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Use of Suweg (*Amorphopallus campanulatus*)Tuber Flour Substitute bread flour on the quality to sweet bread

Pemanfaatan Tepung Suweg Sebagai Pengganti Tepung Roti Terhadap Mutu Roti Manis

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ABSTRACT

There are many foods in the market today that are high in carbohydrates instead of fiber, including one that is rich in carbohydrates, sweet bread because it uses wheat flour. Foods that are high in carbohydrates are not good for consumption at this time given the lack of mobility of human movement, therefore, suweg flour which is rich in fiber is used as a substitute for making sweet bread. The objective of this study was to obtain the best substitution effect of wheat flour and Suweg tuber flour in terms of nutritional value and quality of sweet bread and to determine the effect of CMC concentration in the manufacture of sweet bread. This study used a completely randomized design (CRD) method with two factorials. Factor I is the ratio of wheat flour and flour (T) consisting of 5 levels, namely T0 = 200: 0, T1 = 180: 20, T2 = 160: 30, T3 = 140: 60, T4 = 120: 80. Factor II is CMC concentration (C) consists of 3 levels, C1 = 0.37, C2 = 0.75, C3 = 1.12. Observational parameter tests carried out were organoleptic (color , texture, flavor, taste) expansion volume, water content, ash content, fat content, fiber content, and protein content. The results showed that the ratio of wheat flour and Suweg tuber flour had a very significant difference ($p<0.01$) on organoleptic (color, flavor, texture, taste), dough volume expansion, moisture content, content fat content, protein content and crude fiber content, while the concentration of CMC was very significant ($p<0.01$) on organoleptic (color dan texture) dough volume expansion organoleptic, water content, protein content, fat content, and crude fiber content. The conclusion of this study for best result is T_0 = 200:0 with a concentration of CMC C_3 = 1.12%

Keywords : *CMC, Coarse Fibre, Quality Sweet, Bread Sweet Bread, Tuber Suweg tuber.*

ABSTRAK

Banyaknya makanan yang beredar dipasaran saat ini yang tinggi akan karbohidrat bukan serat, termasuk salah satunya makanan yang kaya akan karbohidrat adalah roti manis karena menggunakan tepung terigu. Makanan yang tinggi karbohidrat kurang baik dikonsumsi pada saat ini mengingat minimnya mobilitas gerak manusia oleh karena itu digunakan tepung suweg yang kaya akan serat sebagai tepung pengganti pembuatan roti manis. Tujuan dari penelitian ini ialah untuk memperoleh pengaruh substitusi tepung terigu dan tepung suweg baik dari segi nilai gizi dan mutu roti manis dan untuk mengetahui pengaruh konsentrasi CMC dalam pembuatan roti manis. Penelitian ini menggunakan metode Rancangan Acak Lengkap (RAL) dengan dua faktorial. Faktor I merupakan perbandingan tepung terigu dan tepung suweg (T) terdiri dari 5 taraf yaitu T_0 = 200 : 0, T_1 = 180 : 20, T_2 = 160 : 30, T_3 = 140 : 60, T_4 = 120 : 80. Faktor II ialah konsentrasi CMC (C) terdiri dari 3 taraf, C_1 = 0,37%, C_2 = 0,75%, C_3 = 1,12%. Uji parameter pengamatan yang dilakukan adalah uji organoleptic (warna, tekstur, aroma, rasa)

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volume pengembangan, kadar air, kadar abu, kadar lemak, kadar serat, dan kadar protein. Dari hasil analisa statistik pada setiap parameter roti manis diperoleh hasil yaitu pada perbandingan tepung terigu dan tepung suweg berbeda sangat nyata ($p<0,01$) terhadap uji organoleptic (warna, tekstur, aroma, rasa) pengembangan volume adonan, kadar air, kadar lemak, kadar protein dan kadar serat kasar, sedangkan pada konsentrasi CMC berbeda sangat nyata ($p<0,01$) terhadap organoleptik (warna, tekstur dan aroma), pengembangan volume adonan, kadar air, kadar protein, kadar lemak, dan kadar serat kasar. Kesimpulan dari penelitian ini hasil terbaiknya adalah T_0 = 200:0 dengan konsentrasi CMC C_3 = 1.12%

Kata Kunci: Umbi Suweg tuber, CMC, Roti Manis, Serat Kasar, Mutu Roti Manis

INTRODUCTION

Indonesia is a country that has land that is very suitable for producing plants that are rich in nutritional content; it is not a new thing if the people make a living as farmers. The fact is that Indonesia has a very large and diverse food potential, and a food market that continues to grow, so independence is one of the goals of our food policy.

Currently, in this modern era, rice and flour are the main players in terms of what the Indonesian people need, it is clear that rice is the staple food of the community, and flour is a food ingredient that is very much needed in making bread. Wheat flour has greatly increased its existence, people's love for flour raw materials so that people themselves forget that Indonesia has plants that can be processed and can equalize wheat flour.

Suweg tuber (*Amorphopallus campanulatus*) is a food that is rich in sources of dietary fiber. Dietary fiber itself is something that is very much needed in this very busy era. Crude fiber itself has a function as a digestive and prevents cancer in the colon. Crude fiber requirement for adult size per day is 25-35 g or 10-133 per 1000 kcal menu (Williams, 1995).

To use of Suweg tuber as an alternative food ingredient about to with concerning relation to food diversification efforts has very potential. Suweg tube still cannot be recognized by the people of North Sumatra due to public ignorance of the Suweg tubers, and the process of processing the Suweg tubers which will be used as a food product.

Bread with non-wheat raw materials, as well as substitution of some raw materials for wheat flour with other commodities is always followed by a decline in internal and external physical quality. Deterioration in quality that usually occurs, among others, is a decrease in the ability to expand bread, worsening external and internal appearance, as well as deteriorating taste and flavor. One way that can be done to overcome this problem is to add food additives such as an emulsifying agent called bread dough conditioner, namely CMC (Carboxy methyl cellulose). With this research, it is hoped that it can strive for the existence of the Suweg tuber in the eyes of the community that Suweg tuber also has a high economic value and has a nutritional content that is not inferior to wheat flour. The use of the Suweg tuber can encourage government programs to increase food diversification.

MATERIALS AND METHODS

The ingredients used include Suweg tuber flour, wheat flour, instant yeast, margarine, butter, milk, egg yolks, sugar, salt, bread improver, and water. While the materials for chemical analysis are distilled water, n-hexane, acetic acid, neutral alcohol, KOH, and PP indicator.

The tools used include bread mixers, plastic, buckets, spoons, analytical scales, measuring cups, glasses, sieves, baking sheets, and ovens. While the tools for analyzing materials and final products include: analytical balance, mortar, drying oven, filter paper, penetrometer, copper gauze, mixing board, stopwatch, beaker glass, and spectrometer.

The study was conducted using a factorial Completely Randomized Design (CRD) consisting of two factors, namely:

Factor I: Comparison of Wheat Flour and Suweg tuber Flour (T) consists of 5 levels, namely: T0 = 100% : 0%, T1 = 80 % : 20 %, T2 = 60 % : 40 %, T3 = 40 % : 60 %, T4 = 20% : 80%. Factor II: Total Addition of CMC (C) consists of 3 levels, namely: C1 = 0.75%, C2 = 1.5 %, C3 = 2.25%. The research was repeated 2 (two) times the accuracy research. The data were analyzed using the analysis of variance (ANOVA) method. The analysis of variance was followed by a further test of LSD(Least Significant Difference). Observational parameters used include Organoleptik test (color, flavor, texture, taste), Dough Development Volume, Water Content, Fat Content, Ash Content, Protein Content, and Crude Fiber Content.

Work procedures

Making Suweg tuber Flour

At this stage, the Suweg tubers are peeled using a knife and washed thoroughly with running water. Thinly slice the Suweg tubers, wash again using running water then drain. Soak in NaCl for 24 hours, then ferment using tape yeast for 46 hours. Dry in an oven at 50oC for 24 hours. Puree the tubers that have been thinly sliced using a blender and sieved with 80 mesh.

Sweet Bread Making

At this stage the flour and flour are put into a container, add additional ingredients such as yeast, salt, sugar, milk, margarine, butter, egg yolks, baking powder, bread improver, and water. Stir until the ingredients are mixed, then enter the CMC according to the treatment then continue stirring until smooth using a mixer. Dough fermented for 30 minutes at room temperature of 30oC. Fermentation again for 60 minutes at a temperature of 50oC. The height and diameter of the fermented dough were measured again. The dough is baked in an oven at 150oC for 30 minutes. Parameter testing is performed.

RESULTS AND DISCUSSION

The results of the research and statistical tests, in general, showed the concentration of the ratio of flour and wheat flour with CMC (Carboxy methyl cellulose) in the analysis of the physical properties of sweet bread from the comparison of wheat flour and wheat flour was observed. And the average results of the comparison of flour and CMC (Carboxy methyl cellulose) for each parameter can be seen in Table 12 and Table 13.

From Table 12, it can be seen that the ratio of wheat flour and Suweg tuber flour has different effects on the above parameters. The higher the concentration of Suweg tuber flour, the ash content, fat content, protein content, and crude fiber content will increase while the organoleptic (color, flavor, texture and taste) the volume of dough expansion, and water content will decrease.

From Table 13 it can be seen that the effect of CMC concentration has different effects on each of these parameters. The effect of higher CMC concentrations will result in organoleptic texture, moisture content, protein content, and crude fiber content, while organoleptic color, flavor, dough volume, and fat content will decrease. The taste and ash content of organoleptic parameters indicate that the CMC concentration will be optimum at the 1st concentration.

Color Organoleptic

Comparison of Wheat Flour and Suweg Tuber Flour

In treatment, T0 was very significantly different from T1, T2, T3, and T4. T1 differed significantly from T2, T3, and T4. T2 is very different from T3 and T4. In T3 treatment, it was very significantly different from T4. The highest color organoleptic was treated with T0 (200:0), which was 2.92. While the lowest value of T4 (120:80) is 1.78. This can be seen in Figure 1.

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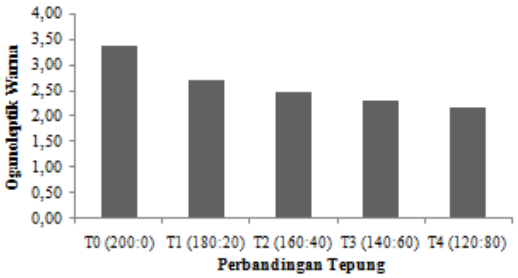
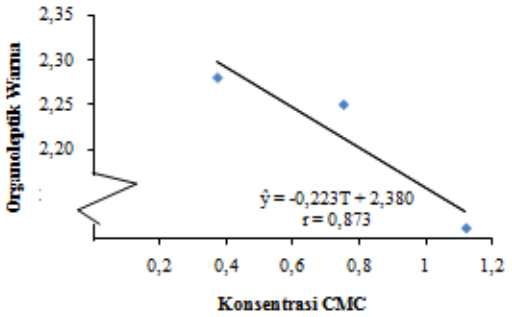


The results of the preference test with color organoleptic parameters showed that the panelists' preference for sweet bread with a ratio of wheat flour and Suweg tuber flour had a value ranging from 2.92 to 1.78 whereas the panelist's assessment of the organoleptic color of sweet bread was vulnerable to dislike - like values. The highest value of panelists' preference for the organoleptic color of sweet bread at treatment T0 (200:0) was 2.92. The lowest value or not preferred by the panelists to the organoleptic color of sweet bread at parameter T4 (120:80) is 1.78. The sweet bread in this study has a light brown-dark brown color.

According to Winarno (1997), the character of the color change in sweet bread is related to the non-enzymatic browning reaction process, where the browning reaction is caused by a browning reaction without enzymatic influence which usually occurs during processing. Like the caramelization process in sugar, which is the process of meeting reducing sugars and amino acids (compiling proteins) at high temperatures and for a long time.

CMC concentration

In the treatment, C1 was not significantly different from C2 and very significantly different from C3, but C3 was very significantly different from C1 and C2. The highest value is found in the C1 treatment, which is 2.28, while the lowest value in the C3 treatment is 2.11. This can be seen in Figure 2.

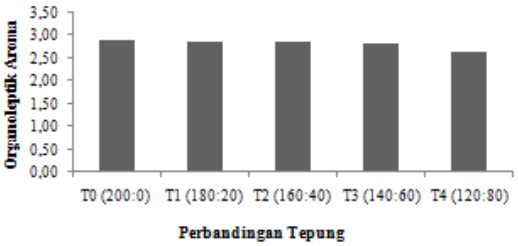


Based on Figure 2, it can be seen that the concentration of CMC with treatment C1 to treatment C3 decreased. The CMC concentration of 0.37 has the highest point while the CMC concentration of 1.12 has the lowest point.

According to Hui (1992), the more concentration of CMC can cause the color tends to darken which is caused by the Maillard reaction process, this reaction occurs due to the presence of amino acids and sugars. In addition to amino acids and sugars, other influencing factors are temperature, pH, and the presence of a new compound, namely CMC. Carboxymethyl sodium has polymer chains such as carbonyl groups where this reaction can occur when baking bread which will cause the color to become brown when the bread dough, contains powdered milk which causes when the carbonyl groups and powdered milk are heated together it will result in a Maillard reaction.

Flavor organoleptic

In treatment, T0 was significantly different from T1, T2, T3, and T4. In treatment, T2 was not significantly different from T3, but significantly different from T3 and T4. In treatment, T3 was significantly different from T4. This can be seen in Figure 3.



The higher the ratio of Suweg tuber flour, the lower the flavor of the sweet bread. Where the highest value in treatment

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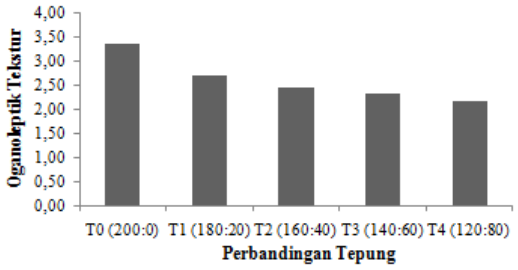
T0 (200:0) with a value of 2.88 while the lowest value in treatment T4 (120:80) with a value of 2.60. The more the ratio of Suweg tuber, the lower the panelists' preference for the flavor of sweet bread.

According to Ioannou and Ghoul (2013) flavor is closely related to the presence of volatile compounds formed during the processing process. The flour processing process will produce volatile compounds. The flavor of the Suweg tuber flour is strong and specific, appearing during the process of processing the Suweg tubers into flour. The flavor appears due to several factors including oxidation and the Maillard reaction that occurs during the process of making Suweg tuber flour. Oxidation itself occurs due to lipids and proteins in the material (Muchtadi et al, 2013).

Texture Organoleptic

Comparison of Wheat Flour and Suweg Tuber Flour

The comparison of wheat flour and Suweg tuber flour has the highest organoleptic texture value in the ratio T0 (200:0) with a value of 3.35 and the lowest value is treated by T4 (120:80) with a value of 2.17. This can be seen in Figure 4.

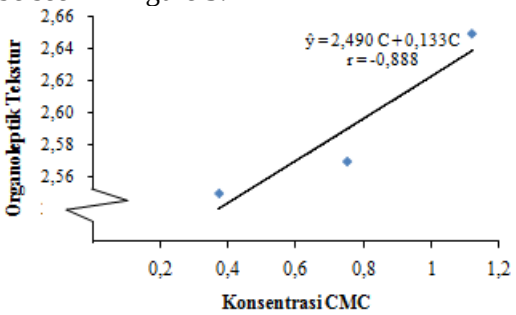


The more flour, the harder the sweet bread will be. Suweg tuber flour has a low gluten content, which gluten can affect the shape, structure, and strength of the dough.

According to Pitoji (2007), the manufacture of bread from non-wheat can affect the structure and texture of the bread produced due to the low gluten content so that the ability to maintain the gas in the bread dough is reduced due to a decrease in gluten content. Gluten has a function as a support structure of bread and gluten's ability to withstand CO2 gas. Suweg tuber has a fairly low starch digestibility value of 61.75%. And starch digestibility is also influenced by amylose and amylopectin in a flour product. The less gluten content of the flour is also the reason the sweet bread is getting harder

CMC concentration

The C1 and C2 treatments had a very significant effect on the C3 treatment. While C1 has no significant effect on C2. The panelists' preference had the highest value in the C3 treatment with a value of 2.65. The decreasing level of preference of panelists in treatment C1 with a value of 2.55. This can be seen in Figure 5.



The higher the concentration of CMC, the higher the preference of the panelists. Carboxyl methyl cellulose (CMC) in the food sector has the function to improve the texture of food. Where CMC is a dietary fiber that can able to maintain the release of air in bread dough.

According to Cahyadi (2005), the addition of CMC in the manufacture of sweet bread can increase the ability to hold CO2 gas. CMC itself has a cellulose component which is the chemical composition of the fiber. CMC can have the ability to absorb water, when water is absorbed the fiber network unites the components of the bread dough to improve the texture of the bread. Where the fiber itself can help hold gas in the bread produced during the fermentation and stirring process.

Comparison of Wheat Flour and Suweg tuber

Flour with CMC Concentration

A comparison of wheat flour and flour with a concentration of CMC (T0C3) has the

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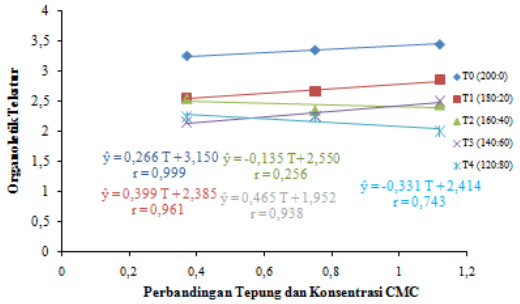
highest organoleptic value of 3.45. While the organoleptic value of the trending texture was the ratio of wheat flour and Suweg tuber flour with a concentration of CMC (T4C3) with a value of 2.00. The relationship between wheat flour and Suweg tuber flour with CMC concentration on organoleptic texture can be seen clearly in Figure 6.



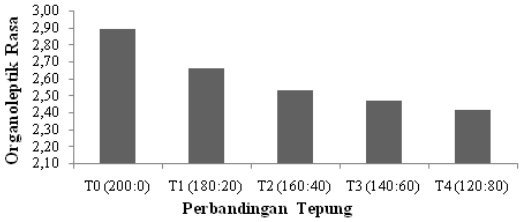
The comparison of wheat flour and Suweg tuber flour with CMC concentration causes the panelists' preference for texture organoleptic to decrease over time. In addition to the amount of flour that affects the texture of sweet bread decreases, the process of making sweet bread also causes the texture of bread products to decrease, one of which is stirring.

According to Cahyadi (2005), stirring in the process of making sweet bread greatly affects the quality of the bread, the bread is stirred until it is smooth. In the process of mixing, the critical point that we must know in making bread is the occurrence of dough development, where in this condition the texture of the dough occurs at optimal conditions. On the other hand, dough that is too fast or too long during the process of mixing bread will cause a dense texture of bread (Handayani, 1987).

Taste Organoleptic

Comparison of Wheat Flour and Suweg Tuber Flour

Treatment T0 was significantly different from treatments, T1, T2, T3, and T4. The treatment of T1 was significantly different from that of T2, T3, and T4. The treatment of T2 was significantly different from that of T3 and T4. T3 is very different from T4. In organoleptic taste, T0 has the highest value of 2.89, while the lowest value of T4 is 2.42. This can be seen in Figure 7.

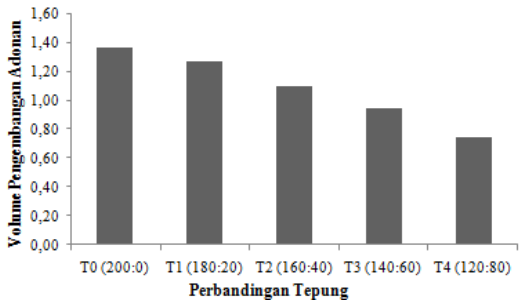


The more concentration of flour, the less the panelists' preference. One way to reduce the itching effect on sweet bread is to use a water soak that has been dissolved in salt.

According to Ratih (2011), the Suweg tuber has an itchy or bitter taste. Where Suweg tuber contains calcium oxalate compounds which are the cause of itching on the tongue after consuming Suweg tubers. The soaking process can dissolve the oxalate salt and reduce its content at the time of disposal of the soaking solution. In addition to soaking, the drying and roasting processes also reduce the oxalate content in the flour. Where this immersion uses the help of a salt solution (NaCl).

Dough Development Volume

Treatment T0 was significantly different from treatments T1, T2, T4, and T4. The treatment of T1 was significantly different from that of T2, T3, and T4. The treatment of T2 was significantly different from that of T3 and T4. T3 is very different from T4. In organoleptic taste, T0 has the highest value of 1.37, while the lowest value of T4 is 0.75. This can be seen in Figure 8.



The parameter T0(200:0) has the highest value which is 1.37, while T4(120:80) is the lowest value in this study, which is 0.75. Suweg tuber flour has a small

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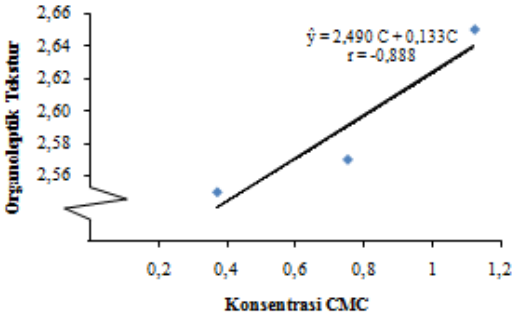
amylose content, and this amylose has a function as an increase in the volume of dough development. So that the more Suweg tuber flour, the lower the volume of dough development on sweet bread.

According to (Richardus et al., 2014) flour containing high amylose will increase the water absorption of flour. And amylose itself will affect the development of a large dough. Meanwhile, amylopectin tends to reduce the swelling power of bread dough.

The amylose content in wheat flour is 24.5% and high amylopectin is 75.5%. This causes a decrease in the volume of dough expansion in bread whereas Suweg tuber flour has a high amylopectin content which tends to decrease the volume of bread dough expansion (Wahyudi, 2013).

CMC concentration

The C1 and C2 treatments had a very significant effect on the C3 treatment. While C1 has no significant effect on C2. The panelists' preference had the highest value in the C3 treatment with a value of 2.65. The decreasing level of preference of panelists in treatment C1 with a value of 2.55. This can be seen in Figure 8.



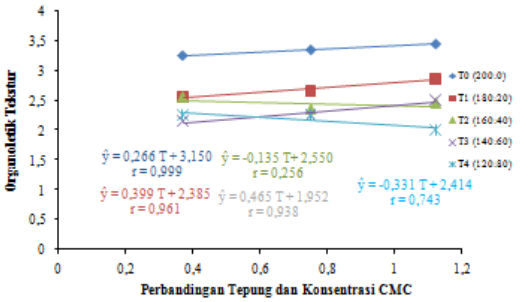
The higher the concentration of CMC, the higher the preference of the panelists. Carboxyl methyl cellulose (CMC) in the food sector has the function to improve the texture of food. Where CMC is a dietary fiber that can maintain the release of air in bread dough.

According to Cahyadi (2005), the addition of CMC in the manufacture of sweet bread can increase the ability to hold CO2 gas. CMC itself has a cellulose component which is the chemical composition of the fiber. CMC can the ability to absorb water, when water is absorbed the fiber network unites the components of the bread dough to improve the texture of the bread.

Comparison of Wheat Flour and Suweg Tuber

Flour with CMC Concentration

A comparison of wheat flour and flour with a concentration of CMC (T0C3) has the highest organoleptic value of 3.45. While the organoleptic value of the trending texture was the ratio of wheat flour and Suweg tuber flour with a concentration of CMC (T4C3) with a value of 2.00. The relationship between wheat flour and Suweg tuber flour with CMC concentration on organoleptic texture can be seen clearly in Figure 9.



In addition to the amount of flour that affects the texture of sweet bread decreases, the process of making sweet bread also causes the texture of bread products to decrease, one of which is stirring.

The kneading process is the manufacture of bread which will determine the quality of the texture of the bread. In the process of mixing, the critical point that we must know in making bread is the occurrence of dough development, where in this condition the texture of the dough occurs at optimal conditions. On the other hand, dough that is too fast or too long during the process of mixing bread will cause a dense texture of bread (Handayani, 1987).

Taste Organoleptic

Comparison of Wheat Flour and Suweg Tuber Flour

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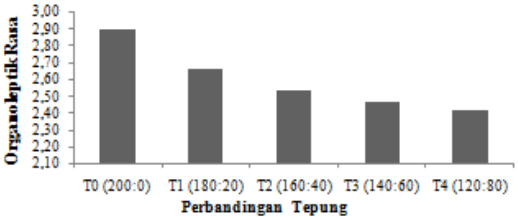
Treatment T0 was significantly different from treatments T1, T2, T3, and T4. The treatment of T1 was significantly different from that of T2, T3, and T4. The treatment of T2 was significantly different from that of T3 and T4. T3 is very different from T4. In organoleptic taste, T0 has the highest value of 2.89, while the lowest value of T4 is 2.42. This can be seen in Figure 10



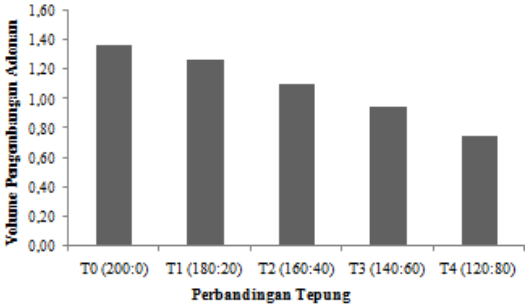
At T0 has a value of 2.89 and then continues to decrease along with the amount of flour concentration of Suweg tuber flour, T4 has a value of 2.42. The itching effect that affects the taste causes the taste of sweet bread to decrease. One way to reduce the itching effect on sweet bread is to use a water soak that has been dissolved in salt.

According to Ratih (2011), the Suweg tuber has an itchy or bitter taste. Where Suweg tuber contains calcium oxalate compounds which are the cause of itching on the tongue after consuming Suweg tubers. The soaking process can dissolve the oxalate salt and reduce its content at the time of disposal of the soaking solution. In addition to soaking, the drying and roasting process also reduces the oxalate content in the flour.

Dough Volume Development

Comparison of Wheat Flour and Suweg Tuber Flour

In organoleptic taste, T0 has the highest value of 1.37, while the lowest value of T4 is 0.75. This can be seen in Figure 11.

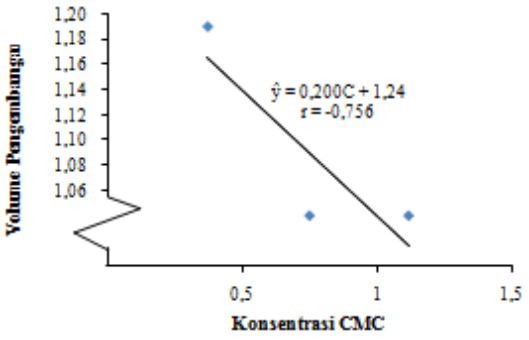


The more comparisons of Suweg flour, the lower the volume of floating dough. Suweg tuber flour has a small amylose content whereas this amylose has a function as an increase in the volume of dough development. So that the more Suweg tuber flour, the lower the volume of dough development on sweet bread.

According to (Richardus et al., 2014) flour containing high amylose will increase the water absorption of flour. Meanwhile, amylopectin tends to reduce the swelling power of bread dough. The amylose content in wheat flour is 24.5% and high amylopectin is 75.5%. This causes a decrease in the volume of dough expansion in bread whereas Suweg tuber flour has a high amylopectin content which tends to decrease the volume of bread dough expansion (Wahyudi, 2013).

CMC concentration

In the treatment, C1 was very significantly different from C2 and C3. While C2 is not significantly different from C3. The highest volume of dough expansion in treatment C1 was 1.19, while the lowest value in treatment T4 was 1.04. This can be seen in Figure 12.



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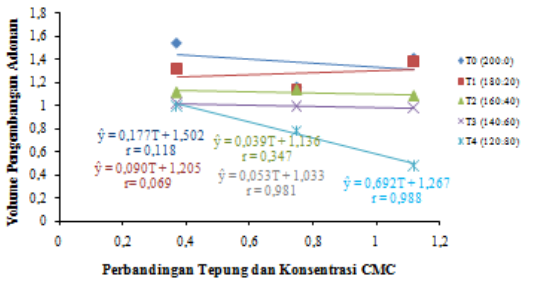
The greater the concentration of CMC, the volume of dough development also decreases, this is caused by increasing the concentration of CMC which can increase the hydrocolloids in sweet bread.

According to Lazaridou et al, (2007), CMC can form a network that can unite the network with gluten-free bread dough components. But the higher the concentration of hydrocolloids, the stronger the bread dough, this also causes an increase in the concentration of hydrocolloids. The increase in the concentration of hydrocolloids causes the bread structures to become more non-uniform. An increase in volume and a decrease in the uniformity of the structure of the bread results in a decrease in the density of the structure of the bread resulting in the hardness of the bread dough which will decrease the volume of development (Widija et al, 2016).

Comparison of Wheat Flour and Suweg tuber

Flour with CMC Concentration

The highest parameter is T0C1(1.54), while the lowest parameter is T4C3(0.48). This can be seen in Figure 13.



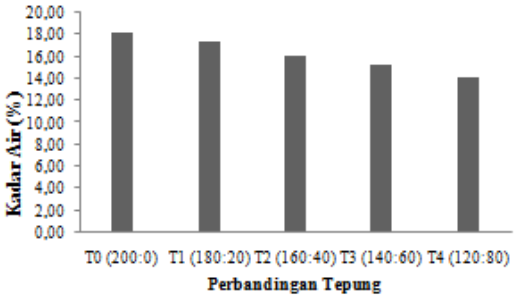
In addition to CMC and flour, yeast has an important role in the volume of bread dough development. The fermentation process using yeast can expand the dough by providing a way for the activity of the CO2 gas produced to be optimal.

According to Koswara (2009), the final fermentation process (final proofing) is the process of developing the dough by providing a path in the right conditions so that the CO2 gas produced will be optimal.

Water content

Comparison of Wheat Flour and Suweg Tuber Flour

The treatment of T1 was significantly different from that of T2, T3, and T4. The treatment of T2 was significantly different from that of T3 and T4. The treatment of T3 was significantly different from that of T4. The highest water content was treated by T0 with a value of 18.23%, while the lowest water content was treated by T4 with a value of 14.11%. This can be seen in Figure 14.



The higher the ratio of Suweg tuber flour, the lower the water content. The decrease in water content in sweet bread with a high ratio of Suweg tuber flour is caused by the very low digestibility of the starch of Suweg tubers, where the starch is not able to bind water in the baking process so it tends to release.

According to Richardus et al, (2014) the decreasing water content is caused by the water absorption power of Suweg tuber starch is smaller than wheat flour. So with the addition of more flour, the bread dough will tend to release more water during baking.

CMC concentration

The C1 treatment had the lowest value of 16.13%, while the highest value was in the C3 treatment with a value of 16.41%. This can be seen in Figure 15.

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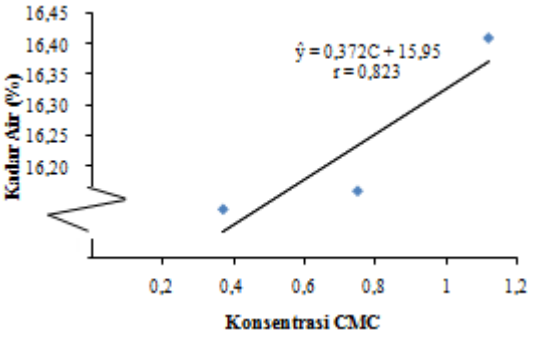


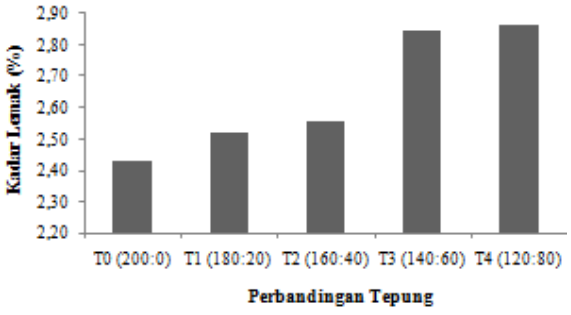
The increasing water content in sweet bread with CMC concentration is caused by CMC which can bind water.

According to Winarno (2000), CMC has properties that can bind water. The higher the concentration of CMC, the greater the water content of the food product. CMC has an OH group which when added to water, the dough will be dispersed (solute) in the water phase, CMC which has water hydrophilic (like) grains will absorb water and enlarge (Kumalaningsih et al, 2005).

Fat level

Comparison of Wheat Flour and Suweg Tuber Flour

Treatment T0 was not significantly different from T1, T2, T3, and T4. At the treatments, T1 was not significantly different from T2, T3, and T4. The treatment of T2 was significantly different from that of T3 and T4. While T3 is significantly different from T4. This can be seen in Figure 16.

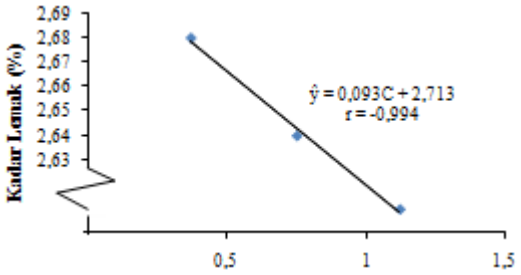


Suweg tuber flour has starch composed of amylose and amylopectin. Where fat content is strongly influenced by amylopectin. The higher the amylopectin, the higher the fat content.

Fat content in flour can interfere with gelatinization because fat is not able to form amylose in a complex manner, thus inhibiting the release of amylose from starch granules. This makes the dough thick and the starch stickiness is reduced due to the reduced amount of water for the development of starch granules. So the higher the fat content, the worse the sweet bread dough will be. This is a sign that the fat content is increasing in the dough (Collison, 1968).

CMC concentration

The treatment of C1 was not significantly different from that of C2, and C3. In the treatment of C2, it was not significantly different from C3. This can be seen in Figure 17.



The higher the concentration of CMC, the lower the fat content in this study. The addition of other substances to the sweet bread dough can reduce the fat content which was originally high to decrease.

According to Alakali (2008), the addition of a stabilizer to the dough will result in a decrease in fat content. The increasing concentration of stabilizer will decrease the original composition of the food. The addition of these substances into a food ingredient causes a decrease in fat content as the concentration of CMC increases.

Comparison of Wheat Flour and Suweg Tuber

Flour with CMC Concentration

T0C1 treatment with a value of 2.51% became the lowest value. While the highest value was in the T4C3 treatment with a

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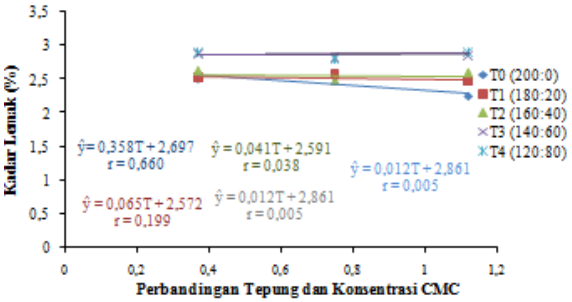
value of 2.91%. This can be seen in Figure 18.

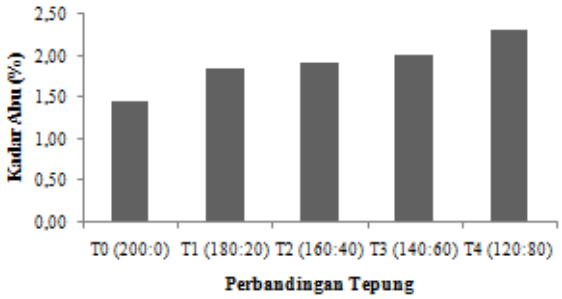


The ingredients in making bread dough are also one of the reasons for the increased fat content. According to Putri (2010) the higher the fat content in the ingredients for making sweet bread, the greater the fat content produced in sweet bread. Margarine, butter, sugar, eggs, and the heating process are also a sweet bread increase.

Ash Level

Comparison of Wheat Flour and Suweg Tuber Flour

Treatment T0 was significantly different from T1, T2, T3, and T4. While T1 was significantly different from T2, T3, and T4. The treatment of T2 was significantly different from that of T3 and T4. The treatment of T3 was significantly different from that of T4. This can be seen in Figure 19.



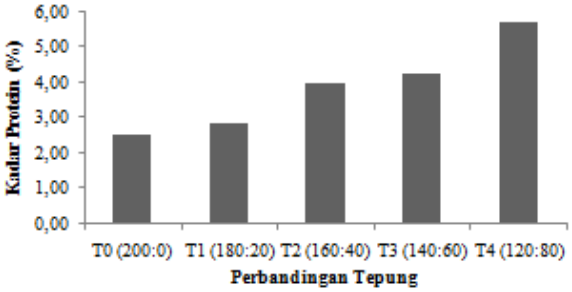
The addition of a large concentration of Suweg tuber flour will cause a high ash content as well. The ash content itself has a relationship with the mineral content found in foodstuffs.

According to Faridah (2005), the mineral content contained in Suweg tuber per 100 grams of tuber of Suweg tuber contained 5.0 mg calcium, 0.6 mg iron. and 20.0 mg phosphorus. The high ash content in food products is caused by foods that are rich in minerals.

Protein Level

Comparison of Wheat Flour and Suweg Tuber Flour

Treatment T0 was not significantly different from T1, while T2, T,3, and T4 were very significantly different from T0, and T1. We can see this in Figure 20.



The ratio of wheat flour and Suweg tuber flour to protein content increased along with the number of ratios of flour concentrations. Suweg tuber flour has a high protein content which causes the concentration of protein content in sweet bread to increase.

According to the Directorate of Nutrition (1992), Suweg tuber flour has a protein content of 7.20%, while this study used high protein wheat flour of 13-14%, if Suweg tuber flour is used in making sweet bread, the higher the protein content.

CMC concentration

The treatment of C1 was not significantly different from that of C2 and C3. While C2 is significantly different from C3. We can see this in Figure 21.

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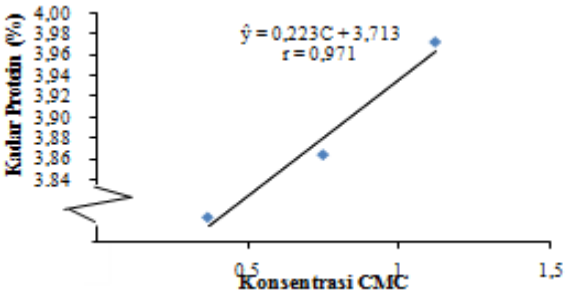


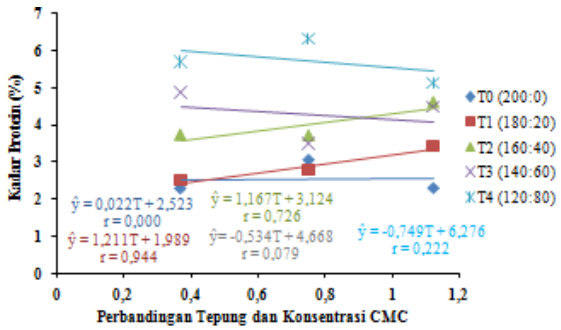
The higher the CMC concentration, the higher the protein content in sweet bread. The increase in protein content in this study was influenced by the concentration of CMC where CMC has binding properties where the protein is bound by CMC so that the protein content in sweet bread increases with the high concentration of CMC and prevents protein deposition.

According to Estiasih (2010), CMC has the advantage of being able to bind solids so that CMC can bind to proteins. CMC has advantages, one of which is that it can prevent protein deposition. Caused by the joining of the carboxyl group of CMC with the positive group charge of the protein.

Comparison of Wheat Flour and Suweg Tuber

Flour with CMC Concentration

Treatment T0C1 with a value of 2.27%, while the highest value in treatment T4C2 with a value of 6.32%. We can see this in Figure 22.



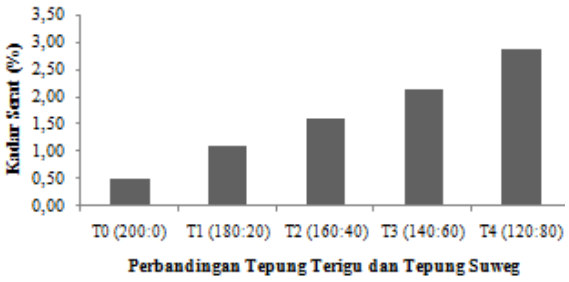
The higher the flour concentration and the CMC concentration, the higher the protein content. The increase in protein content is caused by bread-making ingredients such as flour and eggs.

According to the Ministry of Health (1989) flour and CMC, eggs are also one of the main factors in increasing protein levels, where eggs are the food with the most nutritional content in four components, namely protein, fat, vitamins, and minerals.

Crude Fiber Content

Comparison of Wheat Flour and Suweg Tuber Flour

Treatment T0 was very significantly different from T1, T2, T3, and T4. In T1 treatment, it was significantly different from T2. T1 and T2 were very significantly different from T3 and T4 while T3 and T4 were very significantly different. We can see this in Figure 23.



The higher the ratio of Suweg tuber flour, the higher the fiber content in sweet bread. The high content of crude fiber in flour and wheat flour also affects the high crude fiber in sweet bread.

According to Widodo et al (2014), the ingredients in bread making are the reason for the increased fiber content in food products. One of them is that Suweg tuber flour has a higher crude fiber, which is around 5.23%. While wheat flour itself has a fiber content of 0.43%.

CMC concentration

The treatment of C1 was significantly different from that of C2 and C3. In the treatment, C2 was significantly different from C3. This can be seen in Figure 24.

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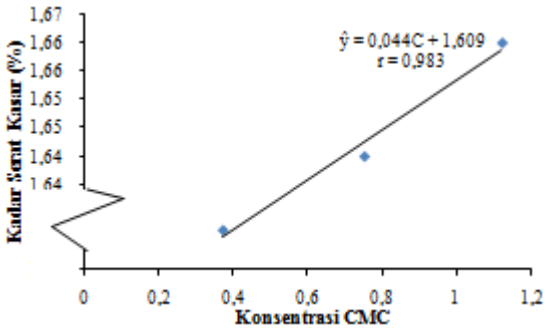
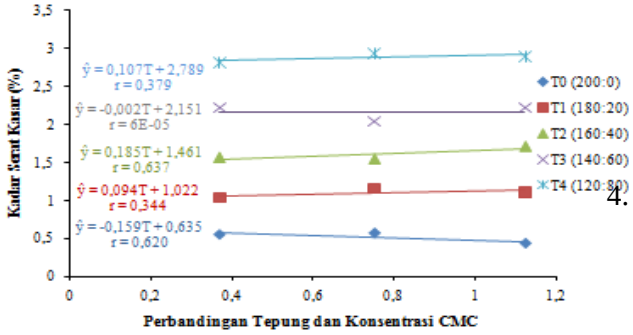


The higher the CMC concentration, the higher the crude fiber content. However, increasing crude fiber content did not increase significantly. Carboxyl methyl cellulose is the content of fiber. Where it will increase the fiber content in sweet bread.

According to Winarno (2004), carboxyl methyl cellulose is a source of dietary fiber that functions to improve the texture of non-wheat bread dough. Dietary fiber in CMC can affect fiber content in food products. The high concentration of CMC, the higher the crude fiber content in food products.

Comparison of Wheat Flour and Suweg Tuber Flour with CMC Concentration

T0C1 treatment became the lowest value with a value of 0.55%. While the lowest value in the T4C2 treatment value of 2.93%. The higher the concentration of flour and CMC ratio, the higher the crude fiber content in this study. Can be seen in Figure 25.



The higher the ratio of flour and CMC concentration, the higher the crude fiber content. According to SNI 01-2973-1992 regarding the quality requirements for dry bread, a minimum of 0.5%. With this, this research has met the SNI standard. Crude fiber itself is good for the body where crude fiber facilitates digestion. But it not only facilitates defecation but prevents and cures colon cancer and wounds in the large intestine, besides lowering cholesterol can also consume crude fiber (Hery, 2001).

CONCLUSIONS AND SUGGESTION

From the results of research and discussion on the comparison of Suweg tuber flour and wheat flour with CMC concentrations on sweet bread, the following conclusions can be drawn:

1. Comparison of wheat flour and Suweg tuber flour gave a very significant difference ($p<0.01$) in the organoleptic parameters of color, flavor, texture, taste, water content, ash content, fat content, protein content, and crude fiber content. And has no significant difference (ns).
2. The concentration of CMC gave a very significant effect ($p<0.01$) on the Organoleptic parameters of color an texture, Development of Dough Volume, Water Content, Protein Content, Fat Content, and Crude Fiber Content. And has no significant effect (ns) on the parameters of Organoleptic (flavor and taste), and ash content.
3. The interaction between the comparison of wheat flour and flour with CMC concentration gave a very significant effect ($p<0.01$) on the Texture Organoleptic parameters, Dough Development Volume, Fat Content, Protein Content, and Crude Fiber Content. And has no significant effect (ns) on the parameters of organoleptic (color, flavor and taste, water content, and ash content.
4. The best research results on the T0C3 texture organoleptic parameter with a value of 3.45, T0C1 Dough Development Volume with a value of 1.54%, T2C2 Fat Content with a value of 2.47%, T4C2 Protein Content with a value of 6.32% and Crude fiber content T4C2 with a value of 2.93%.

Suggestion

There needs to be a factor of adding water to the manufacture of sweet bread, as the ratio of the flour ratio increases, the water also increases. Further research needs to be done by adding the parameters of the carbohydrate content test. Further research is needed to determine the length of baking of sweet bread and the shelf life of sweet bread.

REFERENCES

Alakali, J, S. Okankwo, T, M. Lordye, E, M. 2008. Effect Of Stabilizer On The Physic-Chemical Attributes Of Thermizad Yoghurt. African Jurnal Of Biotechnology, 7 (2): 153- 163.

Cahyadi, Wisnu. 2005. Analisis dan Aspek Kesehatan Bahan Tambahan Pangan. Bumi Aksara. Jakarta.

Callison, R. 1968. Swelling And Gelation Of Starch. Chapman And Hall, Ltd. London.

Depkes. 1989. Daftar Komposisi Bahan Makanan. Bharata Karya Aksara. Jakarta.

Faridah, D. N. 2005. Kajian Sifat Fungsional Umbi Suweg tuber (Amorphophallus campanulatus Bl.) secara In Vivo pada Manusia. Laporan Akhir Penelitian Dosen Muda-IPB. Departemen Ilmudan Teknologi Pangan. Fakultas Teknologi Pertanian. IPB. Bogor. hlm 7.

Handayani. 1987. Mikrobiologi Industri. C.V Andi Offset. Yogyakarta.

Hery Suyono. 2001. Serat Makanan, Benteng Terhadap Berbagai Penyakit. Majalah Intisari Juli 2001.

Ioannou Ghoul. 2013. Food Safety and Standards Authority of India (FSSAI). Training Manual for Food Safety Regulators. New Delhi: Food Safety and Standards Authority of India. Vol I. Introduction to Foof and Food Processing.

Koswara. 2009. Pemanfaatan Tepung Suweg tuber (Amorphopallus Campanulatus B) Untuk Pembuatan Dekstrin Secara Enzimatis. Jakarta.

Kumalaningsih, S., Suprayogi, B, Y. 2005. Membuat Makanan Siap Saji. Trubus Agrisarana. Surabaya.

Lazaridou, A., Duta, D., Papageorgiou, M., Belc, N., Biliaderis, C.G. 2007. Effect Ofhydrocilloids On Dough Rheology And Bread quality Parameters In Gluten-Free Formulation. Journal Of Food Engineering 79: 1033- 1047.

Muchtadi, E. Setyo dan L. N. Yulianti. 2013. Membuat Aneka Roti. Penebar Swadaya. Jakarta.

Pitojo, S. 2007. Suweg tuber . Penerbit Kanisius. Yogyakarta.

Putri, M. F. 2010. Kandungan Gizi Dan Sifat Fisik Tepung Ampas Kelapa Sebagai Bahan Pangan Sumber Serat. Skripsi. Fakultas Teknik. Universitas Semarang. Semarang.

Ratih Turisyawati. 2011. Pemanfaatan Tepung Suweg tuber Sebagai Substitusi Tepung Terigu Pada Pembuatan Cookies. Skripsi. Fakultas Pertanian, Universitas Sebelas Maret. Surkerta.

Richardus Widodo, Setijanen Djoko Harijanto dan Dwi Agustiyah Rosida. 2014. Aspek Mutu Produk Roti Tawar Untuk Diabetesi Berbahan Baku Tepung Porang Dan Tepung Suweg tuber . http://jurnal.untag-sby.ac.id/index.php/agroknow/article/view/340. Diakses pada tanggal 01 Januari 2019.

Smith, P.S. 1972. Starch Derivatives and Their Uses in Foods. Didalam G.M.A. Van Beynum and J.A. Rolls (eds). Food

Carbohydrate. 1982. AVI. Publ. Co. Inc., Westport, Connecticut.

SNI. 1992. Syarat Mutu Roti Tawar. Dewan Standar Nasional. Jakarta.

Wahyudi. 2013. Memproduksi Roti. Direktorat Pendidikan Menengah Kejuruan. Direktorat Jendral Pendidikan Dasar Dan Menengah Dan Departemen Pendidikan Nasional. Jakarta.

Widija, S. L. N., Trisnawati, C. Y., Widjajaseputra, A. I. 2016. Penggunaan Na-CMC dan Gum Xanthan Untuk Memperbaiki Cake Beras Rendah Lemak. Teknologi Pertanian Universitas Katolik Widya Mandala. Surabaya.

Widodo, R, S,D. Herijanto, D,A, Rosida. 2014. Aspek Mutu Produk Roti Tawar Untuk Diabetes Berbahan Baku Tepung Porang Dan Tepung Suweg tuber . Jurnal Bioproses Komoditas Tropis 3(1).

Williams, C. 1995. Controlling Dietary Fiber in Food Product. Van Nostrand Reinhold. New York.

Winarno, F, G. 2000. Potensi Dan Peran Tepung-Tepungan Bagi Industri Pangan Dan Program Pendidikan Gizi. Penganeka Ragaman Makanan Untuk Memantapkan Ketersediaan Pangan.

Winarno, F,G. 2004. Kimia Pangan dan Gizi. Gramedia Pustaka Utama. Jakarta.

Winarno, FG. 1997. Kimia Pangan dan Gizi. PT. Gramedia. Jakarta.