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The Effect of Preliminary Treatment and Storage Time on the Quality of Infused Water Drinks of Butterfly Pea Flower (*Clitoria ternatea*), Siamese Oranges (*Citrus nobilis*), and Mint Leaves (*Mentha piperita* L.)

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A B S T R A C T

Infused water is a natural alternative drink that contains various vitamins. This research will use an infused water drink from butterfly pea flowers, Siamese oranges, and mint leaves. This research aims to analyze the effect of pretreatment and storage time on the quality of the infused water produced and to identify the best treatment between pretreatment and storage time based on the physicochemical, microbiological, and organoleptic characteristics of infused water drinks. This research used a completely randomized design (CRD) with a factorial pattern with two factors and three replications. Factor I is storage temperature (room temperature (27°C), refrigerator temperature (5°C), and room temperature that has been pasteurized (60°C for 15 minutes)). Factor II is storage time (1 hour, 3 hours, and 6 hours). If there is a significant difference, the further test will be continued with 5% DMRT. The best treatment results were obtained in the pre-pasteurization treatment at room temperature with a storage time of six hours which produced infused water with value 5.257; vitamin C 19.57 mg/100g; antioxidant capacity (IC50) 2.187; total acid 0.312%; total phenol 1,261 mgGAE/g; total plate count 1,950 Log CFU/ml; color preference score 3.80; aroma preference score 3.6; taste preference score 3.45.

1. INTRODUCTION

1.1. Research Background

Water is the main component that is most abundant in the human body. About 60% of an adult's total body weight consists of water. Water can help metabolic processes usually run. Every day, the body's water needs must be met; it is recommended to consume 8-10 glasses of water every day. However, some people still consume water in amounts that are less than their needs. The Indonesian Hydration Regional Study (THIRST) stated that 46.1% of the subjects studied experienced water shortages, this incidence was higher in adolescents (49.5%) than in adults (42.5%). Lack of water or fluids in the body has a negative impact on health, causing dehydration and increasing the risk of various diseases. Apart from that, it also has a negative impact on stamina, memory, and intelligence [1].

Infused water drinks have begun to be known and consumed by several Indonesian people because the processing process and ingredients used are straightforward to apply. Infused water is usually consumed as a variant of drinking water because water with pieces of fruit tastes fresh and has a distinctive aroma; it doesn't taste sweet like juice or fruit juice because it doesn't contain any additives [2].

Butterfly pea flower (*Clitoria ternatea*) is one of the plants whose all parts have functional benefits for the human body; the flower petals are helpful as antioxidants, anti-obesity, anti-cancer, anti-inflammatory, antibiotic, and protect liver tissue. The anthocyanin compounds in butterfly pea flowers have higher antioxidant activity than anthocyanins from other flower extracts [3]. Siamese oranges (*Citrus nobilis*) are a type of fruit that has become a superior commodity to be developed because they have a wide planting distribution and a high level of consumption. This is because citrus fruit has taste, aroma, and freshness, and is useful as a fresh fruit food or processed food that has a high vitamin C content. Mint leaves are usually added to infused water to make it taste fresher [4]. Mint leaves contain essential oil consisting of menthol and vitamin C, vitamin A, potassium, iron, phosphorus, calcium, phytonatrium, and chlorophyll. Mint leaves are also rich in antioxidants which help fight cancer cells [5].

Pasteurization is a heating process that extends food's shelf life to a temperature of 60°C-100°C. It aims to kill microorganisms and inactivate enzymes contained in the food itself while still considering its quality [6]. Heating products can increase product durability because the heating process can kill

spoilage microbes and inactivate spoilage enzymes, making product quality more stable during storage [7].

According to research of Ref. [8], the best lemon-infused water has an infusion time of 6 hours at room temperature (24-27°C). Meanwhile, pure orange juice is pasteurized at 75°C for 10 minutes [9]. Based on this, this research aims to analyze the pre-pasteurization treatment and storage time on the quality of infused water drinks with a mixture of butterfly pea flowers, Siamese oranges and mint leaves which will be tested so that it is hoped that this research can provide information about the content of butterfly pea flower infused water drinks. Siamese oranges and mint leaves with the best pretreatment.

1.2. Literature Review

Infused water is water that is added to pieces of fruit or vegetables and left for several hours until the juice comes out; then, it is ready to be consumed, thus providing taste and health benefits. According to Ref. [10], the principle of making infused water is soaking pieces of fruit in water. The juice and ingredients contained in the fruit will dissolve into the water so that you can feel the benefits when enjoying infused water.

Diffusion is the movement of molecules using free kinetic energy; this movement occurs from a high degree of concentration to a low degree of concentration so that in the movement of diffusion, the concentration of molecules will be the same in all parts. The difference in concentration in two solutions is also called a concentration gradient. Diffusion will continue until all particles are spread evenly or reach an equilibrium state where molecular movement continues to occur even though there is no difference in concentration. The diffusion rate can also be increased by stirring so that equilibrium (homogeneous) conditions can be achieved more quickly [11].

The diffusion process can occur in solids, liquids, or gases. In this case, the process does not require energy, which is why diffusion is also called a passive transport system. In diffusion, there is a diffusion coefficient, which is a parameter that states the magnitude of the charge carrier concentration gradient. This coefficient's value is not fixed like a constant in general. This happens because particle size, membrane thickness, area, distance between two concentrations, and temperature influence the diffusion coefficient value. The greater the diffusion coefficient, the faster the diffusion process will occur [12].

Pasteurization can be carried out at a temperature of 60°C-96°C to deactivate spoilage microbes and unwanted enzymes. Heating products can increase product durability because heat can kill spoilage microbes and inactivate spoilage enzymes, making product quality more stable during storage [7]. The pasteurization process followed by storage at cold temperatures, according to [13], will inhibit the growth of microbes that are resistant to hot temperatures. The pasteurization process at a temperature of 80°C produces quality orange juice with the lowest microbial count, namely 1.9 x 102 colonies/ml orange juice, which meets SNI (< 2 x 102 colonies/ml). This research proves that pasteurization treatment can increase the shelf life of food products microbiologically [14].

The heating process at high temperatures can cause antioxidant compounds to oxidize. Antioxidant compounds have properties that are not resistant to high-temperature cooking processes (100°C) because they can reduce their antioxidative properties and can also damage the chemical structure of the constituent compounds. The higher the pasteurization temperature and the longer the pasteurization time, the lower the vitamin C levels in orange juice. The decrease in vitamin C levels is caused by ascorbic acid being unstable and sensitive to heat and will oxidize if exposed to air and high temperatures. Oxidation of ascorbic acid will change ascorbic acid and become dehydroascorbic acid. The higher the pasteurization temperature and storage time, the higher the oxidation rate of ascorbic acid will increase [15]. Pasteurization temperature greatly influences the diffusion process. The higher the temperature, the faster the particles get the energy to move and the faster the diffusion speed [16].

1.3. Research Objectives

This research aims to analyze the effect of preliminary treatment and storage time on the quality of the butterfly pea flower infused water, Siamese orange fruit, and mint leaves produced. As well as identifying the best treatment between pretreatment and storage time on the physicochemical, microbiological, and organoleptic characteristics of infused water from butterfly pea flowers, Siamese orange fruit and mint leaves.

2. MATERIALS AND METHODS

2.1. Materials and Tools

The ingredients used to make infused water samples include butterfly pea flowers, Siamese orange fruit, and mint leaves. Materials used for analysis include Aquades, 1% Starch Solution, 1% Iodine, 96% ethanol, 10% Na_2CO_3, Methanol, 0.1 N NaOH, 1% pp indicator, concentrated H2S04, 10% FeCl3, Follin Ciocalteu reagent, DPPH powder, Gallic Acid, PCA media (plate count agar).

The tools used for this research process are tools for analysis, including a thermometer, incase, UV-vis spectrophotometer, hot plate, memmert oven, analytical balance, measuring cup, Erlenmeyer flask, vortex, pipette, spatula, incubator, refrigerator, burette, static, serving glasses, pens, labels, hedonic test questionnaire sheets.

2.2. Design Experiment and Analysis

The research used a Completely Randomized Design (CRD) method with a factorial pattern with two factors and three replications. The first factor, namely preliminary treatment, includes:

S1 = Without Pasteurization (room temperature storage)
S2 = Without Pasteurization (refrigerator temperature storage)
S3 = Pasteurization 60°C for 15 minutes (room temperature storage)

The second factor, namely storage time, includes:

W1 = 1 Hour
W2 = 3 Hours
W3 = 6 Hours

Table 1. The Treatment Combination of Infused Water

Factor I	Factor II		
	W1	W2	W3
S1	S1W1	S1W2	S1W3
S2	S2W1	S2W2	S2W3
S3	S3W1	S3W2	S3W3

Data from the analysis results were processed using Analysis of Variance (ANOVA) with a level of 5% to determine whether there were significant differences. Further tests use the 5% DMRT (Duncan Multiple Range Test) method if significant differences exist. The organoleptic test uses the hedonic test method with 20 panelists for color, aroma, and taste.

Infused water testing includes pH analysis, vitamin C levels, antioxidant activity, total titrated acids, total phenols, total plate count, and hedonic tests for color, aroma, taste.

2.3. Research Produce

Making infused water in this research is based on modifications from previous research [8] using different materials and treatments.

2.4. Implementation of Research

2.4.1. pH Value [17]

The pH meter is turned on and neutralized for 15-30 minutes. Standardized with a pH buffer solution. Samples can be measured after the pH meter has been calibrated, the pH meter dipped into the sample and left until the pH meter readings are stable. The value is displayed on the pH meter monitor screen. After the measurement, the pH meter is rinsed with distilled water and dried with tissue.

2.4.2. Vitamin C Levels [18]

Testing vitamin C levels uses the iodine titration method by taking a 10ml sample of infused water and placing it in an Erlenmeyer. Add 1 mL of 1% starch indicator. Titrate using 0.01N Iodine solution until a blue color forms.

2.4.3. Antioxidant Activity [19]

Antioxidant activity testing uses the DPPH method by taking 50 µL of the infused water sample, then dissolving it with methanol p.a. to 50 ml, to obtain a concentration of 1000 ppm, then adding 4 ml of DPPH solution. The solution mixture is homogenized and left for 30 minutes in a dark place (not exposed to light).). Absorbance was measured with a UV-Vis spectrophotometer at λ 517nm.

2.4.4. Total Titrated Acid [20]

A 10ml sample of infused water was taken, dissolved in 250ml in a measuring flask, then 50ml was taken, and then dripped with 2-3 drops of PP indicator. The solution was titrated with 0.1 N NaOH until the color changed to pink.

2.4.5. Total Phenols [21]

Preparation of Gallic Acid Calibration Curve with Folin–Ciocalteu Phenol Reagent (Waterhouse, 1999). 50 mg of gallic acid was weighed, 1 mL of 96% ethanol was added, and distilled water was added until the final volume was 50 mL to obtain a 1 mg/mL concentration. 70. From the gallic acid stock solution with a concentration of 1 mg/mL pipetted 1 mL, 1.25 mL, 1.5 mL, 1.75 mL, and 2 mL, respectively, then diluted with distilled water to a final volume of 10 mL to produce a concentration of 100 , 125, 150, 175, 200 µg/ml gallic acid, respectively. From each concentration of gallic acid solution, pipet 0.2 mL, then add 15.8 mL of distilled water and 1 mL of Folin-Ciocalteu Reagent and shake until homogeneous and leave for 8 minutes. 3 mL of 10% Na_2CO_3 solution was added, shaken homogeneously, and left for 2 hours at room temperature. Measure the absorption at the maximum absorption wavelength of 765 nm, then create a calibration curve for the relationship between gallic acid concentration (µg/ml) and absorption.

Determination of Total Phenol Content in Samples Using the Folin–Ciocalteu Method. Weighed 100 mg of the extract and dissolved it to 10 mL with distilled water to obtain a 10 mg/mL concentration. From a 10 mg/mL concentration, 1 mL was pipetted and diluted with distilled water to 10 mL, and an extract concentration of 1 mg/mL was obtained. Pipette 0.2 mL of extract, add 15.8 mL of distilled water and 1 mL of Folin–Ciocalteu reagent, then shake. Leave it for 8 minutes, then add 3 mL of 10% Na2CO3 to the mixture. Leave the solution for 2 hours at room temperature. The absorption was measured using a UV-Vis spectrophotometer at a maximum absorption wavelength of 765 nm. This was done 3 (three) times to obtain the phenol content as mg gallic acid equivalent/g fresh sample.

2.4.6. Total Plate Numbers [22]

Sterilize the tools to be used. Take 1ml sample, then add it to 9ml of diluent (sterile distilled water) and homogenize with a 10-1 dilution. From the 10-1 dilution, 1 ml was taken, then added to 9 ml of sterile distilled water, homogenized to obtain a 10-2 dilution, and carried out continuously until you get a dilution of 10-5. Planting microbes at dilutions of 10-4 and 10-5 using a pour plate method, that is, 1 ml of the suspension is taken from each, put into a petri dish, then pour each petri dish with PCA (Plate Count Agar) media, homogenize and wait until solid. Next, it was incubated at 37°C for 48 hours. Observe the growth of colonies in each petri dish and count them with a colony counter.

3. RESULTS AND DISCUSSION

3.1. pH analysis

Analysis of pH values in Table 2 shows that pasteurization pretreatment stored at room temperature has a lower pH value (acid) than pretreatment without Pasteurization at room and refrigerator temperatures. The low pH value is thought to be due to the high temperature in the pasteurization process. Following the statement [23], the use of high temperatures in the pasteurization process tends to reduce the pH with increasing heating temperature, which is thought to be due to the increase in heat energy contained in the solvent (water), which dissolves the chemical components in the pasteurization process. Acidic substances that cause the pH to decrease.

Table 2. Average pH Value of Infused Water

Preliminary Treatment	Storage Time (Hours)	Average
No Pasteurization (27°C)	1	6.510 ± 0.093^{c}
	3	6.340 ± 0.035^{c}
	6	6.220 ± 0.040^{c}
No Pasteurization (5°C)	1	6.440 ± 0.050^{c}
	3	6.557 ± 0.085^{c}
	6	6.430 ± 0.046^{c}
Pasteurization (27°C)	1	6.173 ± 0.079^{c}
	3	5.877 ± 0.020^{b}
	6	5.257 ± 0.020^{a}

Note: Average values accompanied by different letters indicate significant differences ($p \leq 0.05$)

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The longer the storage time for each pretreatment, the more the pH value decreases (acid) in the infused water of butterfly pea flowers, Siamese oranges, and mint leaves. The low pH value is thought to be because a diffusion process occurs during the storage process, which causes vitamin C to dissolve and cause the pH to become acidic. This follows research [24], which shows that the higher the acid contained in a food ingredient, the sourer the taste will be, and the lower the pH value. Ascorbic acid dissolved in water can cause an increase in hydrogen ions (H+) and a decrease in hydroxydant ions (OH) so that more hydrogen ions are produced, and the pH of a substance will decrease [25].

3.2. Vitamin C levels

Based on Table 3, it can be seen that infused water with pre-pasteurization treatment has higher levels of vitamin C at 14,843 mg/100g compared to pretreatment without Pasteurization which was stored at room temperature or refrigerator temperature at 12.908 mg/100g and 9.318 mg/100g. High temperatures can provide kinetic energy to substances, speeding up the diffusion rate. The increase in vitamin C levels at room temperature is faster than at refrigerator temperature [26].

Table 3. Average Value of Vitamin C Levels in Preliminary Treatment of Infused Water

Preliminary Treatment	Average
No Pasteurization (27°C)	12.908 ± 3.650
No Pasteurization (5°C)	9.318 ± 3.148
Pasteurization (27°C)	14.843 ± 5.292

Note: Average values accompanied by different letters indicate significant differences (p≤0.05)

Based on Table 4. it can be seen that infused water with storage time treatment affects the levels of vitamin C produced. The longer the storage time. The more vitamin C levels will increase. This can happen because vitamin C dissolves and diffuses into the water during storage. So, the longer the storage time. The more vitamin C will be dissolved. The longer the soaking. The more vitamin C content will come from the material [14].

Table 4. Average Value of Vitamin C Levels for Storage Time Treatment in Infused Water.

Storage Time	Average
1 hour	8.037 ± 1.730
3 hours	13.024 ± 3.169
6 hours	16.007 ± 3.624

Note: Average values accompanied by different letters indicate significant differences (p≤0.05)

3.3. Antioxidant Activity

Based on Table 5, it can be seen that the antioxidant activity highest in infused water was 64.932%, which was obtained from pre-pasteurization treatment, which was stored at room temperature for six hours of storage, while the lowest antioxidant activity was 35.447, obtained from pre-pasteurization treatment, which was stored at room temperature with a storage time of 1 hour.

Each pretreatment experienced an increase along with the length of storage time. The increased antioxidant activity in infused water is due to a temperature-dependent diffusion process. The diffusion process will cause the dissolved molecules to spread in all directions until a stable (homogeneous) concentration is obtained. The diffusion process is also defined as the movement of molecules with a high to a low concentration. The more significant the difference in concentration, the faster the diffusion process. The more significant the difference in concentration, the faster the diffusion process.

Table 5. Average Value of Antioxidant Activity of Infused Water

Preliminary Treatment	Storage Time (Hours)	Average
No Pasteurization (27°C)	1	35.447 ± 0.325^{a}
	3	48.726± 0.409^{c}
	6	52.304 ± 0.248^{e}
No Pasteurization (5°C)	1	46.450 ± 0.248^{b}
	3	48.618 ± 0.325^{c}
	6	61.409 ± 0.338^{f}
Pasteurization (27°C)	1	50.190 ± 0.409^{d}
	3	61.680 ± 0.248^{f}
	6	64.932 ± 0.338^{g}

Note: Average values accompanied by different letters indicate significant differences (p≤0.05)

The increase in antioxidant activity influenced by the heating process can help open or break down the tissue or membrane walls contained in the material so that the active components of the material can be extracted. This follows the statement [27]. Which states that the heating process of the material can cause damage. In the plant cell walls, compounds in the cells. Including antioxidant compounds, leave the cells and enter the water solvent. Six hours of storage time for each pretreatment resulted in the highest antioxidant activity, in line with the research results [28]. which revealed that cucumber-infused water's antioxidant activity increased from 0 to 6 hours of soaking. where soaking at the sixth hour was highest antioxidant activity.

3.4. Total Titrated Acid

Based on table 6. it can be seen that the highest total titrated acid was obtained from pre-pasteurization treatment at room temperature. namely 0.256%. while the lowest total titrated acid. namely 0.216%. was obtained from pretreatment without Pasteurization at room temperature. The increase in total acid in the pre-pasteurization treatment was thought to be due to a decrease in pH along with storage time.

Table 6. Average Value of Total Titrated Acid Preliminary Treatment in Infused Water

Preliminary Treatment	Average
No Pasteurization (27°C)	0.216 ± 0.048
No Pasteurization (5°C)	0.232 ± 0.073
Pasteurization (27°C)	0.256 ± 0.050

Note: Average values accompanied by different letters indicate significant differences (p≤0.05)

Table 7. Average Value of Total Titrated Acid Treatment Storage Time in Infused Water

Storage Time	Average
No Pasteurization (27°C)	12.908 ± 3.650
No Pasteurization (5°C)	9.318 ± 3.148
Pasteurization (27°C)	14.843 ± 5.292

Note: Average values accompanied by different letters indicate significant differences (p≤0.05)

The six-hour storage time treatment in Table 7 shows the highest total titrated acid value of 0.296%. while the lowest total titrated acid value is 0.184% with the one-hour storage time treatment. The storage time of infused water significantly affects the increase in total titrated acid. The longer the storage time. The more total acid is dissolved in the sample, the more total acid is dissolved. This shows that total acid is directly proportional to vitamin C, where if vitamin C is high. Total acid is also high and inversely proportional to the pH value. The higher the total acid, the lower the pH value. According to the statement [29], the relationship between total acid and vitamin C in fruit is directly proportional, where if the total acid is high, then the vitamin C level is also high and vice versa. Total acid is closely related to pH; an increase in total acid indicates a decrease in pH, so the acidic properties can be seen [30].

3.5. Total Phenol

The analysis of the average total phenol shows that the highest total phenol was obtained from preliminary treatment without Pasteurization at room temperature with a storage time of one hour, namely 2.059 mgGAE/g. In comparison, the lowest total phenol was obtained from refrigerator temperature treatment with a storage time of one hour, namely 1.200 mgGAE/g. Based on Table 8, infused water drinks with pre-pasteurization at room temperature and without Pasteurization at room temperature, along with longer storage times, experience a decrease in total phenol. The decrease in total phenol is thought to occur due to soluble phenolic compounds being damaged or unstable due to the heating process, and storage.

Table 8. Average Value of Total Phenol Infused Water

Preliminary Treatment	Storage Time (Hours)	Average
No Pasteurization (27°C)	1	2.059 ± 0.014^{c}
	3	1.519 ± 0.016^{b}
	6	1.500 ± 0.021^{b}
No Pasteurization (5°C)	1	1.200 ± 0.014^{a}
	3	1.242 ± 0.014^{a}
	6	1.313 ± 0.070^{a}
Pasteurization (27°C)	1	1.529 ± 0.008^{a}
	3	1.472 ± 0.008^{a}
	6	1.261 ± 0.281^{b}

Note: Average values accompanied by different letters indicate significant differences ($p \leq 0.05$)

The decrease in total phenol is also thought to be due to oxidation during more extended storage following Ref. [31]. This revealed that the decrease in total phenolics was caused by a storage temperature that was too high, which could degrade the phenolic compounds in the material. The higher temperature and longer pasteurization time affect the reduction of the total phenol content in fruit juice processing [32]. Meanwhile, in the pretreatment without Pasteurization at refrigerator temperature, there was an increase in total phenol as the storage time increased. This is thought to occur because refrigerator temperature can inhibit oxidation that occurs in a material.

3.6. Total Plate Numbers

The highest total plate number value was obtained in the pretreatment without Pasteurization at room temperature with a storage time of six hours, namely 6.203 log CFU/ml, while the lowest total plate number value was in the pre-pasteurization treatment with a one-hour storage time, namely 0.348 log CFU/ml.

Table 9. Average Value of Plate Number for Total Infused Water

Preliminary Treatment	Storage Time (Hours)	Average
No Pasteurization (27°C)	1	2.062 ± 0.699^{a}
	3	2.273 ± 2.552^{a}
	6	6.203 ± 0.821^{b}
No Pasteurization (5°C)	1	1.910 ± 0.556^{a}
	3	2.325 ± 0.878^{a}
	6	4.315 ± 2.517^{b}
Pasteurization (27°C)	1	0.348 ± 0.603^{a}
	3	0.362 ± 0.626^{a}
	6	1.950 ± 0.494^{a}

Note: Average values accompanied by different letters indicate significant differences ($p \leq 0.05$)

Based on Table 9, it can be seen that infused water samples with pre-pasteurization treatment, which were stored at room temperature, produced a lower total plate number than pretreatment without Pasteurization at room and refrigerator temperatures. This is thought to occur because the pasteurization temperature or heat can kill some microbes, which do not form spores; following the statement [6], Pasteurization is a heating process at a temperature of 60°C-100°C that aims to kill microorganisms and inactivate enzymes contained in the food itself while still considering its quality.

The longer the storage time, the greater the plate number in each pretreatment. In the pretreatment without Pasteurization at room temperature, microbial growth cannot be controlled as optimally as at refrigerator temperature, resulting in a relatively high increase in bacteria. All research results still fall within the 2009 Indonesian National Standard (SNI) requirements regarding bottled drinking water quality requirements, namely below 1.0 x 10^5 colonies/ml. So, all samples meet the requirements because they fall within the range of requirements.

3.7. Hedonic test

Hedonic testing was carried out on the color, aroma, and taste parameters of infused water samples with 20 panelists. The results of the average panelist preferences can be seen in Table 10.

Table 10. Average Value of Hedonic Infused Water Test

Sample	Color	Aroma	Flavor
S1W1	2.80 ± 0.61^{a}	3.40 ± 0.50^{b}	3.55 ± 0.51^{d}
S1W2	3.25 ± 0.71^{b}	3.45 ± 0.51^{b}	3.15 ± 0.58^{b}
S1W3	3.55 ± 0.51^{b}	2.90 ± 0.85^{a}	3.05 ± 0.51^{a}
S2W1	2.60 ± 0.50^{a}	3.45 ± 0.51^{b}	3.40 ± 0.50^{c}
S2W2	3.30 ± 0.57^{b}	3.55 ± 0.51^{c}	3.55 ± 0.51^{d}
S2W3	3.35 ± 0.58^{b}	3.45 ± 0.51^{b}	3.60 ± 0.59^{e}
S3W1	3.65 ± 0.67^{c}	3.65 ± 0.48^{c}	3.65 ± 0.48^{f}
S3W2	3.60 ± 0.68^{c}	3.55 ± 0.51^{c}	3.50 ± 0.51^{d}
S3W3	3.80 ± 0.61^{c}	3.60 ± 0.50^{c}	3.45 ± 0.51^{c}

Note: Average values accompanied by different letters indicate significant differences ($p \leq 0.05$)

The panelists liked the infused water drink the most, with a color preference level of 3.80, they liked the pre-pasteurization treatment, which was stored at room temperature for six hours. Meanwhile, in the aroma parameter, the panelists liked the infused water drink the most, with an average preference level of 3.65, obtained from pre-pasteurization treatment and stored at

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room temperature with a storage time of one hour. In terms of taste parameters. the panelists liked infused water drinks the most with an average preference level of 3.65, obtained from the pre-pasteurization treatment, which was stored at room temperature with a storage time of 1 hour.

4. CONCLUSION

The results of the analysis of the infused water of butterfly pea flowers. Siamese oranges, and mint leaves showed a significant interaction ($p \leq 0.05$) in the pretreatment and storage time on the pH parameters, Antioxidant activity, total phenols, Total plate number, and organoleptics (color, aroma, and taste). Meanwhile, there was no significant interaction between the parameters of vitamin C and total titrated acid ($p \geq 0.05$), so there was no influence between pretreatment and storage time. The best sample obtained from the pre-pasteurization treatment, which was stored at room temperature (27°C) with a storage time of six hours, had characteristics, namely a pH value of 5.257. Vitamin C is 19.57 mg/100g, and antioxidant activity is 64.932%, total titratable acid 0.312%, total phenol 1.261 mgGAE/g, total plate number 1.950 logCFU/ml, and organoleptic test color 3.8, aroma 3.6, taste 3.45.

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