# Physicochemical and Sensory Characteristics of Rose-Spices as Functional Beverage

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***ABSTRACT***

*Rose flower has varieties of compounds, one of that is antioxidants, but it's not been widely used in the food sector. The processing that can be applied to roses is to make them for functional drinks by adding variations of the three-spice filtrate, which are expected to increase the quality, characteristics and increase the antioxidant activity of the product. This study aims to determine the interaction between the type of spice filtrate and the concentration of the spice filtrate to the quality of the Rose-Spices Drink. Randomized block design (RBD) with 2 replications. The best treatment for Rose-Spices Drink was P4K1 (Spice Combination: 5%) with antioxidant activity 89.67%, brightness level (L) 32.7, redness level (a+) 2.7, yellowness level (b+) 4.1, pH 4.053, total dissolved solids (TDS) 11.7 °Brix, total anthocyanin 0,20 mg/L, taste 3.60 (quite like), flavor 3.50 (quite like) and preference 3.23 (quite like).*

**Keywords***: anthocyanin; antioxidant; functional beverage; rose extract; spices*

## INTRODUCTION

Roses are often cultivated on a large scale as an ornamental plant, the cosmetic industry and aromatherapy. Roses have a distinctive aroma and contain chemical components, one of them is flavonoids which have antioxidant activity. Anthocyanins are natural pigments found in roses which are known to give a natural color to extract drinks and can act as a protector of the liver and kidneys (Saati, Ramadhan, Lutfi, Wahyudi, & Manshur, 2020; Saati, Wachid, & Winarsih, 2017). Based on previous research, rose juice has been widely used including the addition of orange, guava, lemon, and so on to improve its functional properties. This causes roses to have the potential to be developed as a basic ingredient for flower juice drink products to produce juice drinks that match other characteristics, one of which is the addition of spices to increase its functional benefits. This research with the addition of natural ingredients such as spices aims to produce a product with a distinctive sensory taste and increase its antioxidant content. Spices contain various compounds and have different properties. (Hill, Gomes, & Taylor, 2013). Red ginger contains essential oils that provide a good scent, as well as gingerol and shogaol compounds which contain antioxidant activity because it contains benzene rings and hydroxyl groups (Marwat, Shoaib, Khan, Rehman, & Ullah, 2015; Mashhadi et al., 2013; Semwal, Semwal, Combrinck, & Viljoen, 2015). Lemongrass contains essential oils with main components namely citral, citronellol, and geraniol, and has functioned as a flavoring agent for food, beverages, and traditional medicine (Chanthai, Prachakoll, Ruangviriyachai, & Luthria, 2012; Ling, Kormin, Abidin, & Anuar, 2019). The addition of three different spice filtrate to rose extract–based drinks are intended to produce an extract drink that has different characteristics from the previous similar product and to produce an extract drink with a distinctive taste and increase its antioxidant content.

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## METHODS

This research used the Randomized Completely Block Design (RCBD) factorial with 2 factors and 2 replications were applied. The numbers followed by the same letter in data result were not significantly different on BNT Test of 5%. The first factor was the type of spices filtrate which consisted of 4 varieties red ginger, lemongrass, cinnamon, and all spice combination. The second factor was spice filtrate concentration that consisted of 3 levels (5%, 10%, 15%). This research consisted of several stages, (i) production of spice filtrate (ii) analyzed for pH, total dissolved solids (TDS), and antioxidants activity, (iii) roses extract-based drink production with the type and concentration of spice filtrate application, (iv) roses extract-based drink analyzed for pH, total dissolved solids (*Badan Standarisasi Nasional*, 2004), and antioxidants activity using radical scavenging activity (Molyneux, 2004), color intensity (AOAC, 2005), and hedonic test consist of taste, aroma, preference *(Badan Standarisasi Nasional*, 2006).

*Material*

The raw materials used in this study were local roses (95% level of bloom, non-brown color, and fresh aroma) obtained from the farmers of Bangil Pasuruan, red ginger powder (commercial), lemongrass powder (commercial) , cinnamon powder (commercial), sugar, citric acid, and aquades.

*Tool*

Spectrophotometer UV-Vis (GENESYS 20), color reader (CR-10 Konica Minolta), centrifuge (PLC Series), and other supporting tools.

## RESULT AND DISCUSSIONS

*Raw Material Analysis*

The parameter of raw materials analysis that used in this research was antioxidant activity, pH and Total Dissolve Solid (TDS) relatively not much different from the literature because it's same with the former raw materials. The results of the antioxidant activity of the three types of spices showed the highest antioxidant activity was in red ginger 79.75%. Oleoresin was the component that responsible to determine the amount of antioxidant activity and total phenol in red ginger. Phenolic compounds can function as antioxidants because of their ability to eliminate free radicals and peroxide radicals so they are effective in inhibiting lipid oxidation (Wahyudi, Aini, Puspita, & Dewi, 2021; Wahyudi, Octaviana, & Sutrisno, 2020). The lowest pH was red ginger (6.678) and the highest pH was cinnamon, (7.910). The total of dissolved solids between each material was not much different, the highest yield of cinnamon had total dissolved solids of 5.3 °Brix. The analysis of total dissolved solids using a specific hand refractometer that determines the level of sucrose (sugar) in a material, which means the greater the total value of dissolved solids, the greater the sugar content is.

Table 1. Analysis of antioxidant activity, pH, and total dissolved solids

| Parameter | Rose Flowers | | Red Ginger | | Lemongrass | | Cinnamon | |
|---|---|---|---|---|---|---|---|---|
| | A | B | A | B | A | B | A | B |
| Antioxidant Activity (%) | 82,33 | 79,22[a] | 79,75 | 77,65[c] | 70,00 | - | 72,11 | 45,42[d] |
| pH | 4,362 | 5,00[b] | 6,678 | 6,48[c] | 6,741 | - | 7,910 | - |
| TDS (°Brix) | 4,5 | 4,8[b] | 3,4 | - | 3,6 | - | 5,3 | - |

Note: numbers followed by the same letter in a column were not significantly different on BNT Test of 5%.

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*Rose-Spices Drink Acidity Level (pH) Analysis*

Based on the results of the analysis of variance, there was an interaction between the treatment of different types of spice filtrate (red ginger, lemongrass, cinnamon, combination spices) and differences in the concentration of spice filtrate (5%, 10% and 15%) on the pH of rose juice drinks. Based on the DMRT 5% further test, the treatment of the type of spice filtrate and the concentration of the spice extract was very significantly different because it produced different notations between treatment combinations. The lowest pH value is P1K1 (red ginger 5%) which is 3,921 with a notation. The highest pH value is P3K3 (cinnamon 15%) with a value of 4.274 and P4K3 (combination spice 15%) with a value of 4.271 because it is in the notation k. This shows that the pH value of rose juice drink is influenced by the type and concentration of spice filtrate added, where overall from all treatments the pH value tends to increase based on the concentration level of the spice filtrate added compared to Control. The pH value in the P1K1 treatment (5% red ginger), namely 3,921, showed better results compared to other treatments because of the lower acidity level. This is in accordance with SNI (2014) which shows that the pH of juice/fruit drinks is a maximum of 4. The highest pH was recorded in the P3K3 (Cinnamon 15%) which is 4.274 and the lowest result was in the P1K1 (5% Red Ginger). The pH value is an important parameter to analyze because it correlates with the quality of a food product. Food products that have a low level of acidity usually tend to be more durable because microbes do not easily grow in media that has a high level of acidity. Another factor that affects the pH value is the use of citric acid in the process of making rose juice drinks as an acidulate. Citric acid is used to emphasize taste, color and can disguise unfavorable after-taste and also as a pH regulator so as to prevent damage by microorganisms (Underriner, 2012).

Table 2. The acidity level (pH) analysis based on types and concentrations of spice filtrate

| Treatment | pH |
|---|---|
| P1K1 (Red Ginger 5%) | 3,921[a] |
| P1K2 (Red Ginger 10%) | 4,092[d] |
| P1K3 (Red Ginger 15%) | 4,195[h] |
| P2K1 (Lemongrass 5%) | 4,050[c] |
| P2K2 (Lemongrass 10%) | 4,163[g] |
| P2K3 (Lemongrass 15%) | 4,207[i] |
| P3K1 (Cinnamon 5%) | 4,004[b] |
| P3K2 (Cinnamon 10%) | 4,096[e] |
| P3K3 (Cinnamon 15%) | 4,274[j] |
| P4K1 (Spice Combination 5%) | 4,053[c] |
| P4K2 (Spice Combination 10%) | 4,108[f] |
| P4K3 (Spice Combination 15%) | 4,271[j] |
| Control (Without Spice Filtrate) | 3,753 |

Note: numbers followed by the same letter in a column were not significantly different on BNT Test of 5%.

*Rose-Spices Drink Total Dissolve Solids (TDS) Analysis*

Based on the analysis of variance, there was an interaction between the treatment of different types of spice filtrate (red ginger, lemongrass, cinnamon, combination spices) and differences in the concentration of spice filtrate (5%, 10% and 15%) on the total dissolved solids of cider drinks. Based on the 5% DMRT test, the total dissolved solids showed significantly different results in the treatment of the type of spice filtrate and the concentration

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of the added spice filtrate. This shows that the rose juice drink added with spice filtrate has decreased as the more filtrate concentration is added, the lower the total dissolved solids value (ºBrix). The results of the measurement of total dissolved solids are not the same as total carbohydrates, but are the levels of carbohydrate molecules that have a refractive index such as simple sugar components. This refraction is influenced by the interaction of electro statistic and electromagnetic forces from the atoms contained in liquid molecules (Zaera, 2012). The highest total dissolved solids value obtained by P1K1 was 12.0 ºBrix, while the lowest total dissolved solids value was P1K3 treatment (red ginger 15%). The results in the table above show that overall with the addition of spice filtrate and the concentration of spice filtrate added to rose juice drinks, it tends to decrease because the added filtrate is pure without the addition of sugar. The compounds contained in red ginger certainly affect the value of total dissolved solids, namely oleoresin compounds. Ginger contains evaporated oil, non-volatile oil and starch. The evaporating oil, which is called essential oil, is a component that gives off a distinctive odor, while the non-volatile oil, which is called oleoresin, is a component that gives a spicy and bitter taste (Kizhakkayil & Sasikumar, 2011; Moghaddasi & Kashani, 2012).. The total value of dissolved solids in all treatments showed a range between 10.6-12.0 ºBrix, this is in accordance with SNI (2014) which shows the total dissolved solids of juice/fruit drinks, namely Min. 7.5-16.0 ºBrix.

Table 3. Total dissolve solids analysis based on types and concentrations of spice filtrate

| Treatment | TDS (ºBrix) |
|---|---|
| P1K1 (Red Ginger 5%) | 12,0$^{g}$ |
| P1K2 (Red Ginger 10%) | 11,2$^{cd}$ |
| P1K3 (Red Ginger 15%) | 10,6$^{a}$ |
| P2K1 (Lemongrass 5%) | 11,9$^{g}$ |
| P2K2 (Lemongrass 10%) | 11,7$^{e}$ |
| P2K3 (Lemongrass 15%) | 11,2$^{cd}$ |
| P3K1 (Cinnamon 5%) | 11,8$^{f}$ |
| P3K2 (Cinnamon 10%) | 11,3$^{d}$ |
| P3K3 (Cinnamon 15%) | 10,8$^{b}$ |
| P4K1 (Spice Combination 5%) | 11,7$^{ef}$ |
| P4K2 (Spice Combination 10%) | 11,1$^{c}$ |
| P4K3 (Spice Combination 15%) | 10,9$^{b}$ |
| Control (Without Spice Filtrate) | 12,7 |

Note: numbers followed by the same letter in a column were not significantly different on BNT Test of 5%.

*Rose-Spices Drink Antioxidant Activity Analysis*

The antioxidant activity of the spice filtrate type P4 (Combination Spice) has the highest antioxidant activity, namely 89.72%, while the lowest value was P2 (lemongrass). This shows that the treatment for the type of spices P4 (Combination Spice) which is a mixture of the three types of spices; Red ginger, lemongrass, and cinnamon can synergize with antioxidant compounds both in the combination formula and in the basic formula (without spice filtrate), so the spice combination will increase the total antioxidant activity in Rose-Spices Drinks compared to controls. The synergistic phenomenon is formed when two types of antioxidants are present in one food system, so the overall effect can exceed rather than use it separately (Krishnaiah, Sarbatly, & Nithyanandam, 2011). Meanwhile, increasing concentration in each treatment showed no effect.

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Table 4. Antioxidant activity analysis based on types and concentrations of spice filtrate

| Treatment | Antioxidant Activity (%) |
|---|---|
| P1 (Red Ginger) | 86,19a |
| P2 (Lemongrass) | 85,79a |
| P3 (Cinnamon) | 86,92a |
| P4 (Spice Combination) | 89,72b |
| Control (Without Spice Filtrate) | 87,50 |

Note: numbers followed by the same letter in a column were not significantly different on BNT Test of 5%.

*Rose-Spices Drink Brightness (L) Analysis*

The brightness level (L) tends to decrease along with the addition of the type of spice filtrate in the rose extract–based drink compared to control (without the spice filtrate). Besides that, the addition of different concentration spice filtrate also has a significant effect on the brightness (L) in Rose-Spices Drink, where the higher the concentration added, the brightness (L) value decreased or got darker. The highest brightness values were P1K1 treatment (5% Red Ginger) of 33.2 and the lowest was P3K3 (Cinnamon 15%). The more cinnamon is added, the darker the drink. This is because the cinnamaldehyde compound that acts as a colorant to drinks and dissolves in water (Dwijatmoko, Praseptiangga, & Muhammad, 2016; Thomas & Kuruvilla, 2012) .

Table 5. Brightness (L) analysis based on types and concentrations of spice filtrate

| Treatment | Brightness (L) |
|---|---|
| P1K1 (Red Ginger 5%) | 33,2$^{g}$ |
| P1K2 (Red Ginger 10%) | 32,6$^{e}$ |
| P1K3 (Red Ginger 15%) | 32,1$^{c}$ |
| P2K1 (Lemongrass 5%) | 32,7$^{f}$ |
| P2K2 (Lemongrass 10%) | 32,3$^{d}$ |
| P2K3 (Lemongrass 15%) | 31,8$^{b}$ |
| P3K1 (Cinnamon 5%) | 32,1$^{c}$ |
| P3K2 (Cinnamon 10%) | 31,8$^{b}$ |
| P3K3 (Cinnamon 15%) | 31,2$^{a}$ |
| P4K1 (Spice Combination 5%) | 32,7$^{ef}$ |
| P4K2 (Spice Combination 10%) | 32,4$^{d}$ |
| P4K3 (Spice Combination 15%) | 32,1$^{c}$ |
| Control (Without Spice Filtrate) | 36,0 |

Note: numbers followed by the same letter in a column were not significantly different on BNT Test of 5%.

*Rose Extract – based Drink Redness (a+) and Yellowness (b+) Analysis*

The highest redness was P1K1 (5% Red Ginger), 3.8, while the lowest redness was P3K3 (Cinnamon 15%), namely 1.8. The main component of cinnamon is cinnamaldehyde (Thomas & Kuruvilla, 2012). Besides, being an antioxidant cinnamaldehyde also acts as a natural flavor and colorant in drinks. The yellowness (b+) correlates with the redness level (a+), the higher the a + value, the higher the b+ value and otherwise. The intensity of the red color will affect the intensity of the yellow color. The presence of a yellow color effect in spice can be caused by the presence of anthocyanin pigments (Zhang, Peng, Xu, Lü, & Wang, 2016). The treatment of spice filtrate concentration also affected the redness, where K3

(15% concentration) was the lowest. The greater the concentration of flavor extracts added will reduce the redness level of rose extract drinks, but this depends on the nature and characteristics of the flavor ingredients added. The yellowness (b+) value has a correlation with the redness value (a+), where the higher the concentration of spice filtrate added will reduce the yellowness of the rose extract-drink based. The highest yellowness value was K1 (5% concentration). The higher the addition of flavor extracts, the lower the yellowness value of the Rose-Spices Drink.

Table 6. Redness (a+) and yellowness (b+) analysis based on types and concentrations of spice filtrate

| Treatment | Redness ($a^+$) | Yellowness ($b^+$) |
|---|---|---|
| P1K1 (Red Ginger 5%) | $3,8^h$ | $5,2^h$ |
| P1K2 (Red Ginger 10%) | $3,2^g$ | $6,1^i$ |
| P1K3 (Red Ginger 15%) | $2,8^e$ | $6,6^j$ |
| P2K1 (Lemongrass 5%) | $2,9^f$ | $4,4^g$ |
| P2K2 (Lemongrass 10%) | $2,4^c$ | $3,7^e$ |
| P2K3 (Lemongrass 15%) | $2,1^b$ | $3,4^d$ |
| P3K1 (Cinnamon 5%) | $2,4^c$ | $3,1^c$ |
| P3K2 (Cinnamon 10%) | $2,1^b$ | $2,7^b$ |
| P3K3 (Cinnamon 15%) | $1,8^a$ | $2,3^a$ |
| P4K1 (Spice Combination 5%) | $2,7^d$ | $4,1^f$ |
| P4K2 (Spice Combination 10%) | $2,4^c$ | $3,8^e$ |
| P4K3 (Spice Combination 15%) | $2,1^b$ | $3,4^d$ |
| Control (Without Spice Filtrate) | 5,5 | 1,8 |

Note: numbers followed by the same letter in a column were not significantly different on BNT Test of 5%.

*Rose-Spices Drink Organoleptic Analysis*

Rose-Spices Drink Taste Analysis

The results of the organoleptic analysis rose extract–based drink showed the panelists preferred K1 (5% concentration) compared to the K3(15% concentration). K1 (concentration 5%) when compared to control has a lower score. The panelist's acceptance of the taste parameters of the Rose-Spices Drink was influenced by the formulation used and the concentration of the spice filtrate added. The addition of flavor with a certain concentration will increase the acceptance of the product. However, if the concentration is added too much or too high it will actually decrease the taste of the Rose-Spices Drink.

Table 7. Taste score based on types and concentrations of spice filtrate

| Treatment | Taste |
|---|---|
| K1 (Concentration 5%) | $3,40^b$ |
| K2 (Concentration 10%) | $3,00^{ab}$ |
| K3 (Concentration 15%) | $2,65^a$ |
| Control | 4,30 |

Note: numbers followed by the same letter in a column were not significantly different on BNT Test of 5%.

Based on the Figure 1. The organoleptic test on the different addition types of spice showed P1 (Red Ginger) and P4 (Combined Spice) had the lowest taste score. Panelists tend to prefer Rose-Spices Drink with the addition of a spice filtrate that is not too strong in flavor. The aroma of ginger is influenced by the presence of essential oils; oleoresin is the component that responsible for the spicy taste of ginger. The volatile compounds in

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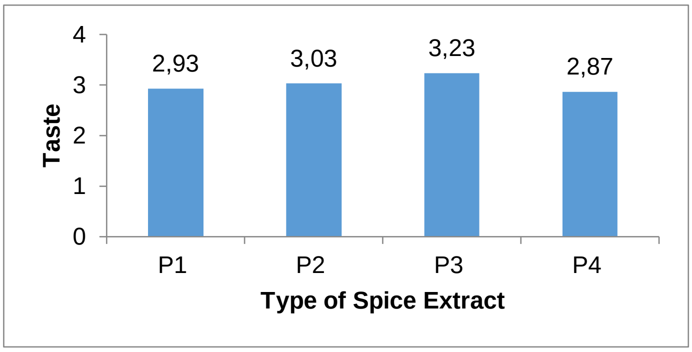
lemongrass extract (essential oil) leave an impression of a bitter and spicy taste (Natisri, Mahattanatawee, & Thaiudom, 2014). The highest taste score was P3 (Cinnamon). The cinnamaldehyde is a major component of cinnamon. It's an oily liquid that has yellowish color with a very strong aroma and a distinctive taste, and gives a sweet taste.



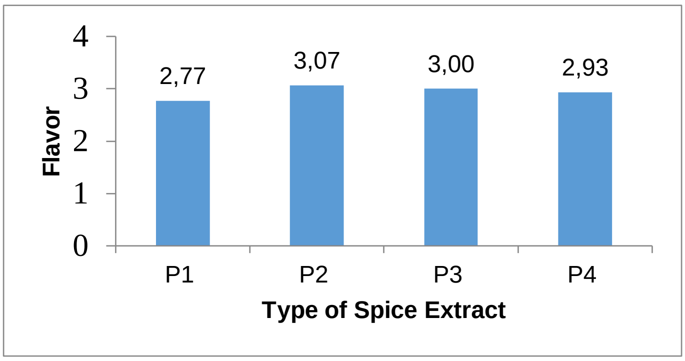

Note:
P1= Red Ginger
P2= Lemongrass
P3= Cinnamon
P4= Spice Combination

Note:
1= Very Dislike
2= Dislike
3= Quite Like
4= Like
5= Very Like

Figure 1. Rose-spices drink taste analysis based on the type of spice filtrate

*Rose-Spices Drink Flavor Analysis*

The results of flavor analysis on the addition of different types of spice filtrate showed that panelists preferred P2 (lemongrass) and P3 (Cinnamon) compared to P1 (Red Ginger). Panelists tend to prefer to have a refreshing scent rather than strong and pungent scents in their drink. The based on the separate sensory test, the addition of ginger extract into the drink will make it has a ginger-flavored drink with a strong spiciness and aroma so it could disguise the flavors and other constituent ingredients found in the drinks.

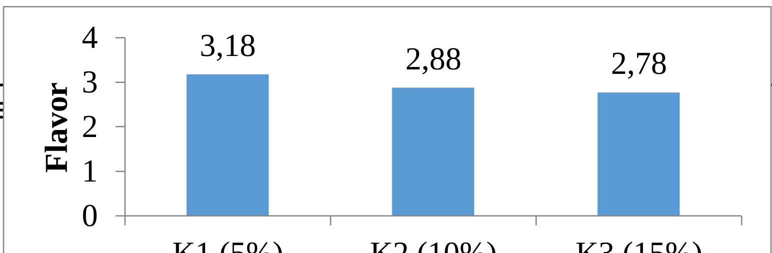



Note:
P1= Red Ginger
P2= Lemongrass
P3= Cinnamon
P4= Spice Combination

Note:
1= Very Dislike
2= Dislike
3= Quite Like
4= Like
5= Very Like

Figure 2. Rose-spices drink flavor analysis based on the type of spice filtrate

The flavor analysis on the different concentrations of the spice filtrate showed the panelists preferred K1 (5% concentration) instead of K3 (15%). The histogram above also shows that the higher the concentration of spice filtrate is added resulted in the lower score of rose extract–based drink. Panelists tend to dislike the sharp and strong flavor, where all of the added spice filtrates have different volatile compounds that has a distinctive aroma from the material. The volatile compounds in food have an important role in the formation of aroma and flavor. The aroma or flavor in food is caused by volatile compounds that evaporate, the higher the volatile compounds in the material, the sharper and the stronger flavor as a result.




Note:
K1= Concentration 5%
K2= Concentration 10%
K3= Concentration 15%

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Figure 3. Rose-spices drink flavor analysis based on the concentration of spice filtrate

*Rose Extract Drink Preference*

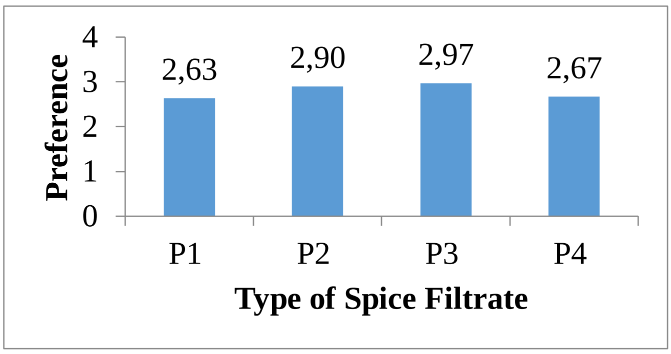
The results of the preference analysis on the differences in concentration of spice filtrate showed the higher concentration of the added filtrate the lower score obtained. Panelists preferred K1 (5% concentration) rather than K3 (15% concentration), but when compared to the control, the results were better in control because there was no addition of spice filtrate which affected the taste and aroma of the Rose-Spices Drink. The analysis of level preference is carried out based on the hedonic test which consists of an assessment of taste and flavor as well as overall appearance.

Table 8. Preference score based on types and concentrations of spice filtrate

| Treatment | Preference |
|---|---|
| K1 (Concentration 5%) | 3,20[b] |
| K2 (Concentration 10%) | 2,70[ab] |
| K3 (Concentration 15%) | 2,48[a] |
| Control | 4,00 |

Note: numbers followed by the same letter in a column were not significantly different on BNT Test of 5%.

The preference analysis for different types of spice filtrate showed that the panelists preferred P3 (Cinnamon) compared to P1 (Red Ginger), the addition of red ginger expected may affect the taste and flavor of the rose extract - based drink. The ginger contains volatile oil, non-volatile oil and starch. The volatile oil is well known as essential oil, is a component that gives off a distinctive odor, while the non-volatile oil, which is called oleoresin, is a component that gives a spicy and bitter taste.




Note:
P1= Red Ginger
P2= Lemongrass
P3= Cinnamon
P4= Spice Combination

Note:
1= Very Dislike
2= Dislike
3= Quite Like
4= Like
5= Very Like

Figure 4. Rose extract – based drink preference analysis based on the type of spice filtrate

*The Best Treatment*

Determination of the best treatment using the effective index method. Determination of the best treatment combination based on the effectiveness index (NE) and product value

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(NP) method, then the value of the product for each parameter is totaled to obtain the best treatment combination (De Garmo Method). The principle of this method is to compare all measured parameters. Based on the physicochemical and organoleptic properties of rose extract–based drink analysis with the addition of different types of spice filtrate (Red Ginger, Lemongrass, Cinnamon, Spices Combination) and the different concentrations of spice filtrate (5%, 10%, and 15%). The best treatment was P4K1 (Combination Spice: 5%) with pH 4.053, total dissolve solids (TDS) 11.7 ° Brix, color intensity (L = 32.7; a + = 2.7; b + = 4.1), antioxidant activity 89, 67%, organoleptic (taste = 3.60; flavor = 3.50; preference= 3.40). This shows that the panelists prefer and accept P4K1(Combination Spice: 5%) because the composition is in accordance with the panelists' acceptance and it also produces good analysis results.

Table 9. The best treatment analysis based on de garmo methods

| Treatment | Total | Rank |
|---|---|---|
| P1K1 (Red Ginger 5%) | 0,67 | 2 |
| P1K2 (Red Ginger 10%) | 0,46 | 6 |
| P1K3 (Red Ginger 15%) | 0,39 | 8 |
| P2K1 (Lemongrass 5%) | 0,64 | 3 |
| P2K2 (Lemongrass 10%) | 0,51 | 4 |
| P2K3 (Lemongrass 15%) | 0,32 | 12 |
| P3K1 (Cinnamon 5%) | 0,47 | 5 |
| P3K2 (Cinnamon 10%) | 0,38 | 9 |
| P3K3 (Cinnamon 15%) | 0,34 | 11 |
| P4K1 (Spice Combination 5%) | 0,71 | 1 |
| P4K2 (Spice Combination 10%) | 0,44 | 7 |
| P4K3 (Spice Combination 15%) | 0,37 | 10 |

*Total Anthocyanin with the Best Treatment*

Total anthocyanin analysis that tested were the two best treatments of the de Garmo test and control products. The best results were shown in the control because there was no addition of spice filtrate and rose flowers itself was a source of anthocyanin compounds with values from 27.35 mg/L. While the thick red ginger extract ranges from 21.68 mg/L (SNI-01-2891-1992). P1K1 (5% red ginger) decreased its anthocyanin levels due to the addition of 5% filtrate where the filtrate was made from 10: 1 water and ginger spices, while P4K1 (Combination Spice: 5%) got the smallest value because, besides red ginger, lemongrass, and cinnamon tend not to contain anthocyanin so the treatment with combination spices only reads the total anthocyanin value of rose extract which has a lower concentration because the addition of the combination spice filtrate causes its stability to decrease. Factors that affect the stability of anthocyanin are temperature, changes in pH, light, and oxygen, and other factors such as metal ions (Saati, 2016). Another factor according to (Asimi, Sahu, & Pal, 2013; Serafini & Peluso, 2016), each plant contains flavone and flavonol groups. Both components have very important roles for plants as well as potential applications for ecology, agriculture, and have nutritional and health benefits for humans. Spices such as ginger, lemongrass, and cinnamon have flavonol and flavone components with different levels and forms. This difference causes the stability of anthocyanin to be different.

Table 3. Average amount of rose-spices drink at λ 520nm

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| Treatment | Total Anthocyanin (mg/L) |
|---|---|
| P4K1 (Spice Combination : 5%) | 0,20 |
| P1K1 (Red Ginger : 5%) | 1,10 |
| Control (Without Spices Filtrate) | 5,66 |

## CONCLUSION

There is an interaction between the addition of type and concentration spice filtrate treatment to pH, total dissolved solids (TDS), brightness level (L), redness level (a +), and yellowness level (b+) of Rose-Spices Drink. There is an effect of adding different types of spice filtrate to antioxidant activity. There is an effect in addition differences in concentration of spice filtrate to the analysis of taste and preference of Rose-Spices Drinks. The best treatment (based on The Duncan's Multiple Test) was P4K1 (Combination Spice: 5%) with an antioxidant activity of 89.67% (with an increase of 2.5% better than the control product), brightness (L) 32.7, redness (a+) 2.7, yellowness (b+) 4.1, pH 4.053, total dissolved solids 11.7 °Brix, total anthocyanin 0.20 mg / L, taste 3.60 (quite like), flavor 3.50 (quite like) and preference 3.23 (quite likes). In this study, the formulation is still limited to the use of spice powder, suggestions for the next need a formulation with fresh spice ingredients.

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