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Product development of Wedang Seroja (Lemongrass, Rosella and Ginger) Tea Bag

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ABSTRACT

Wedang is a beverage that comes from a blend of spices that are often found in Indonesia. The mixture of spices used in making wedang can affect the taste, color and content inside. One of the wedang that can be found is wedang seroja, a wedang that made from a mixture of lemongrass, rosella and ginger in varying proportions. Wedang seroja tea bag is an innovation to serve the wedang easily. The proportion of spices in the mixture can influence the characteristics of the mixture of spice and steeping water. Therefore, this research aims to develop a wedang seroja tea bag product and observe the characteristics of the product by physical and chemical analysis of the dry spice mixture and steeping water of wedang seroja tea bag. The sample was made in three repetition and each sample were analyzed three times (triplo). The results of the study carried out on wedang tea bag with a composition of 20% lemongrass, 70% rosella and 10% ginger, it was found that the wedang tea bag seroja dry spice mixture had a moisture content of 15.90% and an ash content of 6.37% while the steeping water has a pH of 2.10 and objective color testing results with an L value of 43.56, a value of +23.25, and b value of +21.56. The 70% of rosella in the dry spices mixture of wedang seroja tea bag has a big role on the product characteristics.

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1. INTRODUCTION

Wedang is a beverage that is usually drunk to warm the body and is served by steeping it with hot water. This beverage is made from a mixture of several spices from natural ingredients such as ginger, rosella, cinnamon, turmeric, galangal, lemongrass and so on. These spices has various active compounds which have good antioxidant and antibacterial activity to maintain the body's immune system. According to (Sangi & Katja, 2011) extracts of lemongrass stems, basil leaves and pandan leaves have higher free radical scavenger activity when these ingredients are combined rather than using the spices separately. This shows that mixing several kinds of spices can increase the antioxidant activity in wedang. This can be used as an innovation to produce wedang products from the mixture of some spices that are beneficial for health.

One type of wedang that combines more than one spice in its mixture is Wedang Seroja. This wedang is made from a mixture of lemongrass (*Cymbopogon citratus*), rosella (*Hibiscus Sabdariffa*) and ginger (*Zingiber officinale*) in various proportions. The characteristic of this beverage is its sour taste which comes from the rosella with a slight spicy taste which comes from the ginger. According to Rehman et al. (2011), the distinctive taste of ginger is caused by a mixture

of its compound such as zingerone, shogaols, and gingerols. Rosella contains anthocyanin compounds of 26.44 mg/l and vitamin C of 0.02% (Lubis et al., 2024) Rosella also contains phenolic compounds which can act as antioxidants as much as 23.10 mg in every gram of dry weight of rosella petals (Pusat Studi Biofarmaka Tropika LPPM IPB & Gagas Ulung, 2020). Lemongrass has a total phenol content of 42.959 mg/kg extract (Sangi & Katja, 2011) and contains flavonoid, saponin, tannin and terpenoid compounds (Chairina et al., 2023).

The utilization of roselle in beverage product can affect its characteristics. The flower can lower the pH of the beverage as showed in the study conducted by Kurniasari & Murtini (2017) on infused honey tea that the treatments using higher levels of rosella show a lower pH. Not only that, according to the study, the use of rosella in ingredients can also affect the color of the resulting product. Treatments that used higher levels of rosella in Kurniasari and Murtini's research showed a redder color compared to other treatments that used lower levels of rosella. This was also observed by Sholika Sari et al. (2023) that said rosella steeping water has a red or cheery red color.

Wedang is generally prepared by steeping mixed spices with hot water and served warm. The development of wedang seroja (lemongrass, rosella, ginger) products in tea bag packaging can be an innovation to make it easier to serve wedang seroja which can be enjoyed anytime and anywhere because of its practical nature. Nylon tea bag can be used for packaging of wedang seroja because it is the most commonly used packaging in the food industry. Apart from that, this packaging is clear white which can provide a better and cleaner product appearance and shows higher permeation compared to other types of tea bags such as cellulose and polylactic acid. This can occur due to uniform %porosity and pore size (Jha et al., 2020). Based on the several aspects that have been described, innovation was carried out in the wedang seroja beverage product in the form of a tea bag with several chemical tests such as the water content and ash content of the wedang seroja dry spices mixture as well as the pH and color of the steeping water to determine the chemical and physical characteristics of the product produced.

2. METHOD

This research was carried out in February 2024 - June 2024 at the Engineering Laboratory, the Downstreaming Laboratory, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta. The ingredients used in this research were red rosella, lemongrass and emprit ginger obtained from the Gedhe market in Surakarta.

Wedang Seroja tea bag consists of dry spices mixture of 20% lemongrass, 70% rosella and 10% ginger packaged in a nylon tea bag. The manufacture of wedang tea bags goes through several stages, namely size reduction, weighing, mixing, packaging in a nylon tea bag, sealing, and secondary packaging. Samples were made in 3 repetitions of treatment and tested in triplicate.

There are four analyzes carried out, namely water content and ash content of dry spice mixture as well as pH and color analysis using a chromameter of the steeping water. The procedure of each analysis are shown below:

a. Water content analysis

Water content analysis refers to SNI 3836:2013 (2013) about Dried Tea in Packages. A dry cup was heated in an oven at 105°C for 1 hour and cooled in a desiccator for 20 minutes and then weighed (W_0). 5 grams of dry spices mixture of wedang seroja was put into a dry (W_1). The cup containing the sample was heated in an oven at 105°C for 3 hours and cooled in a desiccator for 20 minutes and then weighed. Heating and weighing were carried out every hour until a constant weight was obtained (W_2). Water content is calculated using the formula:

$$\text{Moisture content} = \frac{W_1 - W_2}{W_1 - W_0} \times 100\% \quad (1)$$

b. Ash content

Ash content analysis refers to SNI 01-2891-1992 (1992) about Methods for Testing Food and Beverages. 5 grams of dry spices mixture sample was put into a dry cup that has been weighed. The crucible containing the sample is placed over the burner flame and ashed in a furnace at 550°C until complete ashing occurs. The crucible is then cooled, placed in a desiccator, and weighed until the constant weight is occured. Ash content is calculated using the formula:

$$\text{Ash content} = \frac{(\text{constant weight}) - \text{crucible weight}}{\text{Initial sample weight}} \times 100\% \quad (2)$$

c. Wedang steeping water preparation

One wedang seroja tea bag (4gr) is brewed using 200ml boiled water at a temperature of 90°C. Immersion is carried out by raising and lowering the tea bag for 5 minutes. Next, the tea bag is removed and the steeping water is ready to be tested.

d. pH analysis

pH analysis is carried out by placing around 30 ml of steeping water in a plastic container. The calibrated pH meter is dipped into the sample until the pH is read on the instrument.

e. Color analysis

Analysis was carried out using a chromameter. The color test was carried out using the Hunter L* (white), a* (red), b* (yellow) color system. The chromameter is first calibrated and the steeping water color is read by the device. The resulting analysis results are L*, a*, b* values.

3. RESULTS AND DISCUSSION

Wedang tea bag seroja is an innovative dipped herbal beverages that is made by a mixture of spices that are rich in antioxidants. Each serving contained of 4 grams of dry spice mixture. It has a reddish orange color with a distinctive aroma of spices that emerges. Serving dipped herbal wedang is relatively easy and practical when compared to herbal wedang in general. The steeping method is simply to use hot water (90-100°C), raise and lower the tea bag, and wait for 5 minutes. This makes it easier for consumers to consume the beverage. So that it can increase selling power and people's interest in consuming it. The appearance of wedang seroja beverages can be seen in Figure 1. Apart from that, the development of a product requires analysis of the characteristics so that several physical and chemical tests were carried out on Wedang Seroja which are shown in Table 1.

Table 1. Characterization of Wedang Seroja product

Samples	Characteristics	Amount
Dry spices mixture	Moisture content (%)	15,90±0,50
	Ash content (%)	6,37±0,47
Wedang steeping water	pH	2,10±0,05
	L	43,56±0,96
	a	+23,25±0,60
	b	+21,56±0,21

Note: Data was obtained from three replications of treatment and three repetitions of analysis (triplo). The data is displayed as mean ± standard deviation.

3.1 Moisture content

Analysis of the moisture content in a food product is needed to determine the percentage of moisture contained in the product and can affect the shelf life of the product. Based on the data displayed in Table 1, it can be seen that the water content of the wedang powder in the tea bag is 15.90%. A fairly high moisture content can be caused by the moisture content of each dry spices and also simplicia drying method. This is in accordance to the study conducted by Sylvi et al. (2022) that shows the increase in water content is in line with the increase in substitution for one of the spices in the herbal tea. The dry spices mixture of wedang seroja in this study is dominated by rosella, taking three-quarters of the whole spices mixture. Thus, the moisture content in rosella itself can be responsible for the moisture content in the dry spices mixture.

A traditional drying method that are usually used are sun dried. According to Juhari et al. (2021) showed that a fresh rosella has a moisture content of 89,4%, sun dried rosella of 15,6% and freeze dried rosella of 9,6%. According to the study on different drying method conducted by Purbowati et al. (2018) showed that drying using heat from the sun has a higher water content compared to drying using tools such as a cabinet dryer. It is stated that rosella dried using solar heat has a water content of 11.3% while the cabinet dried rosella has a moisture content of 7,5%. This is due to the inconstant temperature during sun drying. A constant drying temperature in cabinet dryer will result in continuous evaporation of the water mass from the roselle flower petals. Therefore, the highest composition of rosella in the Wedang Seroja tea bag formulation in this study can cause a high water content in the entire wedang dry spices mixture.

3.2 Ash content

Analysis of the ash content in a food product is needed to obtain a general description of the contents of inorganic and mineral components that are used in the manufacturing process (Tenda et al., 2023). Based on the data in Table 1, it can be seen that the ash content of the Wedang Seroja powder mixture is 6.37%. According to Syahidah et al. (2022) the ash content of rosella approximately 4,41 – 6,41% depending on its drying method. According to Shadri et al. (2018) the ash content of lemongrass powder approximately 5,942 – 8,562%. While according to Latona et al. (2012) the ash content of ginger root is 7,64%. Each of these spice in the dry mixture of wedang seroja tea bag can contribute to the ash content. Wedang tea bag products do not yet have an SNI reference, but an approach can be made by referring to black tea bags and green tea bags. Based on SNI 3753:204 (2014) about Black Tea Bag, the total ash content in black tea bag is 4 – 8%. This is the same as the ash content of green tea bags in SNI 4324:2014 (2014), namely 4 – 8%. Therefore, the total ash content in the Wedang Seroja powder blend is in accordance with the SNI for black tea and green tea bags.

3.3 pH

Analysis of pH on a food product can be done to determine the level of acidity and alkalinity of a product. The pH value shows the concentration of H+ (hydrogen) ions dissolved in a solution. Based on the data displayed in Table 1, it can be seen that the pH of wedang seroja steeping water is at 2.10. This shows that the steeping water of wedang seroja has a high level of acidity. Wedang seroja consists of three kinds of spices, namely lemongrass, rosella and ginger. Apart from that, the composition of wedang seroja in this study was dominated by rosella for about 70% of the whole dry spices mixture. Lema et al. (2022) stated that fresh rosella has a pH of 2,7 while sun dried sorella has a pH of 2,35. Wong et al. (2002) identified organic acid in rosella such as oxalic, tartaric, malic, and succinic acids with succinic acid and oxalic acid as the predominant organic acid present in rosella. According to Kurniasari & Murtini (2017) infused honey tea containing 25% rosella has a pH of 2.6, lower than the pH of infused honey tea which contains 5% rosella, namely 3.7. The more rosella content in the mixture and product, the lower the pH produced. Therefore, steeping water from Wedang Seroja tea bag with a rosella content of 70% is in accordance with other research for having a low pH.

3.4 Color

Color is one of the attributes that consumers will pay attention to first in a food product. Color attributes can be analyzed objectively using physical instruments such as a chromameter and can be analyzed subjectively with the human senses through organoleptic testing. Objective analysis using a chromameter tool carried out on the steeping water of Wedang Seroja tea bag can be seen in Table 1. Based on the data presented, it can be seen that the steeping water has an L value of 43.56, an a value of +23.25, and b value of +21.56. The L value in the chromameter results shows the brightness of the product, where the higher the L value, the brighter the product. The a value indicates green coordinates when in negative (-) form and red when in positive (+) form. The b value shows the blue coordinates when in negative (-) form and yellow when in positive (+) form. Based on the chromameter value, it can be concluded that the brewed water of Wedang Seroja tea bag has red and yellow colors. It also in accordance to the appearance of steeping water of wedang seroja that are shown in Figure 1. In the figure, the wedang seroja steeping water has a reddish with a slight yellow color.

Figure 1. The Wedang Seroja Steeping Water

The red color in the steeping water can be caused by the high composition of rosella in the dry spices mixture of wedang seroja. According to Kurniasari & Murtini (2017), treatments that used higher levels of rosella showed a redder color compared to other treatments that used lower levels of rosella. These results are proven by an increase in the a value in the color test, namely +16.9 for infused honey tea with a rosella concentration of 25% and +9.4 for infused honey tea with a rosella concentration of 5%. This shows that the composition of the rosella in the dry spice mixture of wedang seroja greatly influences the red color of the steeping water produced. According to Juhari et al. (2021) the high content of anthocyanin is responsible for the red color, thus this calyx is commonly used for food coloring. The total amount of anthocyanin contents in rosella is 2,52g/100g (Wong et al., 2002).

4. CONCLUSION

Based on the research that has been carried out, it can be concluded that the dry spice mixture of Wedang Seroja tea bag has a water content of 15.90% and an ash content of 6.37%, while the steeping water has a pH of 2.10 and objective color testing results with an L value of 43. .56, a value of +23.25, and b value of +21.56. The 70% composition of rosella in the dry spice mixture has a big role in the low pH and red color produced in the wedang seroja steeping water. Another study can be conducted to characterized the product using more analysis to better undertand the product.

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