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The effect of CMC and arabic gum stabilizer combination on the characteristics of soursop velva (*Annona muricata L* .)

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Abstract. The aims of this study were to determine the effect of the combination of CMC and Arabic Gum stabilizer toward the soursop velva characteristics and to determine the best stabilizer combination of soursop velva. This study was performed using Completely Randomized Design (CRD) with one factor: combination of CMC and Arabic Gum stabilizer using two sample replications and the analysis was repeated three times. The result showed that the use of the combination of CMC and Arabic Gum stabilizer gave a significant effect on the overrun value, melting power, total dissolved solids, moisture content, dietary fiber, taste, texture and overalls. Moreover, there were no significant effect on color and flavor of the soursop velva. The experiment showed that soursop velva F4 (3:1) was the best formula with overrun value 9.93%, the melting power was 22 minutes 52 seconds, the total dissolved solids 19,10°*Brix*, the moisture content 71.508%, dietary fiber 3.301% and it has sensory values of color, taste, flavor, texture, *overall* at 3.66, 3.267, 3.33, 4.06, 3.10 respectively.

1. Introduction

Soursop (*Annona muricata L*) is tropical fruit that can grow in lowland with dry climates. The large number of national soursop production, makes this fruit can be easily found and available in the abundant amounts. The ripe soursop fruit is delicious, sweet, or sweet sour. Nevertheless, public interest to processed soursop is still low. Food diversification is needed so that the availability of abundant soursop fruit can be utilized. One form of processing that can be applied is producing soursop velva products.Velva is one type of desserts made from fruits or vegetables and frozen with ice cream maker. It has low fat content and high fiber. The fat contained in velva is very low because it does not use fatty ingredients, such as milk, in the production process. The main difference between fruit velva and ice cream is the consistency of the fruit used. Fruit velva uses fruit pure as the main ingredient, while ice cream uses fruit juice as an additional ingredient.

One important component in the production of velva is the stabilizer. Stabilizers were used to prevent the formation of rough ice crystals, form a soft texture, and provide better endurance [1]. The problem faced in making the fruit velva is a rough texture and quick melt. To produce velva with smooth texture required stabilizer ingredient with the type and concentration in accordance with the character of the fruit. According to the previous study [2] the use of two or more different stabilizers combination on ice cream gives better results. Therefore, in this study a combination of stabilizer ingredients CMC and Arabic Gum was applied. According to [3], the use of CMC as stabilizer does not need short aging time. The addition of Arabic Gum aims to prevent the formation of larger ice crystals by binding some of the water. In this study, the researchers tried to use a combination of CMC

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and Arabic Gum stabilizers which aimed to produce the best velva with better overrun, better melting power and texture. According to [4], generally the choice of the stabilizer type is based primarily on its effect on the overrun and texture. By the combination of stabilizers used in this study, it is expected that production of velva product can be more optimal.

2. Methods

2.1. Equipment

Blender (National), mixer (Miyoko), refrigerator (Sharp), ice cream maker (Gelatio II), freezer (Modena), digital scales (Cis analytical), stopwatch, measuring cup (Pyrex), Erlenmeyer, refractometer (RHH-92ATC), destilator, water bath, oven, desiccator

2.2. Ingredient

Javanese varieties of ripe soursop ripe condition obtained from Pasar Legi Surakarta, sugar, CMC and Arabic Gum stabilizer.

2.3. Preliminary Research

Preliminary research was conducted to determine the combination of *puree* (fruit : water) i.e. 1:1, 1:2, 1:3 and sugar concentration 15%, 20%, 25%. The result showed that the selected *puree* was 1:1 and the sugar concentration 20%. From the observations and opinions of 30 panelists the average of panelist preferences is puree 1:1 with 20% sugar concentration because has a good texture and it is not too sour taste. On a 1:2 puree ratio it looks too fluid. In Comparison of pure 2:1 looks very thick and too sour taste that causes panelists do not like.

2.4. Formulation and Production

Soursop was peeled and the seeds were removed. Then, it was blanched in 5 minutes and shattered with a blender. After that, CMC and Arabic Gum were added and mixed. The dough was stored in refrigerator temperature for 8-12 hours then done quick freezing with ice cream maker. After that, the velva was stored in freezer temperature [5].

2.5 Analysis of Physical, Chemical, and Sensory Characteristic of Sousop Velva

Physical characteristics observed were overrun [6], melting power [7]. The observed chemical properties were total soluble solids [8], moisture content [8], dietary fiber [9]. While sensory analysis included color, taste, flavor, texture, overall.

3. Result and Discusion

3.1. Physical characteristic of soursop velva

The highest overrun value was produced by the product with formula F2 using combination of CMC and Arabic Gum stabilizer 1:3, that was equal to 13.84% (Figure 1). While the lowest overrun value produced by product F5 with CMC and Arabic Gum stabilizer 1:0 that was equal to 9.15%. Arabic Gum has the characteristic of forming a solution with a low viscosity so that the velva with a combination of stabilizers with greater Arabic Gum ratio increases the overrun as the air can penetrate the dough surface and the product can expand [3]. CMC has the characteristic of forming high viscosity, so the product can expand which causes a low measured overrun. The overrun value of carrot velva reference with the same stabilizer CMC and Arabic Gum that was equal to 11.05% - 19.79% [10], was not much different from the velva soursop overrun.

3.2 Melting Power

The highest melting power value was produced by the product with the formula F4 (Figure 2) using a combination of stabilizer CMC and Arabic Gum 3:1, i.e. 22 minutes 52 seconds. While the lowest melting power value was produced by F1 product with stabilizer CMC and Arabic Gum 0:1, 19 minutes 17 seconds. CMC could form a high viscosity, so the velva with a combination of stabilizers

using a larger CMC ratio could produce small ice crystals so they did not melt quickly. The value of the carrot velva reference was 20.25-27.00 minutes [10], it was not much different from the soursop velva.

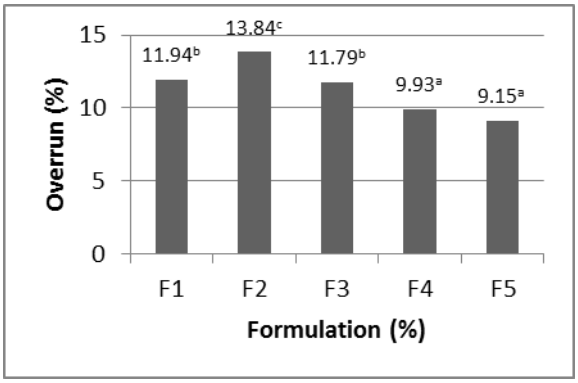


Figure 1. Overrun of soursop velva

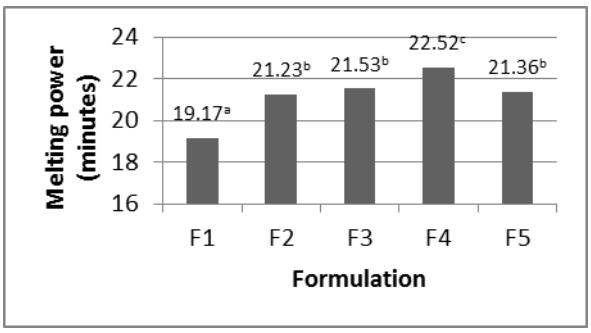


Figure 2. Melting Power of soursop velva

3.3. Chemical characteristic of soursop velva

3.3.1. Total Dissolved Solids The highest value of total dissolved solids was produced by the product with formulation F4 using a combination of CMC and Arabic Gum stabilizer 3:1 at 19.10ºBrix. While the total value of the lowest dissolved solids was produced by F1 product with CMC and Arabic Gum stabilizer 0:1 which was equal to 16.80ºBrix. The total value of dissolved solids of carrot velva reference was 18.75-19.25ºBrix [10] and on parang machete velva 15.1-18.9ºBrix [11] was not much different from the total solid value of soursop velva. The role of the stabilizer in the increased soluble solids of the soursop velva because CMC contains linear and water-soluble polysaccharida [12]. While Arabic Gum are simple sugars or descendants, can gradually hydrolyzed into smaller parts [13]. So that the use of a combination of stabilizers of CMC and Gum Arab 3: 1 is optimal in the increase of dissolved solids of soursop velva.

3.3.2. Moisture Content The highest value of moisture content was produced by the product with formula F1 using the ingredients of CMC and Arabic Gum 0:1 i.e., 75.103%. The lowest moisture value was produced by F5 product with stabilizer of CMC and Arabic Gum 1:0 i.e., 70.249%. According to [14] CMC has the ability to absorb water greater than other stabilizers so that the moisture content is measured lower. The value of moisture content of carrot velva reference [10] that was 74.12 – 75.25% not much different from soursop velva.

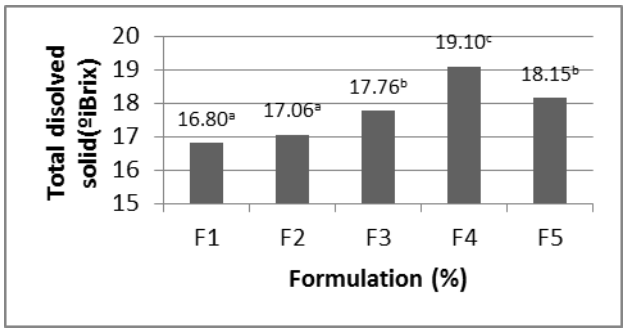


Figure 3. Total Dissolved Solids Of Soursop Velva

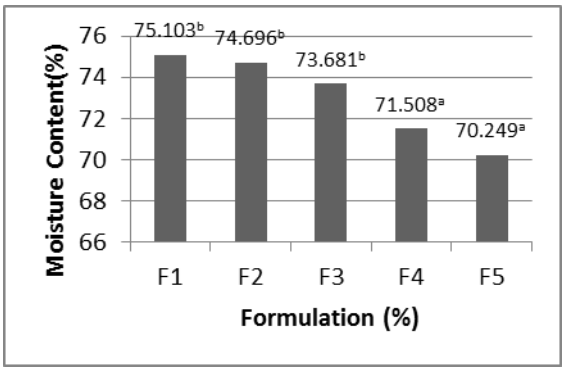


Figure 4. Moisture content of soursop velva

3.3.3. Dietary fiber The highest value of dietary fiber (Figure 5) was produced by product with formula F4 using combination of stabilizer of CMC and Arabic Gum 3:1 that was equal to 3.301% .While the lowest fiber value was produced by F1 product with stabilizer CMC and Arabic Gum 0:1 that was 1.329%. CMC is a polymer fiber food chain consisting of cellulose molecule units having fiber and Arabic Gum is a group of soluble fiber [15] so as to increase the food fiber of soursop velva.

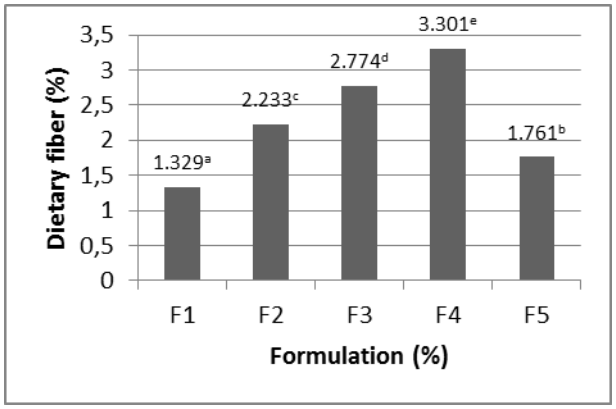


Figure 5. Dietary Fiber Of Soursop Velva

3.4. Sensory Characteristic of Soursop Velva

Table 1. Sensory characteristic of soursop velva

	Characteristic				
	Colour	Taste	Flavor	Texture	Overall
F1	3.70	3.43[ab]	3.36	2.50[a]	3.00[a]
F2	3.80	3.83[c]	3.56	2.56[a]	4.10[b]
F3	3.76	3.56[b]	3.53	3.06[a]	3.30[a]
F4	3.66	3.26[ab]	3.33	4.06[b]	3.10[a]
F5	3.63	3.10[a]	3.30	2.83[a]	3.00[a]

Table 1 shows the stabilizers CMC and Arabic Gum effect on taste, texture and overall parameters, but it does not show any significant effect on the color and flavor of the soursop velva. Stabilizer is a hydrocoloid that does not have a volatile compound so that it will not affect the color and flavor of a product but it will affect the taste significantly [16]. According to [17], CMC has a threshold of taste so that at certain concentrations will experience a decrease in sweet taste and increase the sour taste that make panelists do not like.

3.5. Determination of the best velva concentration

Determination of the best formula of soursop velva with stabilizers of CMC and Arabic Gum was determined from the analysis of physical, chemical and sensory characteristics. It used compensatory method [18]. The F4 velva product using CMC and Arabic Gum stabilizer 3:1 was the best velva formulation. It had an overrun value of 9.93%, the power of melting reached 22 minutes 52 seconds, the total dissolved solids 19.10ºBrix, moisture content of 71.508%, 3.301% dietary fiber, and had sensory value of color, flavor, texture, overalls respectively i.e., 3.66, 3.26, 3.33, 4.06, 3.10.

4. Conclusion

The use of CMC and Arabic Gum stabilizer combination gave a significant effect on the overrun, melting power, total dissolved solids, moisture content, dietary fiber, taste, texture and overalls; and there was no significant effect on color and flavor of the soursop velva. Velva with CMC and Arabic Gum stabilizers (3:1) was the best concentration of soursop velva.

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