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Analyzing the Rendement, Water Content, Chemical and Organoleptic Properties of Watermelon (Citrullus lanatus) Sweet Spicy Seasoning

Siti Sabariyah[1], Muhammad Jufri[1], If'all[1], Siti Fathurrahmi[1], Spetriani[1], Sultan[1], Ramadhani Chaniago[2*]

[1] Program Studi Teknologi Hasil Pertanian, Fakultas Pertanian, Universitas Alkhairaat Palu, Indonesia.
[2] Program Studi Agroteknologi, Fakultas Pertanian. Universitas Muhammadiyah Luwuk, Indonesia.

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Corresponding Author:
Ramadhani Chaniago
idhon86chaniago@gmail.com

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Abstract: Until now, the use of watermelon has not been carried out optimally, often watermelon is only used as a food ingredient that is processed in less varied ways. This research aims to determine the physical, chemical, and organoleptic properties of sweet and spicy watermelon sprinkles and determine the physical, chemical, and organoleptic properties of the best sweet and spicy watermelon sprinkles. Sprinkle seasoning can improve taste and aesthetics in the food industry which is practical and varied. This research was carried out using a factorial Completely Randomized Design (CRD) and organoleptic testing with three replications consisting of: Factor A (addition of watermelon) S1=1000g Watermelon, S2= 800g Watermelon, S3= 600g Watermelon, S4= 400g Watermelon. Factor B (storage time,) P0 = no storage, P1 = 2 weeks of storage (P2 = 2nd month of storage for antioxidant testing). The best treatment of 40% was found in the fourth treatment after 2 weeks of storage. The best water content of 17.67% was found in the second treatment after 2 weeks of storage. The best antioxidant activity of 7.96 ppm was found in the first treatment without storage. The best Vitamin C content* both with and without storage was 0.19%. The best organoleptic taste 3.45 was found in treatment 1 without storage, in the aroma test the best and much liked.

Keywords: Seasoning; Sweet spicy; Watermelon.

Introduction

Indonesia is famous for the taste of processed food products with various spices. Processed food products with a delicious aroma and attractive color appearance require multiple spices. Spices function to strengthen and enrich the taste of processed food products. The taste of processed food that is added with spices has a fragrant, delicious, and rich smell, which can provide and strengthen the characteristics of the processed food ingredients. The diversity of spices as additional ingredients in processed food products also greatly affects the visual appearance because it gives different colors to processed food products (Lahmudin *et al*., 2021). One of the food ingredients that can be used as a spice is watermelon.

Watermelon (*Citrullus lanatus*) is a very popular fruit with Indonesians because of its sweet, crunchy taste and high-water content. Watermelon is usually harvested to be eaten fresh or made into juice. Watermelon has hard skin, dark green or light green with dark green stripes depending on the cultivar, and the juicy flesh is red or yellow (Yustikarini, 2022). According to the Direktorat Jenderal Hortikultura, Kementerian Pertanian (2015), the amount of waste from watermelon is around 10% of the total production, around 60 tons. According to Megawati *et al.* (2017), the albedo or thickest skin with a 1.5 - 2.0 cm thickness, white on the inside of the watermelon, is household waste rarely utilized optimally as food ingredients. Watermelon albedo contains citrulline, vitamin C, various minerals, and enzymes that are beneficial to the human body (Maulani *et al*., 2014).

The utilization of watermelon fruit has not been optimal until now; often, watermelon fruit is only used as a food ingredient that is processed in a less varied

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way. Watermelon is generally only consumed as fresh fruit, while the fruit's skin is only used as animal feed. Watermelon fruit can be processed into products with high sales value by utilizing all parts of the fruit, including the flesh or skin of the fruit. Wijinindyah et al., (2023) has researched the use of tea from Kakalai (*Stenochlaena palustris*), Moringa and Egg Shells as Alternative Powdered Sprinkles. Based on the description above, the author is interested in conducting a study entitled "Analysis of Physical, Chemical, and Organoleptic Properties of Sweet and Spicy Watermelon Sprinkle Seasoning (*Citrullus lanatus*)."

Method

This study was conducted using a factorial Completely Randomized Design (CRD) and organoleptic testing with three replications consisting of Factor A (addition of watermelon) S1 = 1000g Watermelon, S2 = 800g Watermelon, S3 = 600g Watermelon, S4 = 400g Watermelon. Factor B (storage period) P0 = no storage, P1 = 2 weeks storage, P2 = 2nd-month storage for antioxidant testing) and there are 24 treatment units. The process of making sweet and spicy watermelon sprinkles can be seen in the following steps (Prasetyawati *et al*., 2021), which were modified: The watermelon is cleaned and cut, and all parts are removed except the green outer skin. Then, pure it using a blender or other pureeing tool. Put the chilies in a blender, add 50 ml of water, then puree. Add 50 ml of water, add sugar, and stir until dissolved. Add the watermelon and chili that have been pureed into the pan. Cook until it becomes a coarse powder, then remove, cool, and grind. Next, it is analyzed and then stored for 2 weeks.

Observation Parameters

Yield Test

The yield test was conducted to determine the percentage of food processing efficiency. The yield test on sweet and spicy sprinkles was performed by calculating the percentage produced compared to the food ingredients used (Wahyudi, 2006), Weighing the resulting sweet and tangy seasoning. Weigh the initial weight of the ingredients (weight of wet watermelon + chili + water). To calculate the yield, the following formula is used:

$$\text{Yield (\% w/v)} = \frac{\text{Results of Sweet Spicy Seasoning (g)}}{\text{Weight of wet watermelon + chilies + water (ml)}} x\ 100 \qquad (1)$$

Water Content

Water content (%) of sweet and spicy watermelon sprinkles by drying by cooking, then a comparison is made between the initial weight of the sweet and spicy watermelon sprinkles minus the final weight after cooking with the initial weight of the sweet and spicy watermelon sprinkles multiplied by one hundred per cent (Setyaji *et al*., 2012). The following are the steps in the water content test process: The empty cup is dried in the oven for 15 minutes; then, approximately 2 g of the sample that had been homogenized in the cup is quickly weighed. Put in the cup and then in the oven for 2.5 hours at a temperature of around 1500C until the water content decreases. The cup is cooled for 10-15 minutes; after cooling, the material is weighed until the initial and final weights are compared. The water content is calculated using the formula:

$$\text{Water content} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \text{x } 100\% \qquad (2)$$

Vitamin C

Vitamin C levels in samples were determined using the modified Iodometry (titration) method (El-Ishaq & Obirinakem, 2015). Provide 1 g of fine sample (product) of each sweet and spicy watermelon sprinkle in a 100 mL flask, and then add 100 mL of distilled water to the limit mark. Add five drops of starch indicator, then titrate with 0.01 N iodine (I2) until blue. Vitamin C content can be calculated using the formula:

$$\text{Vitamin C} = \text{x } 100\% \frac{V\ iodin\ x\ N\ iodin\ x \frac{179}{mol}}{Sample\ weight\ (mg)} \qquad (3)$$

Antioxidant

To determine the activity of antioxidants in sweet and spicy watermelon sprinkles, the DPPH method was modified by Amin *et al*. (2015). The following is the antioxidant testing process using the DPPH method. To get a solution concentration of 1000 ppm, the sample extract was weighed up to 10 mg, transferred to a 10 ml measuring flask, and then tested using an ethanol solvent. After that, a series of dilutions was performed to obtain solutions at 20, 40, 60, 80, and 100 ppm. Three milliliters of 50µM DPPH solution (1.97 mg/100 ml methanol) were added to the prepared solution, which had been pipetted up to one milliliter. After homogenizing the mixture, it was placed in a dark area for half an hour. A wavelength of 517 nm was then used to measure the absorbance. Additionally, the DPPH solution was tested. The following formula was utilized to calculate the percentage inhibition based on the acquired absorbance value:

$$\%\ Inhibition = \frac{Abs.DPPH - Abs.Sample}{Abs.\ DPPH}\ X\ 100\% \qquad (4)$$

Organoleptic Test

20 untrained panelists tested the testing of the watermelon sweet, spicy seasoning sample. The

panelists selected were Faculty of Agriculture, Alkhairaat University, Palu students. Then, the participants were asked to assess taste, aroma, color, and texture using the hedonic method. For the organoleptic data results, validity and reliability were tested using ANOVA and significant difference tests (BNJ/Duncan).

Result and Discussion

Rendement

Analysis of the sweet and spicy seasoning powder yield is useful for evaluating the weight of the seasoning powder produced from the drying process. The yield value is obtained by calculating the weight of the seasoning powder that has undergone the drying process with the initial weight. The average yield value of the seasoning powder can be seen in Figure 1.

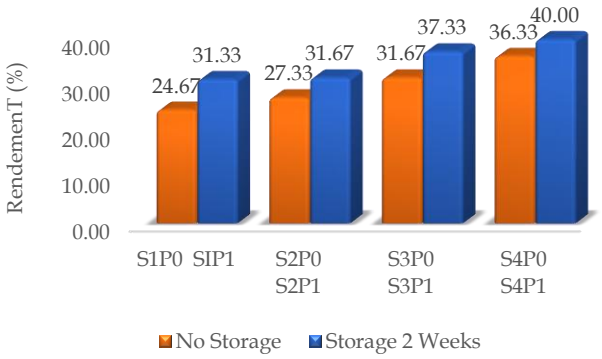

Figure 1. Rendement results.

The analysis of variance in Figure 1 shows that the highest average yield (40%) was in treatment four during storage, so the spice yield had a significant effect. On the other hand, the lowest yield (24.67%) was in treatment one without storage. So, the spice yield has a considerable impact. In various treatments, the highest and lowest yields are also different. The longer the heating, the lower the yield of the resulting sprinkled seasoning. This is likely due to the decreased water content in the sprinkled seasoning. According to Hall (1998), the high and low yields produced are more influenced by the amount of water lost during heating. This study has a lower yield when compared to (Wahyuni et al., 2021) with a value of 6.97-21.37.

Water Content

Water content is the amount of water contained in food ingredients. Water content is an important parameter for determining a food ingredient's quality. Water content also determines the shelf-life quality of food ingredients, including sprinkles. The average results of the sprinkled seasoning can be seen in Figure 2.

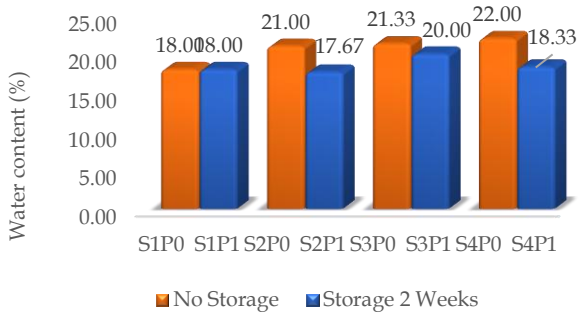

Figure 2. Water content results

Based on the analysis of variance in Figure 2, the highest average water content (22.00%) was in treatment four without storage, so the water content of the seasoning had no significant effect. While the lowest water content (17.67%) was in treatment two during storage. So, the water content of the sweet and spicy sprinkled seasoning had no significant effect. The results of the water content analysis in the sprinkled seasoning showed that the water content produced was in the range of 17.67% - 22.00%. According to SNI 01-3709-1995, the maximum water content of powdered seasoning is 12.0%, so the water content produced in the sweet and spicy sprinkled seasoning does not meet the quality requirements of powdered seasoning. The water content analysis in the sprinkled seasoning decreased due to storage, the longer the storage, the lower the water content. This research has a lower water content when compared to (Wijinindyah et al., 2023) with a value of 6.29-7.95

Antioxidants

An antioxidant test is a test conducted to detect antioxidant compounds in a sample. Antioxidants are the properties of a compound that can fight free radicals. Antioxidants can be found in fruits, vegetables, and other processed foods. The average results of antioxidant values in sweet and spicy sprinkles can be seen in Figure 3.

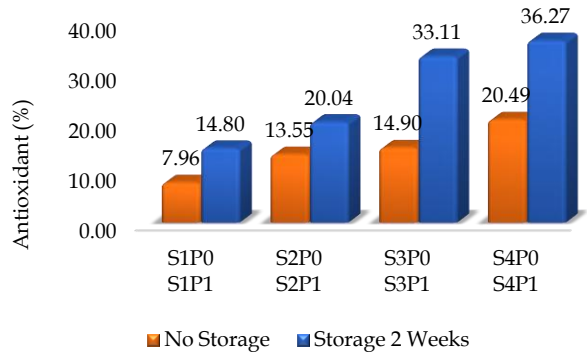

Figure 3. Antioxidant Results

Based on the analysis of variance in Figure 3, the highest antioxidant activity was in the P1 treatment without storage (P1B0) calculated based on IC50 (7.96 ppm), while the weakest antioxidant activity was P4 (67.14 ppm) in the second month of storage (P4B2) so, the longer the storage of the spicy sweet watermelon sprinkles, the antioxidant activity decreases. Based on the study's results, it is also known that the more watermelon is given, the higher the antioxidant content of the spicy, sweet watermelon sprinkles. So, the spicy, sweet watermelon sprinkles can counteract free radicals because they have very strong antioxidant activity. Free radicals formed in the body will produce new free radicals through a chain reaction that continues to increase in number, then attacks body cells so that tissue damage occurs but can be treated by consuming foods rich in antioxidants (Winarsi, 2007). This study has antioxidants that are partly the same as (Kusumawati, 2023) with a value of 14.59%.

Vitamin C

The body needs vitamin C, but it cannot be synthesized. It has the properties of counteracting free radicals, which will slow down the oxidation process that occurs in the body. Vitamin C functions as a form of connective tissue. This vitamin is also needed to form red blood cells (Handayani *et al*., 2020).

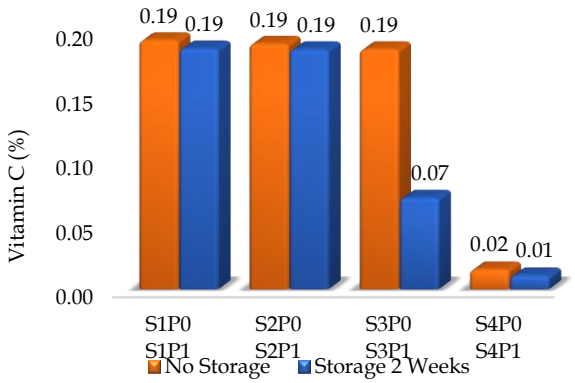

Figure 4. Vitamin C Level Results

Figure 4 shows the average vitamin C results for sweet and spicy seasonings. According to Figure 4's analysis of variance the highest vitamin C content (0.19%) is in treatments 1, 2, and 3 without storage and during storage, the vitamin C content of the seasoning has no significant effect. While the lowest vitamin C content (0.01%) is in treatment four during storage. So, the vitamin C content of the seasoning has a significant effect. Temperature can affect vitamin C levels; the higher the temperature, the lower the vitamin C content (Hudzaifah, 2014; Rachmawati *et al*., 2009). In addition to high temperatures, vitamin C can dissolve in water and is easily oxidized by atmospheric oxygen or the enzyme ascorbate oxidase. Although easily oxidized, vitamin C can be an antioxidant in the human body (Suryani *et al*., 2023).

Taste

Taste is one of the factors that can determine whether a product is accepted or not by consumers. Taste is something that is received by the tongue. In human taste perception, it is divided into 4. The main tastes are sweet, bitter, sour, and salty, and there are additional responses if modifications are made (Arziyah *et al*., 2022). The average results of the organoleptic test on the taste of sweet and spicy sprinkles can be seen in Figure 5.

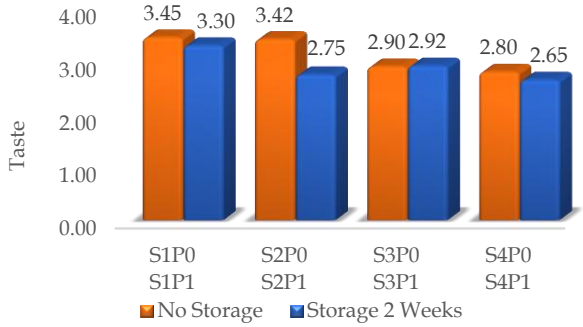

Figure 5. Taste Test Results

Based on the analysis of variance in Figure 5, the highest organoleptic taste of the sprinkled seasoning (3.45) is in treatment one without storage, so the researcher likes the taste of the seasoning and has no significant effect. The lowest organoleptic taste of the sprinkled seasoning (2.65) is in treatment four and stored for 2 weeks. So, the researcher does not like the organoleptic taste of the sweet and spicy sprinkled seasoning, and it has a significant effect. According to Maimunah (2019), the variety of natural perceptions creates the complexity of a taste. Three things affect taste: oral stimulation (hot and cold), taste, and fragrance. The first element is noticed by the sense of smell, while the tongue's sensory cells detect the second factor (Ikrom, 2020).

Aroma

Using the sense of smell, aroma is one of the factors used to measure sensory qualities (organoleptic). If the final product has a certain scent, it can be tolerated (Kusmawati *et al*., 2000). The results of the analysis of aroma variance in sweet and spicy watermelon sprinkles can be seen in Figure 6.

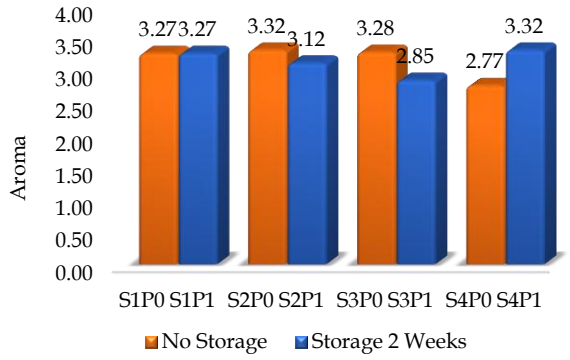

Figure 6. Aroma Test Results

Based on the analysis of variance in Figure 6, the highest aroma test on the sprinkled seasoning (3.28) is in treatment three without storage, so the researcher likes the aroma of the seasoning, and it has a significant effect. At the same time, the aroma test on the sprinkled seasoning is the lowest (2.77) in treatment four without storage. So, the researcher does not like the aroma test of the seasoning, and it has a significant effect. According to (Khalisa *et al*., 2021; Zuhrina, 2012), the aroma spread by food is a very strong attraction and can stimulate the sense of smell to arouse appetite. The emergence of food aroma is caused by the formation of volatile compounds due to enzyme reactions, which can also be formed without the help of enzyme receptors.

Color

The first sensory component that researchers can directly observe is color. The quality of food ingredients is typically determined by their color; a color that does not differ from the ideal color will give the impression that researchers are evaluating it. Figure 7 below displays the data from the color calculation results for the spicy and sweet sprinkle seasoning:

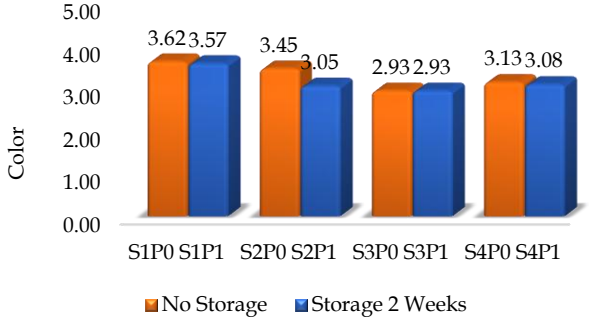

Figure 7. Color Test Results

Based on the analysis of variance in Figure 7, the highest color test on the sprinkled seasoning (3.65) was in treatment one without storage, so the color of the seasoning was very much liked by researchers and had a very real effect. The lowest color test on the sprinkled seasoning (2.93) was in treatment three without storage and 2 weeks of storage, so the organoleptic color of the sweet and spicy sprinkled seasoning was not liked by researchers and had a real effect. When assessing the quality or level of acceptance of a food ingredient or product, color plays a significant role. Additionally, chemical changes in food ingredients, such as browning and caramelization reactions, can be indicated by color (Novianti, 2021).

Texture

The sensation of texture is associated with touch. Because texture influences how food is viewed, it is occasionally regarded as being just as significant as taste, smell, and scent. Analysis of texture variance in sweet and spicy watermelon sprinkles can be seen in Figure 8.

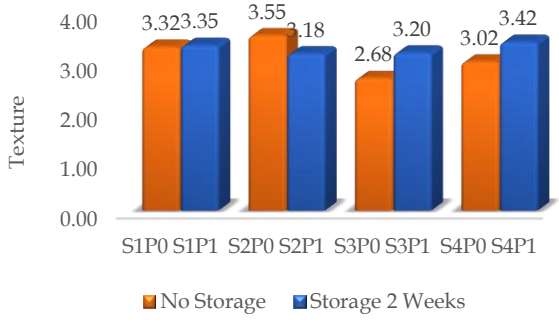

Figure 8. Texture Test Results

Based on the variance analysis, the highest texture test on the sprinkled seasoning (3.55) was in treatment two without storage. Hence, the researcher liked the spice texture test, which had a significant effect. The lowest texture test on the sprinkled seasoning (2.68) was in treatment three without storage, so the texture test on the seasoning was not liked by the researcher and had a significant effect. The various texture sensations assessed by the fingertips include wetness, dryness, hardness, smoothness, roughness, and oiliness (Soekarto, 1990). According to Winarno (1991), A material's consistency and texture will influence the flavor it produces.

Conclusion

Based on the analysis of variance, it can be concluded that: (1) The best yield of 40% was found in treatment four during 2 weeks of storage, the best water content of 17.67% was found in treatment two during 2 weeks of storage, and the best antioxidant activity of 7.96 ppm was found in treatment one without storage. The best Vitamin C from storage and without storage was 0.19%; (2) In the organoleptic test of sweet and spicy

watermelon sprinkle seasoning that researcher liked much in terms of taste, the best, 3.45, is in treatment 1 without storage; in the aroma test, the best and most wanted by researchers, 3.28, is in treatment three without storage. In color, the best and most liked by researchers, 3.65, is in treatment one without storage. The best and most liked texture test by researchers 3.55 is in treatment 2 without storage.

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Conflicts of Interest
There are no conflicts of interest, according to the author.

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