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PEMANFAATAN PISANG TANDUK *(Musa x paradisiaca L.)* DAN SIRSAK *(Annona muricate L.)* DALAM PEMBUATAN SELAI LEMBARAN SUMBER SERAT

[Utilization of Horn Plantain (Musa x paradisiaca L.) and Soursop (Annona muricate L.) in The of Making Fiber Source Sheeted Jam]

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ABSTRACT

Horn plantain and soursop are horticultural products of climacteric fruits that contain high nutrition and fiber, but have a relatively short shelf life after harvest. One solution so that both of them can still be consumed by maintaining their nutritional and fiber content is making sheeted jam. This study aims to determine the ratio of puree horn plantain and soursop, and to determine the ratio of carrageenan:konjac hydrocolloid and the concentration of hydrocolloid in the making of fiber source sheet jam. Initially, horn plantain and soursop were made into a puree (ratio of horn banana puree : soursop = 1:0, 3:1, 1:1, 1:3, and 0:1). The 1:3 ratio was chosen as the best ratio (fiber content of 5.82%) and was subsequently used in the determination of the hydrocolloid ratio of carrageenan: konjac (1:0, 1:1, and 1:2) and the concentration of hydrocolloid (1.0; 1.5; and 2%). A ratio of 1:1 with a concentration of 2% hydrocolloid produces the best sheeted jam based on dietary fiber content of 5.60%; syneresis 0.28%; pH 3.43-3.62; total dissolved solids (TDS) 33.73-34.87° Brix; hardness 671,74 g*; water 45.79%; ash 0.08%; fat 0.05%; protein 0.35%; carbohydrates (by difference) 53.73%; and still accepted by consumers with the overall hedonic value (4.91 on a scale of 7.00 [neutral]).*
Keywords: *fibre; hidrocoloid, jam; plantain; soursop*

ABSTRAK

Pisang tanduk dan sirsak merupakan produk hortikultura buah-buahan klimakterik yang mengandung gizi dan serat tingi, namun memiliki waktu simpan relatif singkat setelah panen. Salah satu solusi agar keduanya tetap dapat dikonsumsi dengan mempertahankan kandungan gizi dan seratnya adalah pembuatan selai lembaran. Penelitian ini bertujuan untuk menentukan rasio *puree* pisang tanduk dan sirsak, serta menentukan rasio hidrokoloid karagenan:*konjac* dan konsentasi hidrokoloid dalam pembuatan selai lembaran sumber serat. Awalnya, pisang tanduk dan sirsak dijadikan *puree* (rasio *puree* pisang tanduk:sirsak = 1:0, 3:1, 1:1, 1:3, dan 0:1). Rasio 1:3 terpilih sebagai rasio terbaik (kandungan serat 5,82%) dan selanjutnya digunakan dalam penentuan rasio hidrokoloid karagenan:*konjac* (1:0, 1:1, dan 1:2) serta konsentrasi hidrokoloid (1,0; 1,5; dan 2%). Rasio 1:1 dengan konsentrasi hidrokoloid 2% menghasilkan selai lembaran terbaik berdasarkan kandungan serat pangan sebesar 5,60%; sineresis 0,28%; pH 3,43-3,62; total padatan terlarut (TPT) 33,73-34,87°Brix; *hardness* 671,74 g; air 45,79%; abu 0,08%; lemak 0,05%; protein 0,35%; karbohidrat (*by difference*) 53,73%; dan masih diterima konsumen dengan nilai hedonik keseluruhan (4,91 dari skala 7,00 [netral]).
Kata kunci: hidrokoloid, pisang, serat, selai, sirsak

INTRODUCTION

Horn plantain (*Musa x paradisiaca* L.) is a tropical fruit of the plantain processed banana type with the AAB genome which contains higher fiber than other varieties, which is 2.3% (Musita, 2012 and Michaelsen *et al.*, 2009). Amankwah *et al.* (2011) adds that cooking plantain contains 62.5% water, 1.82% ash, 5.03% protein, 1.24% fat, 28.91% carbohydrates, 794.5 mg/100 g potassium, 33.10 mg/100 g sodium, 0.75mg/100g phosphorus, 0.71 mg/100 g iron, and 15.40 mg/100 g calcium. Another tropical fruit that contains high fibre content is soursop (*Annona muricate* L.), that is 3,3%. This much value can meet the daily needs of 13% (Yunianto *et al.*, 2014). According to Lim (2012), the nutritional content of soursop includes carbohydrates, vitamin C, vitamin B1, vitamin B2, and potassium. These two fruits contributed largely each year, however its handling so that it can be consumed in a long time is still limited. Therefore, a manufacturing process is needed in order to produce a food product from these two fruits with added value to the dietary fiber content.

The needs of modern society are increasingly leading to practicality of food consumption. Herman (2009); Mawarni and Sudarminto (2018) mentioned that jam in sheet form is a product that is similar to spread jam but is more practical to consume because the texture is not too soft and not too hard. Previous studies stated that the best ratio in making banana sheet jam and red dragon fruit and processing jackfruit and soursop jam is 1:1. (Herianto *et al.*, 2015; Wahyuni *et al.*, 2017). Therefore, this study used a banana and soursop ratio of 1:0, 3:1, 1:1, 1:3 and 0:1.

The characteristics of jam are also supported by the role of gelling agents (hydrocolloids). The research conducted by Putri *et al.* (2013) and Septiani *et al.* (2013), shows that making plantain and guava leaf jam using carrageenan produces sheet jam with high synergy, so it is advisable to add other hydrocolloids such as konjac. Parnanto *et al*. (2016) and Savary *et al*. (2009) said that carrageenan produces a hard but brittle gel texture so that it potential for syneresis; whereas konjac is able to bind water better so that it can reduce syneresis, but it needs the addition of other hydrocolloids because konjac cannot form a single gel. The research conducted by Ellya *et al.* (2006) and Kaya *et al.* (2015) shows that the best ratio of mixing carrageenan and konjac in gel formation is 1:1. Therefore, this research uses carrageenan and konjac with carrageenan:konjac ratio= 1:0, 1:1, and 1:2.

Apple and star fruit jam making by Mawarni and Sudarminto (2018) and Septiani *et al.,* (2013) showed that the optimum carrageenan concentrations were 2.0% and 1.5%, respectively; Meanwhile, according to Imeson (2010), the addition of konjac in food is carried out at a concentration of 1-5%. Therefore, the research used a hydrocolloid concentration of 1.0; 1.5, and 2%.

The objective of this research was to determine the ratio of puree banana and soursop (1:0, 3:1, 1:1, 1:3, and 0:1), and to determine the ratio of hydrocolloid carrageenan: konjac (1:0, 1:1, and 1:2) and hydrocolloid concentrations (1.0; 1.5; and 2%) in the manufacture of fiber source sheet jam based on aspects of dietary fiber content, syneresis, and hedonic value.

MATERIALS AND METHODS

Materials and Equipments

Main materials: horn plantain, ripe soursop (the ripe criteria are not dense spines on the soursop), water, citric acid, sucrose, kappa carrageenan, and konjac. Analysis materials: distilled water, standard buffer pH 4 and 7, K_2SO_4, H_2SO_4 96%, H_2O_2 35%, boric acid 4%, mix indicator, NaOH 35%, HCl 0.56 N, NaOH 5%, HCl 5%, ethanol 78 % and 95%, hexane, α-amylase, protease, D-glucose, PP.

Equipments: blender, 500 ml beaker, 20x10 cm pan, spectrophotometer, hand refractometer, XT Plus texture analyzer, chromameter, fume hood, oven, desiccator, ashes and evaporation dishes, pH meter, soxhlet, kiln, burette, kjeldahl analytical scales, and chromatogram.

Research Method

The research consisted of the preparation stage, stage I and stage II. At the preparation stage, the cooking process is carried out by preparing the horn plantain and soursop puree. The horn plantain are separated between the skin and the pulp, blanched (90°C, 6 minutes reduced in size with a knife, mash (blender; fruit:water = 1:1 w/v) until a cooking plantain puree is produced (Putri *et al.,* 2013; Tapre and Rakesh, 2016 with modifications). Soursop fruit is separated between the skin and pulp, reduced in size with a knife, blended (blender; fruit:water 1:1 w/v) (Budiman *et al.,* 2017 with modification). Proximate analysis was performed on each fruit puree (water, ash, protein, fat and carbohydrate).

Phase I research (Budiman *et al.,* 2017 and Putri *et al.,* 2013 with modifications) began by mixing the two fruit purees (the ratio of horn plantain puree : soursop = 1:0, 3:1, 1:1, 1:3, 0:1) and the best puree ratio was determined based on a proximate analysis of mixed fruit purees (water, ash, protein, fat, and carbohydrates). Phase II research (Septiani et al., 2013 with modifications) is done by adding carrageenan:konjac 1:0, 1:1, 1:2 as much as 1.0; 1.5; and 2.0%, 0.5% citric acid, 25% sucrose, and water in the puree selected in the study phase I, cooking (90°C, 10 minutes), moulding on a 20x10 cm baking sheet, temperature reduction (~25°C), cutting, and determining the best formulation based on the analysis of dietary fiber content, syneresis, pH, hardness, DST, proximate (water, ash, protein, fat, carbohydrate), and hedonic.

The experimental design of the first phase of research was a completely randomized design (CRD) with one factor (the ratio of horn plantain puree and soursop puree with 5 levels (1:0, 3:1, 1:1, 1:3, 0:1) and 3 replications. The second stage of the research was the two-factor CRD. The first factor (the ratio of carrageenan: konjac contains 3 levels (1:0, 1:1, 1:2). The second factor contains 3 levels (1.0%; 1.5%; 2%). Repetition is done 3 times.

Dietary Fiber Total (Mc Clary *et al.*, 2009)

Analysis of dietary fiber using the enzymatic gravimeric method. 1 gram sample was added 1 ml ethanol and 40 ml α-amylase. The mixture was incubated (37°C, 16 hours), inactivated α-amylase, cooled to 60°C, added 1 ml of protease, and incubated (60°C, 30 minutes). The sample was added 4 ml of 2M acetic acid. Determination of dietary fiber with large molecular weight (cellulose; resistant starch) by precipitation, filtration, washing, determination of protein and ash content. Determination of water soluble dietary fiber with small molecular weight through the process of filtrate recovery, deionization, LC analysis, D-glucose determination, chromatogram analysis. Dietary fiber total is determined by the formula:

$$\text{Dietary fiber total (\%)} = \frac{\left(\begin{array}{c}\text{Large molecule dietary fiber total +}\\ \text{small molecule water soluble dietary fiber}\end{array}\right)}{1000} \times 100\%$$

Titrated Acid Total (BSN, 2013)

A total of 10 g of puree was dissolved to 250 ml, then titrated with 0.1 M NaOH by adding 3-4 drops of phenolptalein indicator to the sample. The sample is titrated until it reaches a pink color. The acidity value as grams of acid/100 ml was calculated using a conversion factor.

Syneresis (Verawaty, 2008)

The sheet jam is placed in a container and stored (~25°C; 24 hours); the percentage of syneresis is calculated. The initial weight and final weight of the sample are weighed.

$$\text{Syneresis} = \frac{\text{early weight - final weight}}{\text{final weight}} \times 100\%$$

pH (AOAC, 2009)

1 gram sample was dissolved in 5 ml distilled water. pH analysis was performed after calibration. The results of pH analysis are obtained after the value shows a constanty.

Texture Analysis (Triwardahani, 2014)

The texture analyzer was set with a pre test speed setting of 2 mm/s, a test speed of 0.5 mm/s, and a post test speed of 5 mm/s. The probe used is a cylinder type. The sample is placed under the probe and texture (hardness) analysis is carried out in the three different parts of the sample.

Dissolved Solids Total Analysis (AOAC, 2009)

The refractometer prism is cleaned with alcohol and a tissue, the syrup sample is dropped to cover the prism surface. The refractometer is then closed and the DST value is observed which is shown in units of °Brix (solid/100 g sample).

Moisture Content Analysis (AOAC, 2009)

The analysis of moisture content is conducted using the oven method. A total of 5 grams of sample was put in a constant dish and dried in an oven for 3 hours (until constant weight) at 105°C. The moisture content is calculated by the following formula:

$$\text{Water content(\%)} = \frac{\text{early weight - final weight}}{\text{final weight}} \times 100\%$$

Protein Content (AOAC, 2009)

Protein content was analyzed using the Kjeldahl method. The 2 gram sample was put into 100 ml Kjeldahl flask, 7 grams of K_2SO_4 was added, 5 mg of selenium, 10 ml of 96% H_2SO_4, 35% H_2O_2. The sample was digested (420°C, 30 minutes) to a clear solution, allowed to stand at ~25°C. 25 ml of 4% boric acid and 3-4 drops of mix indicator are put into Erlenmeyer then distilled using 50 ml 35% NaOH. The sample was titrated with 0.2 N HCl until it was pink. Protein content is determined using the formula:

$$\text{Nitrogen content (\%N)} = \frac{\left(\begin{array}{c}\text{sample titration volume} - \\ \text{blanko titration volume}\end{array}\right) \text{x N HCl x 14 x 100\%}}{\text{sample weight}}$$

Protein (%) = %nitrogen x correction factor 6,25

Ash Content (AOAC, 2009)

A total of 2 grams of sample is put into the furnace at a temperature of 550-600°C. The sample is cooled in a desiccator, and weighed. The ash content is calculated using the formula:

$$\text{Ash content (\%)} = \frac{a-c}{b-c} \times 100\%$$

a = Weight of plate + sample after ashing
b = Weight of plate + sample before ashing
c = constant plate weight

Fat Content (AOAC, 2009)

The fat content is analyzed using the Soxhlet method. The 2 gram sample was wrapped in filter paper covered with cotton and then put into a Soxhlet containing hexane. Extraction was carried out for 5-6 hours. Put the fat extract in the oven (100-105°C, 1 hour). Fat content (%) is determined by the following formula:

[{(boiling flask weight + fat extract) – constant boiling flask weight} x100%]/sample weight

Carbohydrate Content (AOAC, 2009)

The carbohydrate content was analyzed using the by difference method with the formula:

carbohydrate content (%) =100% - (%water +%ash +%fat +%protein).

Hedonic Test (Graham *et al*., 2017)

The hedonic test analysis was performed by 70 semi-trained panelists. Samples are presented with a random number label. The hedonic assessment was carried out using the 7-point hedonic scale method (1=very dislike; 7= very like). The results are processed with SPSS.

RESULTS AND DISCUSSIONS

Sample Preparation Phase

The proximate yield of horn banana puree: moisture content of 81.84±0.30%; ash content of 0.02±0.02%; protein content of 0.46±0.02%; fat content of 0.81±0.03%; and 16.34±0.40% carbohydrates. According to Ojure and Quandri (2012), horn plantain flesh has a moisture content of 68.5%, 1.80% ash, 1.22% fat, 2.40% protein, and 29.2% carbohydrates.

The proximate yield of soursop puree is of the following: moisture content of 92.31±0.28%; ash content of 0.32±0.01%; protein content of 0.72±0.02%; fat content of 0.48±0.02%; 6.18±0.27% carbohydrates. According to Siquera *et al.* (2015), Morada soursop variety has 80.57% moisture content, 0.82% ash, 0.01% fat, 1.03% protein, and 12.14% carbohydrates. According to Ndife *et al.* (2014) and Abbo *et al.* (2006), the process of making puree causes a change in the percentage of nutritional components.

Phase I Methods

Anova one-way statistical analysis showed that the ratio of horn plantain puree to soursop puree affected the total dietary fiber of sheet jam ($p<0.05$). The more soursop puree, the greater the total dietary fiber value (Table 1). According to Michaelsen *et al.* (2009) and Siqueira *et al.* (2015), the dietary fiber content on soursop puree is of 3.72-5.76%, while that of horn plantain which is 2.3%. The ratio of 1:3 produces the highest total dietary fiber of 5.82±0.08%. BPOM (2016) determines that a food product is categorized as a source of dietary fiber if it meets 3 grams of dietary fiber.

Table 1. Phase I analysis results (dietary fiber total, pH, dissolved solids total, dan titrated acid total)

Horn Plantain Puree : Soursop Ratio	Dietary Fiber Total (%)	pH Value	DST (°Brix)	TAT (g citric acid/100 g)
1:0 (control)	3.99 ± 0.09ᵃ	4.65 ± 0.07ᵈ	11.90 ± 0.30ᵉ	0.28 ± 0.01ᵃ
3:1	4.41 ± 0.11ᵇ	4.61 ± 0.06ᶜ	11.52 ± 0.38ᵈ	0.31 ± 0.01ᵇ
1:1	4.58 ± 0.10ᶜ	4.46 ± 0.04ᵇ	11.04 ± 0.41ᶜ	0.35 ± 0.01ᶜ
1:3	5.82 ± 0.08ᵈ	4.32 ± 0.08ᵃ	10.32± 0.34ᵇ	0.38 ± 0.01ᵈ
0:1 (control)	6.00 ± 0.11ᵉ	4.05 ± 0.04ᵃ	9.50 ± 0.17ᵃ	0.45 ± 0.01ᵉ

Note: Different notations in the same column indicate significant differences (p<0.05)

Anova one-way statistical analysis showed that the ratio of horn plantain puree to soursop puree affected the pH value of sheet jam (p<0.05). The more soursop puree, the lower the pH value (Table 1). The pH value of soursop fruit was 3.52 and the pH value of the horn plantain fruit was 6 (Ndife *et al.,* 2014; Tsamo *et al.,* 2014). Ngoh *et al.* (2009) and Jimenez-Zurita *et al.* (2017) added that one of the organic acids in horn plantain is malic acid, while in soursop fruit is ascorbic acid.

Anova one-way statistical analysis showed the ratio of horn plantain puree to soursop puree affected the DST of sheet jam (p<0.05). Increasing the soursop puree further decreased the DST (Table 1). The carbohydrate content of horn plantain was 29.2%, while soursop was 16.83% (Ojure and Quadri, 2012; Abbo *et al.,* 2006).

Anova one-way statistical analysis showed that the ratio of horn plantain puree to soursop puree affected the acidity of the sheet jam (p<0.05). The more soursop puree, the more acidic the sheet jam increases (Table 1). The organic acid content is higher in soursop fruit than horn plantain. According to Chang *et al.* (2018), soursop has organic acids in the form of malic acid, citric acid, tartaric acid, and galacturonic acid, which dissociate in water to form acids.

Based on the analysis of dietary fiber total, pH, DST, and acidity, the puree ratio selected was 1:3. This ratio is able to produce the highest total dietary fiber (5.82±0.08%); the lowest pH value (4.32±0.09) which can prevent sugar crystallization, so that the characteristics of sheet jam are formed better; the total value of dissolved solids was 10.32±0.34 °Brix and the end point of the titration was 0.38±0.01 g citric acid/100 g.

Phase II Methods

Two-way Anova statistical analysis showed that the carrageenan-konjac ratio and the hydrocolloid concentration interacted to influence the total fiber sheet jam (p<0.05). Increasing the konjac ratio caused the decrease of total dietary fiber, and increasing the hydrocolloid concentration increased the total dietary fiber (Table 2). According to Chaidir (2006) and Wahjuningsih (2012), konjac contains less fiber (9-11%) than carrageenan (83.4%). Increased carrageenan or konjac can increase the total fiber in food products (Septiani *et al.,* 2013).

Two-way Anova statistical analysis showed that the carrageenan-konjac ratio and the hydrocolloid concentration interacted to influence the syneresis rate of sheet jam (p <0.05). The increase in the konjac ratio and the hydrocolloid concentration resulted in a lower syneresis rate of sheet jam (Table 2). Carrageenan and konjac are polysaccharide group carbohydrates that are able to bind water in the gel (Imeson, 2010). Carrageenan produces a tightly structured gel that allows water to be pushed out of the gel structure, while konjac in the ratio of carrageenan and konjac mixture can reduce the syneresis rate by forming a stronger double helix structure. Konjac can bind free water to the gel so that it holds water out of the gel structure (Kaya *et al.,* 2015 and Selviana, 2016).

Two-way Anova statistical analysis showed that the carrageenan-konjac ratio and the hydrocolloid concentration did not interact with each other to influence the pH of the sheet jam (p>0.05). The carrageenan-konjac ratio and the hydrocolloid concentration each affected the pH value (p<0.05). The more konjac, the higher the pH (Table 3). According to Nurlaela and Asrul (2011), konjac has a neutral pH (~7), so the addition of konjac increases the pH value. The increase in pH is also due to the OH-carrageenan group reacting with the H+ group of citric acid during the processing of sheet jam (Agustin and Widya, 2014).

Two-way Anova statistical analysis showed that the carrageenan-konjac ratio and the hydrocolloid concentration did not interact with each other to influence the DST of sheet jam (p>0.05). The carrageenan-konjac ratio did not affect DST (p>0.05), while the hydrocolloid concentration affected DST (p<0.05). Yuwono *et al.* (2013) stated that the more the number of hydrocolloids added, the more solid molecules dissolved in the mixture. Hydrocolloid macromolecules can trap water-soluble components in the mixture so that the DST increases.

Two-way Anova statistical analysis showed that the carrageenan-konjac ratio and the hydrocolloid concentration interacted with the hardness of the sheet jam (p<0.05). The greater the ratio of added konjac, the lower the hardness value, while the more hydrocolloid is added, the hardness value will increase (Table 2). Kaya et al. (2015) states that the gel produced by the addition of carrageenan has a stronger and more compact gel structure compared to the addition of the konjac ratio. According to Mawarni and Sudarminto (2018); Imeson (2010); and Willliams (2009); the addition of carrageenan concentration causes bonds between molecules in the gel so that the resulting texture is tighter and harder, while Konjac has an ester group that can interact with the carrageenan helical structure through hydrogen bonds so that the gelation process can occur.

Two-way Anova statistical analysis showed that the carrageenan-konjac ratio and the interacting hydrocolloid concentration influenced the hedonic value of sheet jam by 70 semi-trained panelists (p<0.05). Table 2 shows that the increasing ratio of konjac tends to increase the hedonic value, but increasing the concentration of hydrocolloid tends to decrease the hedonic value. All treatments resulted in a hedonic value above a neutral score (4) from the highest value of 7 (very like), so it can be said that the sheet jam is still acceptable to consumers based on taste, aroma, and texture.

Table 2. Phase II analysis results (dietary fiber, syneresis, *hardness*, dan general hedonic)

Carrageenan: Konjac Ratio	Hydrocolloid Concentration (%)	Dietary Fiber (%)	Syneresis (%)	Hardness (g)	General Hedonic
1 : 0	1.0	5.51 ± 0.13^{d}	0.66 ± 0.03^{g}	525.34 ± 46.05^{d}	4.97 ± 1.13^{bcde}
	1.5	5.74 ± 0.16^{ef}	0.64 ± 0.03^{g}	643.50 ± 23.18^{f}	4.57 ± 1.30^{ab}
	2.0	5.86 ± 0.15^{f}	0.58 ± 0.02^{f}	746.26 ± 19.16^{h}	4.39 ± 1.44^{a}
1 : 1	1.0	4.35 ± 0.20^{b}	0.46 ± 0.02^{c}	406.45 ± 7.23^{b}	4.97 ± 1.06^{bcde}
	1.5	4.73 ± 0.18^{c}	0.43 ± 0.02^{a}	536.64 ± 10.66^{d}	5.37 ± 0.98^{e}
	2.0	5.60 ± 0.23^{de}	0.28 ± 0.01^{b}	671.74 ± 11.17^{g}	4.91 ± 0.96^{bcd}
1 : 2	1.0	3.45 ± 0.14^{a}	0.45 ± 0.02^{de}	308.22 ± 10.71^{a}	5.29 ± 1.00^{de}
	1.5	4.58 ± 0.09^{c}	0.34 ± 0.01^{c}	474.80 ± 13.25^{c}	5.09 ± 1.07^{cde}
	2.0	4.70 ± 0.23^{c}	0.25 ± 0.01^{a}	577.22 ± 11.17^{e}	4.79 ± 1.08^{bc}

Note: Different notations in the same column indicate significant differences (p<0.05)

Table 3. Phase II analysis results (pH dan DST)

		pH	DST (°Brix)
Carrageenan: Konjac Ratio	1 : 0	3.36 ± 0.08[a]	33.43 ± 0.94[a]
	1 : 1	3.43 ± 0.10[b]	33.73 ± 0.58[a]
	1 : 2	3.51 ± 0.10[c]	34.00 ± 0.94[a]
Hydrocolloid Concentration (%)	1.0	3.33 ± 0.06[a]	32.67 ± 0.55[a]
	1.5	3.54 ± 0.08[b]	33.63 ± 1.03[b]
	2.0	3.62 ± 0.10[c]	34.87 ± 0.96[c]

Note: The difference in notation on the same column and factor shows a significant difference ($p<0.05$)

Based on the analysis of total dietary fiber, pH, DST, syneresis, hardness, and overall hedonic, the hydrocolloid ratio and concentration selected were 1:1 ratio and 2% concentration. This formula is able to produce high total dietary fiber (5.60±0.23%); low syneresis value (0.28±0.01%); consistent and compact texture (hardness) (671.74±11.17 g); pH value from 3.43 to 3.62; DSTvalue of 33.73-34.87 °Brix; and still acceptable to consumers with an overall hedonic value of 4.91±0.96 (neutral) from a scale of 7.00.

CONCLUSION

Sheet jam manufacturing process with a 1:3 ratio of banana puree and soursop puree and with the addition of 2% hydrocolloid carrageenan:konjac 1:1 produces the best fiber source sheet jam with a high dietary fiber content of 5.60%; low syneresis that is 0.28%; 3.43-3.62 pH, 33.73-34.87 °Brix DST; 671.74 g hardness, 45.79% moisture content, 0.08% ash, 0.35% protein, 0.05% fat, 53.73% carbohydrates (by difference), and still acceptable to consumers (hedonic 4.91 on a scale of 7.00 [neutral]). This selected jam is categorized according to BPOM (2016) as a source of fiber because it contains more than 3% dietary fiber.

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