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Melting Time, Total Solids, Vitamin C, Hedonic Quality Test of Color, Aroma, Sweet Taste and Overall Soursop Velva (*Annona muricata* L.) with Various Levels of Carrageenan Concentration

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Abstract

This study aims to determine the effect of variations in the concentration of carrageenan on melting time, total solids, vitamin C and hedonic quality test of soursop velva. The materials used in this study were soursop, mineral water, carrageenan, sugar and citric acid. Carrageenan was added in different concentrations, i.e., 0%, 0.25%, 0.50%, 0.75% and 1% (w/w). Further, quality attributes of soursop velva were evaluated, including its melting time, total solids, vitamin C and hedonic quality test. Melting time was measured using a stopwatch, total solids were analyzed using an oven, vitamin C was analyzed using spectrophotometry UV-VIS and hedonic quality test was performed by panelists. The measurement showed a significant difference ($P<0.05$) in total solids, hedonic quality of color, aroma and overall soursop velva as a result of different carrageenan concentrations. However, the melting time and sweet taste of soursop velva did not show significant differences ($P>0.05$). The most optimal use of carrageenan concentration in soursop velva is 0.25% because it has a soft texture, long melting time and is most preferred.

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Introduction

Velva is one of the frozen dessert products that have a low-fat content compared to ice cream because in its manufacture it does not use milk fat and only uses the main ingredients of fruit puree and additives such as sweeteners and stabilizers. The problem that is often faced in making fruit velva is that it has a rough texture and quickly melts, so it is necessary to have a type of stabilizer and concentration by following with the character of the fruit used (Firdaus et al., 2018). Soursop fruit is one of the fruits that can be processed into velva because it has good health benefits, which has a high fiber content and high vitamin C. Soursop fruit content in 100 g has a fiber content of 3.3 g (Lamban et al., 2017). The content of vitamin C in soursop fruit functions as an excellent antioxidant to increase endurance (Hermawan et al., 2013). The use of carrageenan can protect and inhibit the oxidation of vitamin C because it can form a double helix structure (Agustin and Putri, 2014). However, the use of carrageenan must be by following with the character of the fruit used to produce good and optimal velva products. The characteristics of good velva is that it has a soft texture and has a long melting time at room temperature.

Therefore, this study was conducted to determine the effect of variations in carrageenan concentration on melting time, total solids, vitamin C and hedonic quality on soursop velva. This research can provide useful information to obtain optimal carrageenan concentration so that the product has a soft texture, a long melting time at room temperature and can be accepted by the wider community.

Materials and Methods

Materials

The materials used in this research are soursop fruit, mineral water, carrageenan, sucrose, and citric acid. The tools used in this study are knives, analytical scales, blender, pan, stove, spoon, thermometer, ice cream maker, beaker cup, hand mixer, plastic container, plastic wrap, basins, freezers, plastic cups, stopwatch, oven and spectrophotometry UV-VIS.

Method

This research was conducted during October 2019. This research includes the process of making soursop velva, melting time, total solids, vitamin C and hedonic quality test.

The process of making soursop velva was done based on Dewi (2010) which has been modified, starting with making soursop puree, then adding carrageenan according to the treatment namely 0%, 0.25%, 0.50%, 0.75% and 1%. After that added 25% sucrose and 0.1% citric acid then stirred using a hand mixer for 10 minutes, then the dough was aged for 24 hours at 4^{o}C. Subseqently, the velva dough was stirred with a hand mixer for 2 minutes then put into an ice cream maker for 30 minutes at a temperature of 5-6^{o}C. Furthermore, freezing using a freezer at -20^{o}C for 24 hours.

A stopwatch was used to measure the melting time (Bodyfelt et al., 1988). Oven was used to measure total solids (Achmad et al., 2012). Spectrophotometry UV-VIS was used to analyze vitamin C (Satria and Tarigan, 2018). The hedonic quality test was conducted by 25 semi-trained panelists (Sudjono, 1985).

Data from the test results include melting time and total solids, normality tests were performed to determine the data are normally distributed, analyzed the influence test using Analysis of Variance (ANOVA) with a significance level of 5% and if there are differences continued with Duncan's Multiple Range Test (DMRT) to determine differences between treatments. Organoleptic test data were analyzed with the Kruskal-Wallis Test and if there was any distress, a further test was performed using the Mann Whitney U Test. These data were analyzed with SPSS 25 application.

Results and Discussion

Melting Time

Figure 1 (a) shows that the use of carrageenan with various concentrations has no significant effect (P>0.05) on the melting time of soursop velva. The mean value of soursop velva melting time has increased the melting time with concomitant higher carrageenan concentration from T_0 to T_4 treatment. The use of carrageenan, the higher the concentration can give a slower melting time. According to Maria and Zubaidah (2014), the concentration of stabilizers which is higher in concentration can bind more water so that it gives a slow melting time. However, the use of carrageenan with concentrations that are too high will cause the soursop velva to be so thick that the texture of the velva becomes soft because the ice crystals do not become homogeneous. Firdaus et al. (2018) which states that the higher concentration of stabilizers will cause the mixture to be too thick so that it interferes with the formation of homogeneous ice crystals during freezing. One other factor that can affect the speed and speed of melting soursop velocity is that there is fiber in soursop velva from soursop fruit. The fiber content can bind water so that the product becomes thicker and melting time will be slow (Oksilia et al., 2012).

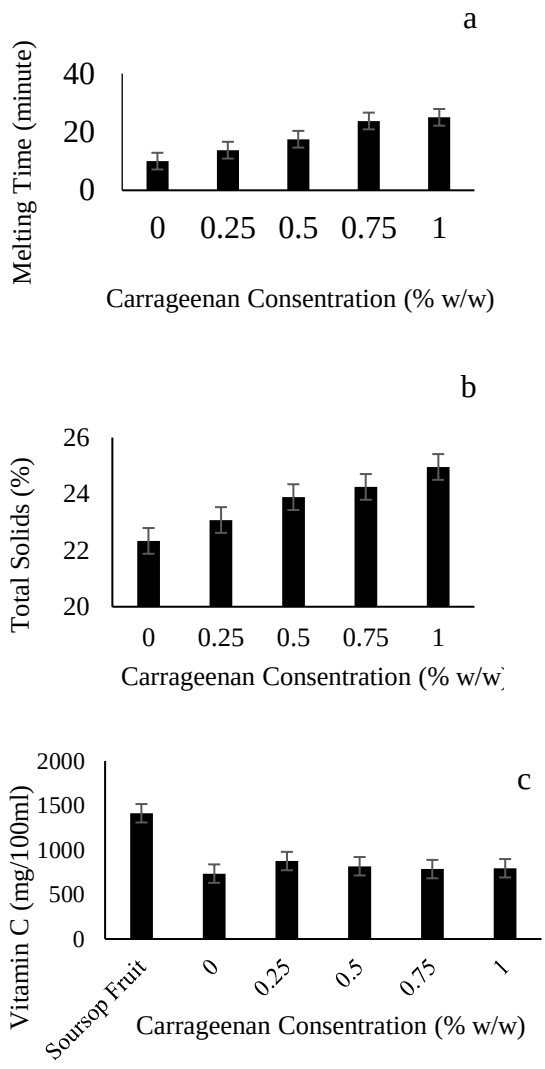

Figure 1. Melting time (a), total solids (b), vitamin c (c) of velva made of soursop using difference concentrations of carrageenan (0%, 0.25%, 0.50%, 0.75% dan 1%). The superscript shows significant difference using Duncan's Multiple Range Test.

Total Solids

Figure 1 (b) shows that the use of carrageenan with various concentrations has a significant effect (P <0.05) on the total solids of soursop velva. The mean total solids of soursop velva solids increased from T_0 to T_4 treatments. This is due to the presence of solids in the soursop velva. Total solids are all components of

solids that are in a food. The use of carrageenan with higher concentrations in velva shows that the total value of soursop velva solids will increase. Dewi (2010) states that the use of stabilizers and the addition of high concentrations of sugar can increase the content of solids in the dough to become thick so that during freezing it will reduce its freezing point and make the product denser. Velva products which have a high total solid value can reduce the ice crystals that form. According to Frandsen and Arbukle (1961), the greater the total amount of solids, the lower the freezing point and the smaller the amount of water that is frozen so that it will reduce the ice crystals that form. Velva texture influences the total solids of velva is if the total value of the solids is low it will make the velva texture rough and the total value of the solids is too high, making the velva texture sticky and soft. Total solids that are too low will make the velva texture rough and total solids that are too high will make the velva texture sticky and soft Mahdiana et al. (2015).

Vitamin C

Figure 1 (c) shows that the vitamin C content of soursop has a high value. Soursop has the most dominant vitamin C content compared to other vitamins and has many good health benefits. Burhan et al. (2012) state that soursop contains the most vitamin C, where the compound functions as an antioxidant that can increase endurance and capture free radicals in the body. Increased levels of vitamin C come from the process of biosynthesis of vitamin C from glucose found in fruit maturity. According to Kartika (2010), fruit vitamin C levels can reach optimum levels when the fruit is ripe which is characterized by changes in color. The addition of carrageenan with high concentrations can maintain vitamin C content in food because it has a double helix structure. According to Mawarni and Yuwono (2018) which states that the use of carrageenan can maintain vitamin C content in a product because it can form strong colloid disperse (double helix structure). The content of vitamin C in soursop velva decreases due to environmental factors such as temperature and light. Vitamin C has properties that are very sensitive to external influences such as light, temperature, pH, oxygen, sugar concentrations and enzymes (Arif et al., 2016).

Hedonic Quality Test

Figure 2 shows that the use of carrageenan with different concentrations has a significant difference ($P<0.05$) in the color, aroma and overall quality of soursop velva but does not have a significant difference ($P>0.05$) in the sweet taste of soursop velva. The color of soursop velva most favored by panelists was T_3 treatment. The color of the white soursop velva comes from the flesh of the white fibrous soursop fruit. However, the color of the soursop velva can turn dark because soursop contains vitamin C. According to Winarno (2004), changes in the color level of brightness can be caused by the content of vitamin C (arctic acid) which is very easily degraded by environmental factors such as light and temperature during storage, so it can form brown compounds. The aroma of soursop velva most favored by panelists is the T_3 treatment. Soursop fruit has a distinctive aroma even though soursop fruit has been processed. Mardiana and Ratnasari (2011) stated that the ripe soursop fruit would emit a distinctive aroma of fresh soursop and this aroma still appears even though the soursop fruit has been processed into a product. The sweet taste produced from soursop velva comes from the typical soursop fruit and sweetener. Risti and Herawati (2017) state that the characteristics of soursop meat has a distinctive sweet and sour taste. The use of sweetener in velva is the addition of sucrose in velva dough. Cahyadi et al. (2017) states that sweeteners function to give sweetness to a food and can increase flavor, so that consumer acceptance and preferences can increase. The overall preference for high soursop velva is T_1 treatment because it has the right thickness and soft texture. The hedonic quality test conducted by panelists was asked to provide a personal response about preferences related to the existence of the product and the acceptability of the product so that the highest overall from the panelists showed the product's preferences and acceptability (Lukito et al., 2012).

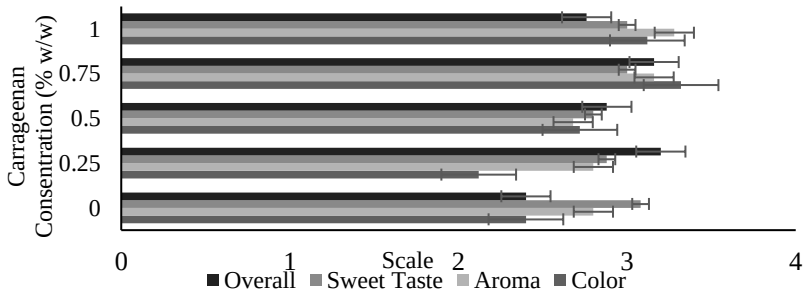

Figure 2. Hedonic quality test of velva made of soursop using difference concentrations of carrageenan (0%, 0.25%, 0.50%, 0.75% dan 1%). The superscript shows significant difference using Mann Whitney U Test.

Conclusion

Based on the research results obtained, the use of carrageenan with higher concentrations can affect melting time, total solids, vitamin C and hedonic quality of soursop velva. The optimal use of carrageenan concentration in soursop velva is 0.25% because it has a soft texture, long melting time and is most preferred.

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