedonic sensory characteristics. BJ4 treatment velva had a descriptive yellow color, orange aroma, orange taste, and soft texture. In addition, the BJ4 treatment had a crude fiber content of 2.39%, an overrun of 8.88%, a melting rate of 10.01 ml/minute, and vitamin C of 36.96 mg.

Conclusion

The ratio of Jicama puree and Sweet Orange juice significantly affected the total solids, overrun, melting rate, vitamin C, crude fiber content, and descriptive and hedonic sensory assessments of color, aroma, taste, texture, and overall assessment. Based on the parameters tested, the selected treatment was the BJ4 treatment with the ratio of Jicama puree and Sweet Orange juice (40:60), which the panelists preferred. The BJ4 treatment had a crude fiber content of 2.39%, total solids of 34.26%, overrun of 8.88%, melting rate

of 10.01 ml/minute, and vitamin C of 34.32 mg/100 ml. The BJ4 treatment had a descriptive assessment of a yellow color, orange aroma, orange taste, and soft texture.

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