Effect of the Type and Concentration Stabilizer Characteristics Velva Roselle (Hibiscus sabdariffa)

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Abstract: The objectives of the research were knowing comparison between kind of stabilizer, and stabilizer concentration of roselle Velva exactly to get the which has the best product characteristic. The advantages of research were given alternative way to processing rosella Become a more durable product. And the other advantage of research is getting more variants of frozen dessert that has containing low fat, so the product was safe for consumer with a diet program, and get the benefits of roselle at the product. The design of doing in this research were includes two factors are kind of stabilizer as a factor that level a1 (gelatin), level a2 (gum arabic) and level a3 (CMC), and stabilizer concentration as B factor that level b1 (0.3%), the level of b2 (0.4%) and b3 level (0.5%). While the design of testing in this research was using pattern of 3 x 3 factorial According to Random of Group Design (RGD) by Three Times reviews. The results of the research were kind of stabilizer as (A) factor was influenced in overrun, the color and the flavor of the product. Stabilizer concentration factor (B) was influenced in overrun and color of the product. The interaction of two factors that (AB) was influenced in the overrun, melting speed, and color in a product. The best roselle Velva product based on a scoring test to a result of chemistry and physical analysis and organoleptic testing was the product that kind of stabilizer gum arabic with the concentration of 0.4% (a2b2), the color and the flavor of the product. Stabilizer concentration factor (B) was influenced in overrun and color of the product. The interaction of two factors that (AB) was influenced in the overrun, melting speed, and color in a product. The best roselle Velva product based on a scoring test to a result of chemistry and physical analysis and organoleptic testing was the product that kind of stabilizer gum arabic with the concentration of 0.4% (a2b2). The color and the flavor of the product. Stabilizer concentration factor (B) was influenced in overrun and color of the product. The interaction of two factors that (AB) was influenced in the overrun, melting speed, and color in a product. The best roselle Velva product based on a scoring test to a result of chemistry and physical analysis and organoleptic testing was the product that kind of stabilizer gum arabic with the concentration of 0.4% (a2b2).

Keywords: Stabilizer, Velva & Characteristic.
1. INTRODUCTION

Roselle which has the scientific name Hibiscus sabdariffa Linn is a member of the family Malvaceae and is an annual herbaceous plant that can grow well in the tropics and subtropics, Maryani [1].

Important ingredient contained in Roselle calyx is grossy peptin, anthocyanins, and gluside hibiscin. Besides red rosella flower petals also contain organic acids, polysaccharides, flavonoids are useful to prevent some diseases such as controlling blood pressure, blood circulation, and smooth bowel movement, Daryanto [2].

Roselle calyx extract can also reduce the absorption of alcohol, so as to reduce the effect dtimbulkan from drinking alcohol. Other properties of rose is to relieve heartburn, lowering cholesterol levels, weight control, mEnhancing stamina and increase the vitality of the body, as well as beneficial to replace electrolytes lost body fluids after exercise [1].

Roselle calyx can be taken as a fresh beverage ingredients such as syrups and teas, jams and beverages, especially of plants that flower thick. Flower petals in addition to vitamin C, vitamin A, also contains protein and calcium [2].

In Indonesia, not many people who take advantage of the roselle plant. While in other countries, roselle already stout utilized since long. Actually the whole plant, from flower petals, seeds, and leaves can be used.

Rosella petals can also be used as an ingredient of salads, soups sauces, drinks, juices, pickles, jams, puddings, syrups, jellies and Velva [1]. Velva is a kind of shaped frozen desserts such as ice cream and low-fat, which is made from plant materials such as fruits, vegetables and other ingredients with the addition of sweeteners and stabilizers.

2. MATERIALS AND METHODS

The main raw material used in the manufacture of Velva roselle petals are that are ready to be harvested and fresh obtained directly from the plantation roselle in Ciwaruga. Another ingredient is sucrose, gelatin, gum arabic, and CMC (Carboxy Methyl Cellulose)

The tools used in the manufacture of Velva roselle namely knives, blenders, spatulas, scales, thermometer, a stove, a spoon, a plastic container, stirring the ice, votator ice or ice cream maker, plastic cups and refrigerator.

2.1 Method of Experiment

The work was undertaken in two stages, namely the preliminary study and the main study.

2.1.1 Research Introduction

Preliminary research conducted to find the best sucrose concentration for Velva products roselle variation of sucrose concentration used was 20%, 25% and 30%. To determine the concentration selected, the product Velva in the organoleptic test the response of color, aroma, texture and flavor using hedonic quality.

2.1.2 Primary Research

The main study was done using sucrose concentration selected preliminary research results

a. Draft Treatment

The design of the treatment set on the main research there are two factors. The first factor is the type of stabilizer (A) consists of three levels ie gelatin (a1), gum arabic (a2) and CMC (a3). The second factor is the concentration of the stabilizer (B) consists of three levels ie 0.3% (b1), 0.4% (b2), 0.5% (b3).

b. Design of Experiments

The experimental design used in this study is a 3 x 3 factorial design in a randomized block design (RBD) with three replications, in order to obtain as many as 27 units of experimental replicates. Experimental models used are as follows:
\[ X_{ijk} = \mu + K_k + A_i + B_j + (AB)_{ij} + \epsilon_{ijk} \]

Information:
\( X_{ijk} \) = Value observations on experimental unit-K group to obtain a combination of treatments \( ij \) (i-th level of the factor type of stabilizer and the j-th level of concentration factor stabilizer (B)).

\( \mu \) = Mean population (average)
\( K_k \) = Influence to the group level-k
\( A_i \) = Effect of treatment-th level of factor in the type of stabilizer (A)
\( B_j \) = Effect of j-th level of concentration factor stabilizer (B)
\( (AB)_{ij} \) = Effect of the interaction i-th level of the factor type of stabilizer (A) with a level j of the concentration factor stabilizer (B).
\( \epsilon_{ijk} \) = Effect of error of experimental unit-K group to obtain a combination of treatments i and j.

c. Draft Response
The draft response was conducted on the response to chemical and organoleptic.
(1) Chemical Response
Chemical responses do include vitamin C, Priyantono, [3] and fiber content.
(2) Physical Response
Response physics done to test the degree Velva roselle include development or overrun, Arbuckle [4], the test speed of melting and total dissolved solids (Total Soluble Solid), AOAC [5].
(3) Response Appearance
Organoleptic response made to Velva roselle calyx include color, aroma, texture and taste. The method used is the hedonic quality test, Soekarto [6] using 30 panelists.
d. Determining the Best Method
Determining the best method is to test the scoring, which of these tests if the highest value obtained is the best sample, whereas when the lowest value obtained is the ugliest samples.
The test is to assess the results of chemical analysis include: high levels of vitamin C and fiber content. Physical analysis include: the degree of development (% overrun), the speed of melting, and todat dissolved solids. Organoleptic include: test the taste, aroma, texture, and flavor.
e. Description Trial
Description Velva experiment of making roselle can be done as follows:
1. Sorting
   Roselle calyx that will be used each sorted beforehand with the aim to separate the good rate with the bad (broken).
2. Trimming
   \textit{trimming} done to separate the parts that are not needed, namely seeds of roselle.
3. Washing
   Roselle already separated from the seeds and then each washed with clean water to remove impurities inherent in Roselle calyx.
4. Draining
   Roselle calyx was washed and then each drained with the aim of eliminating the remainder of the washing water.
5. Destruction
   Roselle calyx which has been drained crushed by using blander until it becomes mush interest is completely destroyed.
6. Mixing and Cooling
   The slurry was then roselle calyx with sucrose solution with a certain concentration and stabilizer gelatin, gum arabic, and CMC at a concentration of 0.3%, 0.4%, 0.5%. Materials that have been dissolved and then incorporated into the ice cream maker. In this tool at the same mixture cools to a temperature of 4 - 6\(^\circ\)C for 10 minutes, stirring once this cooling Objectives are to provide an opportunity for the stabilizer to bind water.
7. Freezing
The products have been cooled and then will be a freeze on the conditions of a temperature of -10 - (-20) °C for 24 hours. The purpose of this freezing is to give a soft texture, the appearance of a hard and increase the volume of the product during freezing.

3. RESULTS AND DISCUSSION

Based on the analysis of variance is known that sucrose concentration treatment did not significantly affect the color, texture, and flavor, while the aroma affect the characteristics of roselle Velva. The best aroma is at a concentration of 20% sucrose.

The addition of sucrose concentrations were added actually affect the color aroma and taste but for comparison that is not too large, then the difference is not significant.

Velva product color crimson rosella is derived from anthocyanin pigments contained in the roselle calyx. Winarno [7], stating that the red color of many fruits due to the pigment anthocyanin color red at low pH or acidic.

According, fever [8] the anthocyanins can be damaged are caused by heating the sugar content increases, the storage process, low pH and the presence of ascorbic acid.

Wibowo [9], texture of ice cream products is determined by the solids contained in the dough, the sugar concentration, viscosity and resistance pelelehannya. Sugar hinders the formation of ice crystals during freezing. This phenomenon occurs because the sugar molecules attract water molecules that interfere with ice crystals.

Thus sugar helps prevent the formation of large ice crystals, resulting in a softer texture produced. Actual sucrose concentration affects the taste, but because of the concentration ratio of sucrose small and very sour taste roselle the results are not significantly different.

According to [4], taste is a major factor in determining the quality of ice cream products. Meanwhile, Winarno [10] states that the taste of food is actually composed of three components, namely smell, taste and oral stimulation. Because it's been a product with a concentration of 20% sucrose as prodk has the aroma of the most baik. Konsentrasi Velva roselle is used in the main study.

3.2 Primary Research
3.2.1 Chemical Response
1. Levels of Vitamin C
Roselle Velva is made from roselle calyx. In general, the vitamin C content of fresh roselle calyx about 14 mg / 100 grams of petals. Based on the analysis of variance is known that this type of stabilizer (A), the concentration of stabilizer (B) and interksi both (AB) did not significantly affect blood levels of vitamin C product. This is caused by differences in the levels of vitamin C obtained are not too large. Differences in levels of vitamin C were slightly is due to three types of stabilizers does not contain vitamin C although the concentration of stabilizers used are different yet very small difference causes no significant difference in each treatment.

Decreased levels of vitamin C in Velva product can be caused due to a decrease in vitamin C already during handling and storage of roselle calyx for one day after harvest until sales by merchant. Roselle calyx stored at room temperature during storage, transport and sale by merchants, so it is very susceptible to decreased levels of vitamin C. Vitamin C is the vitamin most easily damaged, in addition to very soluble in water, easily oxidized, and the processes are accelerated by heat, light, alkali, enzyme, oxidant, and catalyst of copper and iron. In the process of making Velva roselle is not carried out the heating process, except for the heat transfer process in the freezer (freezer) at the time of freezing products can also reduce levels of vitamin C product, on the freezing decreased levels of vitamin C on average 6% on products vitamin C at a temperature of -18°C for 6-12 months. Thus, a decrease of vitamin C is very small when the first product is only stored in closet of freezing for 24 hours to process the degree of development and texture improvement is expected.

The type and concentration of stabilizers used in the product does not cause significant differences in the products of the vitamin C for the three types of stabilizer does not contain vitamin C so that
the type and amount of stabilizer added concentration is not would affect the levels of vitamin C product.

2. Fiber Content Total
Based on the analysis of variance is known that treatment of the type of stabilizer (A), the concentration of stabilizer (B) and their interaction (AB) did not significantly affect total fiber content of the product. Crude fiber content in the product is small, and the difference between treatments is small and almost equal to each other, so there is a clear difference in the analysis of variance either by their treatment with factor A, B as well as the influence of interaction (AB).

3.2.2. Physical response
1. Degree of Development (Overrun)
From the results of analysis of variance, showed that the type of stabilizer (A), the concentration of stabilizer (B), and the interaction of the stabilizer (AB) significantly for each treatment on the degree of development (% Overrun).

Table 1. Interaction influence the type and concentration of stabilizer Against degrees Development (% Overrun)

<table>
<thead>
<tr>
<th>Type</th>
<th>Concentration</th>
<th>0.3% (b1)</th>
<th>0.4% (b2)</th>
<th>0.5% (b3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gelatin (a1)</td>
<td>7:14 a B</td>
<td>8:47 a B</td>
<td>9.76 a A</td>
<td></td>
</tr>
<tr>
<td>Gum Arabic (a2)</td>
<td>5:26 a A</td>
<td>5.89 a A</td>
<td>7.79 b A</td>
<td></td>
</tr>
<tr>
<td>CMC (a3)</td>
<td>8:44 a B</td>
<td>7.79 a B</td>
<td>7:14 a A</td>
<td></td>
</tr>
</tbody>
</table>

Information:
Read the small letters toward the line, different letters stating the real difference in the level of 5%.
Read large letters column direction, a significantly different letters express a real difference at the level of 5%.
In Table 1 it can be seen that the higher the concentration of gelatin stabilizer greater the value of the degree of development because of froth produced will be even greater, as well as the greater konsentrasi gum arabic is added, the greater the value of the degree of development.
While the degree of development stabilizer types CMC will decrease if the concentration is increased because of its ability to bind water present in the product, so the higher the concentration of CMC used then the mixture will be lumpy.

2. Melting Speed
One of the quality parameters that are important in the food industry frozen dessert is melting speed.
Based on the analysis of variance is known that treatment of the type of stabilizer (A) and konsentrasi stabilizer (B) did not significantly affect the speed of melting of the product. While the interaction of both (AB) effect on the melting speed of the product.
Table 2. Interaction Effect of type and concentration of stabilizer Against melting Speed

<table>
<thead>
<tr>
<th>Type</th>
<th>Concentration</th>
<th>0.3% (b1)</th>
<th>0.4% (b2)</th>
<th>0.5% (b3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gelatin (a1)</td>
<td>13:18 b</td>
<td>12:32 a</td>
<td>10:48 a</td>
<td></td>
</tr>
<tr>
<td>Gum Arabic (a2)</td>
<td>12.68 a</td>
<td>11.91 a</td>
<td>11.79 a</td>
<td></td>
</tr>
<tr>
<td>CMC (a3)</td>
<td>10.75 a</td>
<td>12.93 a</td>
<td>13.35a</td>
<td></td>
</tr>
</tbody>
</table>

Information:
Read the small letters toward the line, different letters stating the real difference in the level of 5%. Read large letters column direction, a significantly different letters express a real difference at the level of 5%.

Melt speed is closely related to total dissolved solids of prodak. High dissolved solids content can lower the freezing point which enables faster product melt, which means that products that contain high total dissolved solids no longer will melt. Stabilizer is a hydrocolloid which, hydrocolloids are solids that can increase the total solids in the product.

Power melting and melting time is closely related to the characteristics of the body and texture of ice cream. Velva fruit texture is determined by the presence of stabilizer, the more stabilizers are used it will be more tender texture, and according to [4], and in Intan [11] Velva rough-textured, low would more easily melt.

The sugar in the dough Velva lowering the freezing temperature so that the product will be faster melt [11]. Melting speed of a product desserts depending on the total solids contained in the product.

3.2.3. response Appearance

a. Value of Color
Color is important for a lot of food, both for foods that are not processed or manufactured for. Together with the smell, taste, color and texture plays an important role in the acceptance of food [8]. A foodstuff is considered nutritious, tasty, and very good texture will not be eaten if they have an unsightly color or give the impression of color should deviate [10]. Based on the analysis of variance is known that the treatment is treatment of the type of stabilizer (A) the concentration of the stabilizer (B) and the interaction of the type and concentration of stabilizer (AB) significantly affect the product's color. Gelatin inhibitor type choose color preferences lowest value, this happens because gelatine can adsorb roselle so paler color. The greater the concentration yangh added paler colors produced or in other words the increasingly unpopular.

b. Value Aroma
Based on the analysis of variance is known that treatment of the type of stabilizer (A) significantly affect the aroma of the product, while the concentration of stabilizers (B) and their interaction (AB) did not significantly affect the aroma of the product (AB). Aroma of Velva products are a mix between a typical aroma aroma of roselle, while the stabilizer does not have a distinctive smell that can be recognized. Based on the information submitted panelists known samples using the type of stabilizer CMC has the lowest value and Gum Arabic has the highest value.

c. The value of the texture
Based on the analysis of variance is known that the treatment of type stabilizer (A), the concentration of stabilizer (B) and their interaction (AB) did not significantly affect the texture of the product. Stabilizers in Velva serves to prevent the formation of large ice crystals during freezing, resulting in Velva soft texture, menyeraamkn products, and inhibit melting [4]. Based on the results of organoleptic observations can be seen in Figure 13 that produk softest texture that treatment a3b2 (CMC at a concentration of 0.4%) with a value of 3.79, while the lowest that softness in the treatment a1b2 (gelatin with konsentrasio0.4%) with a value of 3.26.
d. Value Sense

Based on the analysis of variance is known that the treatment of type stabilizer (A), the concentration of stabilizer (B) and their interaction (AB) did not significantly affect the sour taste in the product. The most acidic product feels that the treatment a3b3 with a value of 5.73, while the lowest acid taste that is a2b1. The taste was generally agreed that there are only four basic tastes of sweet, bitter, sour and salty. Sensitivity to the taste buds located on the tongue. The relationship between the chemical structure of a compound is more easily determined by taste. In this roselle Velva products that can be perceived consumer taste that is sour. Their sugar content in a batter Velva this roselle can decimate the sour taste of the product. Sour taste different and the perceived acidity can depend on acid groups, pH and acidity tertitrasi [8].

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusion

1. The results of the preliminary study of selected product quality testing hedonic method is sucrose 20%
2. Factor kind of stabilizer (A) effect on% overrun, Color, and fragrance products.
3. The concentration factor stabilizer (B) effect on% overrun, The color of the product.
4. Interaction factor in the type and concentration of stabilizer (AB) effect on% overrun, melting speed, and color of the product.

4.2 Recommendations

1. It should be investigated further to establish the quality standards Velva good products, so as to commercial scale can produce a uniform product.
2. Considered when choosing the raw materials, namely petals terms of color, should be the same level of maturity and freshness petals.

5. REFERENCES

[2] Daryanto (2008), Healthy Red Roselle Syrup,