Jurnal Teknologi Industri Pertanian 34 (2): 97-103, Agustus 2024
DOI: https://doi.org/10.24961/j.tek.ind.pert.2024.34.2.97
ISSN: 0216-3160 EISSN: 2252-3901

Terakreditasi Peringkat 2
SK Dirjen Pendidikan Tinggi, Riset, dan Teknologi No. 158/E/KPT/2021
Tersedia online http://journal.ipb.ac.id/index.php/jurnaltin

THE QUALITY TEST OF CHOCOLATE DRINK WITH THE ADDITION OF RED GINGER POWDER (*ZINGIBER OFFICINAL*) AND CINNAMON (*CINNAMOMUM VERUM*)

UJI MUTU MINUMAN COKLAT DENGAN PENAMBAHAN BUBUK JAHE MERAH (ZINGIBER OFFICINAL) DAN KAYU MANIS (CINNAMOMUM VERUM)

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Paper: Accepted August 30, 2023; Corrected January 21, 2024; Approved February 09, 2024

ABSTRAK

Penelitian ini mengeksplorasi sifat obat jahe merah dan kayu manis dalam produksi minuman cokelat. Jahe merah, yang dikenal karena khasiat penyembuhan tradisionalnya, dan flavonoid kakao, menawarkan berbagai manfaat kesehatan, dikombinasikan untuk membuat minuman cokelat. Kayu manis, dengan tanin dan flavonoidnya, melengkapi campuran, diyakini dapat merangsang sirkulasi darah dan memberikan efek pemanasan. Penelitian ini bertujuan untuk mengidentifikasi formulasi optimal dengan berbagai rasio jahe merah terhadap kayu manis dan menilai pengaruhnya terhadap kualitas minuman cokelat. Tiga rasio (95%:5%, 85%:15%, 75%:25%) diperiksa kadar air, kadar sukrosa, dan atribut organoleptik. Desain Acak Lengkap dengan tiga replikasi dan pengujian post hoc menggunakan Perbedaan Paling Tidak Signifikan digunakan untuk analisis data. Hasil terbaik dicapai dengan rasio jahe merah 75% terhadap kayu manis 25%, dengan aroma 3,41 (agak disukai). Kandungan air dan sukrosa memenuhi standar Indonesia (01-4329-1996). Sebagai kesimpulan, penelitian ini menggarisbawahi efek positif dari jahe merah dan kayu manis dalam minuman cokelat. Rasio 75%:25% menghasilkan skor aroma yang optimal, memenuhi standar kualitas, memberikan wawasan untuk pengembangan produk. Penelitian ini berkontribusi untuk memahami dampak rasio jahe merah dan kayu manis terhadap karakteristik minuman cokelat.

Kata kunci: bubuk jahe merah, bubuk kayu manis, minuman cokelat

ABSTRACT

This study explored the medicinal properties of red ginger and cinnamon in chocolate beverage production. Red ginger, known for its traditional healing properties, and cocoa flavonoids, offering various health benefits, were combined to create a chocolate drink. Cinnamon, with its tannins and flavonoids, complements the mixture and is believed to stimulate blood circulation and provide a warming effect. The research aimed to identify the optimal formulation with varying red ginger-to-cinnamon ratios and assessed their influence on chocolate drink quality. Three ratios (95%:5%, 85%:15%, 75%:25%) were examined for water content, sucrose content, and organoleptic attributes. A Completely Randomized Design with three replications and post hoc testing using the Least Significant Difference was employed for data analysis. The best results were achieved with a 75% red ginger to 25% cinnamon ratio, scoring 3.41 (somewhat liked) in the aroma. Water and sucrose contents met Indonesian National Standards (01-4329-1996). In conclusion, the study underscores the positive effects of red ginger and cinnamon in chocolate drinks. The 75%:25% ratio yielded optimal aroma scores, meeting quality standards and providing insights for product development. This research contributes to understanding the impact of red ginger and cinnamon ratios on chocolate beverage characteristics.

Keywords**:** red ginger powder, cinnamon powder, chocolate drink

INTRODUCTION

The growing public understanding and awareness of the significance of the relationship between health and fitness significantly impacts the expansion of research into processed food products (food and drinks) (Rialita *et al.*, 2018). The POM Agency (2011) defined functional food as processed food having one or more components that, in accordance with scientific research that have been shown to be safe and advantageous to health, have distinct physiological functions beyond their necessary functions (de Souza *et al.*, 2018).

Numerous epidemiological studies have been released showing a clear connection between the flavonoid content of cocoa and a number of health advantages (Nissa *et al.*, 2018). These substances have been shown to increase blood flow and blood vessel flexibility, lower blood pressure, function as anti-inflammatories, lower cholesterol, and prevent cancer; daily consumption of 100 grams of chocolate with 500 mg of polyphenols can lower systolic blood

**Coressponding Author*

pressure while improving insulin sensitivity and decreasing insulin resistance (Nissa *et al*., 2018)

Instant drinks are prepared beverage products that are easy to serve, last for a long time, and may be taken internally in a short amount of time, making them practical (González-Barrio *et al.,* 2020a). An adequate substitute for serving nutritious and functional beverages is making instant drinks in powder servings that are then dissolved in water. Producing quick drink products in powder form is a unique draw for the community because of how convenient they are to make and consume (Delgado-Ospina *et al.,* 2021). Products for instant drinks are being created using spices, including ginger, turmeric, and cinnamon. The general public recognizes spices as natural preservatives. The growth of germs is allegedly inhibited by spices like turmeric, ginger, and garlic, which are frequently employed as flavoring agents *(Delgado-Ospina et al*., 2021).

The abundance of oleoresins and essential oils in red ginger rhizomes contributes to the warming sensation that red ginger is known for. Red ginger thus plays a vital part in medicine, both traditionally and commercially, through employing developments in technology (Momtaz *et al.,* 2018). This beverage will taste much better thanks to the fragrant gingerol molecule (Fahmid *et al.,* 2018). The plant effectively treats various treating a variety of diseases, including bronchitis, expectorants, and laxatives (Błaszczyk *et al.,* 2021). The general public has valued red ginger ginger has long been appreciated by the general public for its therapeutic properties. Only direct boiling is often used to ingest red ginger. Red ginger still needs to be used in drinks that are powdered. The shelf life of glasses can be extended for a longer time by utilizing red ginger as a powdered beverage, which is also more convenient and easy to use (Baker *et al*., 2020).

One spice that not only improves flavor but also has a distinct and pleasant spice fragrance is cinnamon. Cinnamon contains tannins, flavonoids, triterpenoids, and saponins, all of which are very beneficial. All four are thought to boost blood circulation, which makes the body feel warmer (Sonwa *et al.,* 2019), and act as antioxidants and anti-clotting red blood cells. The ability of cinnamon to improve health (Rehman, 2018) organoleptic properties of the drink in the form of color, aroma, and taste are what draw researchers to add cinnamon powder to this functional drink. The addition of cinnamon powder is expected to increase the antioxidants contained in chocolate and red ginger so that it will improve health more optimally. This research aims to create a chocolate-based health drink that is packed with benefits (Daud Supu *et al.,* 2018). Therefore, researchers are interested in researching and studying the development of recipes for making chocolate drinks with the addition of red ginger powder and cinnamon, as well as finding out the effect of this comparison on the quality of the finished product.

RESEARCH METHODS

This research is an experimental study using a Completely Randomized Design (CRD) with three repetitions. Preliminary research and qualitative chemical analysis were carried out at the Makassar Health Center Laboratory and the Food Technology Laboratory, Faculty of Agriculture, Bosowa University, Makassar. This research was conducted in April-June 2022. The tools used in this research were manual scales, a made blender, an oven, 60 mesh sieve, digital scales, iron spoons, and aluminum baking pans. The ingredients used in this research were chocolate powder, red ginger, cinnamon powder, powdered sugar, and creamer.

The treatment carried out in this research was the following comparison of red ginger powder and cinnamon powder

Table 1. Experimental Design

Treatment	Cinnamon Powder	Ginger Extract
K1	5%	95%
K2	15%	85%
K3	25%	75%

This research data collection technique uses Google Forms on the organoleptic properties of cocoa powder, red ginger, and cinnamon powder. Twenty-five panelists carried out data collection to determine the organoleptic properties of the research results, including color, aroma, and taste. In this method, panelists are asked to provide an assessment based on their level of liking using a score of 1 (dislike very much), 2 (dislike), 3 (somewhat like), 4 (like), and 5 (like very much). The data was then analyzed using the SPSS program and analyzed using a single classification variant (single ANOVA). If the influence of the test shows that it is significant, it will be continued using Duncan's advanced test. The following scheme for making red ginger powder is in Figure 1. The following schematic of the chocolate drink-making process is in Figure 2.

Manufacturing of Chocolate Drinks

In the first step, mixing chocolate drink ingredients involves combining ingredients in specific proportions of 20% cocoa powder, 55% sugar, and 15% creamer, with additional ratios of 75%, 85%, and 95% ginger powder and 5%, 15%, and 25% cinnamon powder. The process needs to be repeated three times to ensure the homogeneity of the mixture.

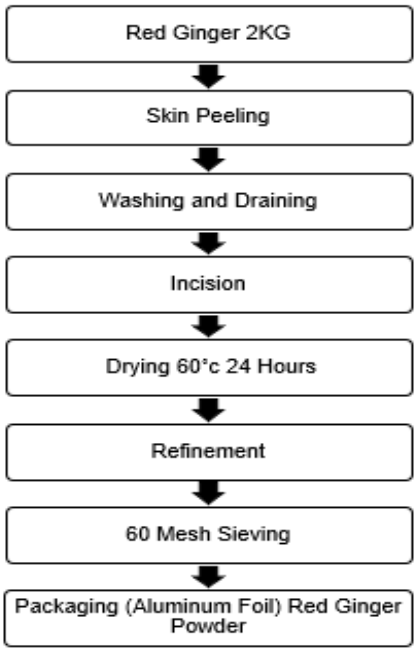


Figure 1. Making red ginger powder

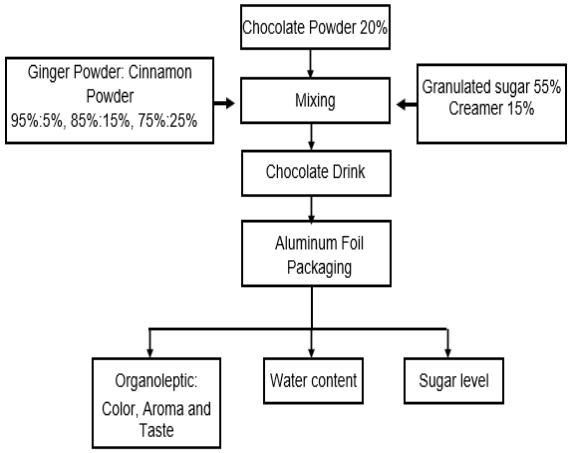


Figure 2. Making Chocolate Drinks

Next, the second step involved packaging the product using pressed aluminum foil to maintain its quality and moisture. In addition, a chemical analysis of the chocolate drink was conducted to measure the moisture content and sugar content, specifically sucrose, following the method described in the study by (Rachmawati *et al.,* 2021). Finally, the third step involves the decoction of 300 ml of hot water with 30 grams of chocolate liquor, followed by an organoleptic test that includes assessing the color, taste, and aroma of the chocolate liquor using organoleptic techniques. All these steps need to be documented in detail to ensure reproducibility and make it easier for other researchers to repeat the experiment with similar results.

RESULTS AND DISCUSSION

Chocolate Drink Research Results

The results of research on chocolate drink products with a comparison of red ginger powder and cinnamon powder can be seen in Figure 3. Then, a water content analysis was carried out with the aim of determining the water content in the product, and then an analysis of the sugar content as sucrose was carried out with the aim of determining the sucrose content in the product. Organoleptic testing was carried out with the aim of finding out the panelists' preferences for color, aroma, and taste.

Figure 3. Documentation of chocolate beverage product research results
Source: processed by researchers, 2023

Moisture Content Results

The water content of cocoa drinks ranged from 1.35% to 1.69%. The red ginger powder with an 85% treatment had the lowest water content (15% cinnamon powder by 1.35%), and the red ginger powder with a 95% treatment had the highest (5% cinnamon powder by 1.69%). The Indonesian National Standardisation Agency determined that the maximum water content of conventional powder drinks is 3.0 (Anonymous, 1996). This indicates that the chocolate beverages. This study's water content complies with Indonesia's national standards. Figure 2 displays the findings of the average water content value of chocolate beverages.

As shown in Figure 4, the results of the analysis of variance for the water content of the chocolate drink showed that the effects of contrasting red ginger powder and cinnamon powder had no discernible impact on the water content of the chocolate drink, a BNT follow-up test was not carried out. According to Figure 2, red ginger has a high water content, so the more red ginger is added, the more water is produced in the chocolate drink, increasing the water content value. At 5%, cinnamon powder had the highest water content (1.69%) when used to treat chocolate drinks with 95% red ginger powder. According to Eze and Agbo (2011), dried ginger has a 1-3% essential oil content, a 5- 10% oleoresin content, a 50– 55% starch level, and a 7–12% moisture content. Moreover, have trace protein, fiber, fat, and ash (Momtaz *et al.*, 2018)

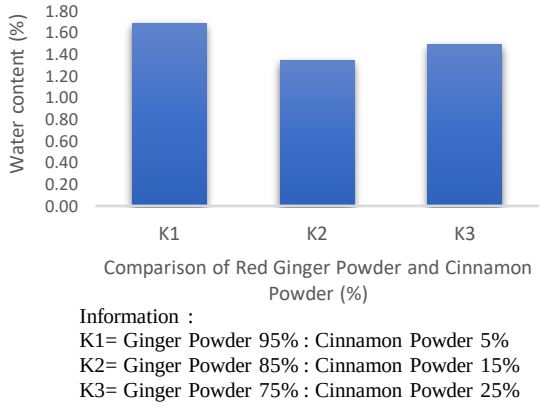


Figure 4. Effect of comparison of red ginger powder and powder cinnamon against water content of chocolate drinks

Source: processed by researchers, 2023

Sugar Content Results

According to this investigation's findings, the sugar level of the chocolate drink ranged from 56.44% to 59.42%. The treatment with a ratio of 75% red ginger powder to 25% cinnamon powder had the lowest sugar level (56.44%). In contrast, the treatment with a 95% red ginger powder ratio to 5% cinnamon powder had the most incredible sugar content (59.54%). The Indonesian National Standardisation Agency has set a maximum sugar content of 85.0 for traditional powder drinks (Błaszczyk *et al.*, 2021). This indicates that the chocolate drink used in this study's sugar analysis complies with Indonesia's National Standard. Figure 3 displays the findings of the average sugar concentration in chocolate beverages. The research on variation in the chocolate drink's sugar content revealed, as shown in Appendix 3b, that the comparison of red ginger powder and cinnamon powder had no discernible influence on the chocolate drink's sugar content. As a result, BNT did not conduct additional investigations.

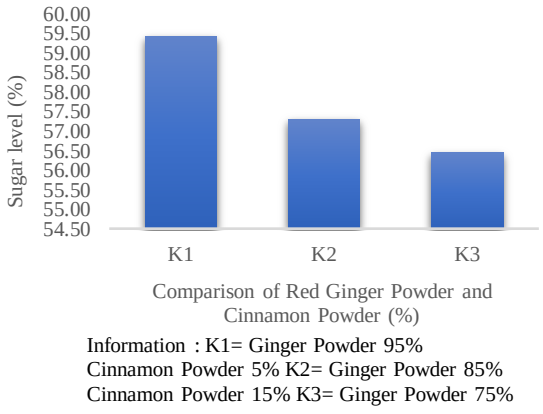


Figure 5. Effect of comparison of red ginger powder and cinnamon powder against sugar content in chocolate drinks

Source: processed by researchers, 2023

Based on Figure 5, a higher ratio of ginger powder tends to produce a lower level of sweetness in chocolate drinks. This finding is consistent with (Petcu et al., 2023), which states that the spicy flavor produced by red ginger can mask or reduce the sweetness provided by sugar. In this context, formulations containing a higher ratio of red ginger produce the effect of lowering the overall sweetness level. In addition, the selection of a formula with a high level of granulated sugar at 55%, as described by (Serra et al., 2021), may also have influenced these results. High sugar levels can act as the main sweetener in chocolate drinks. However, they also have the potential to function as a natural preservative, increasing product shelf life and avoiding the growth of microorganisms. Therefore, the combination of a high ratio of red ginger powder and a formulation with a high sugar content may be a factor in the lower sweetness of the chocolate drink, as shown in the analytical results in Figure 5.

Color

The most challenging aspect of color to express and quantify is how easily it can be shaped and impressed. In evaluating a product, subjective judgment based on sight is still crucial *(Daud Supu et al.,* 2018). The brown mixture included an average treatment ratio of 3.64 to 3.74 for red ginger and cinnamon powder . The 75% red ginger powder: 25% cinnamon powder comparison treatment yielded the lowest color score, 3.64, while the 95% red ginger powder: 5% cinnamon powder comparison treatment produced the highest, 3.74. Figure 4 displays the average color score for the chocolate beverage. A BNT follow-up test was conducted since the analysis of variance for the chocolate drink's color revealed that the comparative treatments of red ginger powder and cinnamon powder had no discernible impact on the beverage's color they were not completed.

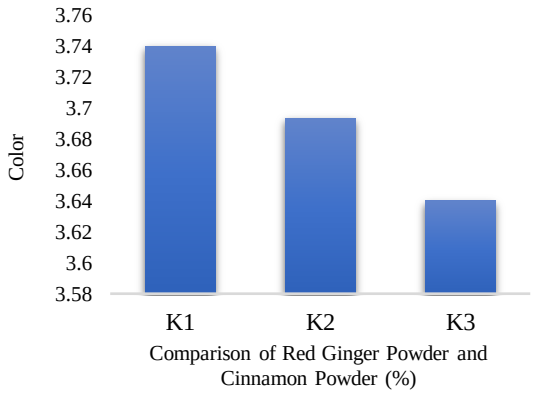


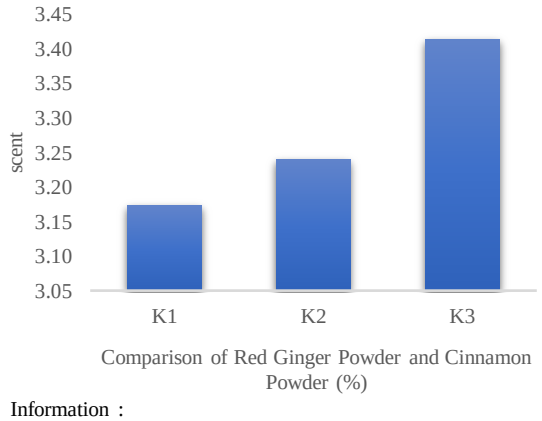
Figure 6. Effect of comparison of red ginger powder and powder cinnamon against the color of a chocolate drink

Source: Compiled by Researchers, 2023

The results of the panelists' assessment of the color of the chocolate drink are shown in Figure 6. The 95% treatment of red ginger powder yielded the highest level of panelist preference: 5% cinnamon powder, scoring 3.74 (likes), while the 75% red ginger powder comparison treatment produced the lowest level of panelist preference: 25% cinnamon powder, scoring 3.64 (likes). This is because the panelists favor the brown beverage's coloring and the more red ginger powder it contains. Red ginger is, after all, naturally a yellowish-brown tint. The product's coloration is also a result of reduced influences from the cinnamon powder ratio; specifically, because the cinnamon powder is dark brown, the combined color is light brown. This follows the theory (Daud Supu *et al.*, 2018) that the hue gets darker with more cinnamon powder. The presence of cinnamaldehyde is the cause of this. According to (Irawan *et al.*, 2019), increasing the amount of ginger extract in beverages will raise the glass's brightness level.

Aroma

When an odor enters the nose and is processed by the sense of smell, the aroma of a product can be identified. A food or beverage product's flavor can be inferred from its aroma. The scent of the chocolate beverage treated with red ginger and cinnamon powder ranged from 3.17 to 3.41 on average. The comparative treatment with 95% red ginger powder and 5% cinnamon powder had the lowest aroma score, 3.17, while the comparison treatment with 75% ginger powder and 25% cinnamon powder had the highest aroma score, 3.41. Figure 7 displays the findings of the average color rating for chocolate beverages.



Information :
K1= Ginger Powder 95% : Cinnamon Powder 5%
K2= Ginger Powder 85% : Cinnamon Powder 15%
K3= Ginger Powder 75% : Cinnamon Powder 25%

Figure 7. Effect of comparison of red ginger powder and cinnamon powder against the aroma of chocolate drinks

Source: processed by researchers, 2023

A BNT follow-up test was conducted after the chocolate drink aroma variance analysis (Figure 7) revealed that the comparison treatments of red ginger powder and cinnamon powder significantly affected the chocolate drink's aroma. The ratio of 95% red ginger powder to 5% cinnamon powder was substantially different from the treatment ratio of 75% red ginger powder to 25% cinnamon powder but not significantly different from the ratio of 85 red ginger powder to 15% cinnamon powder, according to the least essential difference test. 85% red ginger powder: 15% cinnamon powder was significantly different from 75% red ginger powder: 25% cinnamon powder but not substantially different from 95% red ginger powder: 5% cinnamon powder in terms of treatment. Compared to 95% red ginger powder: 5% cinnamon powder and 85% red ginger powder: 15% cinnamon powder, the treatment ratio of 75% red ginger powder: 25% cinnamon powder was noticeably different.

In Figure 5, the panelists' rating of the chocolate drink's aroma reveals that they enjoy the treatment ratio of 75% red ginger powder to 25% cinnamon powder the most. The lowest result of the panelists' preference level in the treatment of the balance of 95% red ginger powder to 5% cinnamon powder was 3.17 (very liked), while it was 3.41 (somewhat picked). This is because the panelists will favor the aroma of chocolate drinks the higher the quantity of cinnamon powder.

After all, the strong scent of red ginger might be hidden by the aroma of cinnamon, which predominates. Due to the presence of cinnamaldehyde and eugenol, cinnamon has a pleasing fragrance. This finding is consistent with (Mehrpouri *et al.*, 2020), which found that fragrance is an allure that can pique the sense of smell and influence consumer tastes. This is so you can understand the pungent aroma of the red ginger. Since ginger contains essential oils, it has a unique aromatic smell. This investigation supports the theory (Novita *et al.*, 2022) that the amount of ginger extract added causes ginger's distinctive solid aromatic fragrance to become more pungent.

Taste

Taste combines smell, taste, and other perceptions, including sight and scent. Because the product comprises dissolved components, the flavor can be perceived by the senses of taste. The ratio of the chocolate beverage treated with red ginger and cinnamon had an average flavor rating between 2.91 and 2.97. The mix of 75% red ginger powder and 25% cinnamon powder yielded the treatment's lowest taste rating of 2.91. Comparatively, the treatment with a ratio of 85% red ginger powder to 15% cinnamon powder had the highest flavor value. Is 2.97. Figure 6 displays the results of the average taste rating for the chocolate beverage. The BNT follow-up test was not

performed because the amount of red ginger powder and cinnamon powder in the chocolate drink had no appreciable effect on the flavor, according to the analysis of the chocolate drink flavor variance.

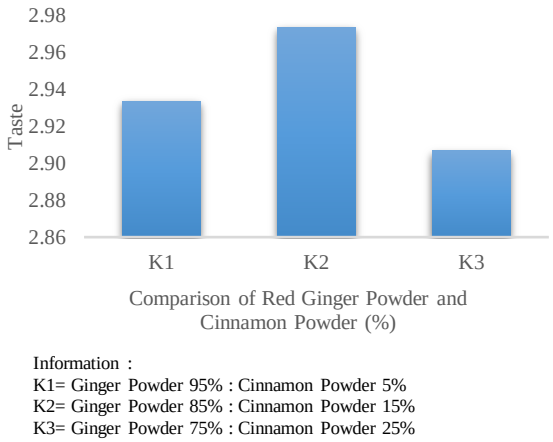


Figure 8. Effect comparison of red ginger powder and cinnamon powder against the taste of chocolate drinks
Source: processed by researchers, 2023

Figure 8. According to the findings, the panelists treated to the ratio of 85% red ginger powder to 15% cinnamon powder and received a taste rating of 2.97 (rather liked) had the highest preference for the chocolate drink. In contrast, the ratio of 75% red ginger powder to 25% cinnamon powder was determined to have the lowest degree of panelist preference, receiving 2.91 (likes). The panelists will prefer the taste of a chocolate drink because the taste of red ginger is hot and warm and is also influenced by cinnamon, which has a slightly sweet taste and does not cause a bitter taste when both are used in the correct ratio. This is because the red ginger powder to cinnamon powder ratio is balanced. This outcome is consistent with the fact that red ginger includes both essential oils, which give it a characteristic perfume, and oleoresin. This non-volatile oil gives it a spicy and bitter taste. Cinnamon has aromatic, somewhat sweet, warm, and fragrant chemical characteristics and pharmacological actions, according to (Gbenga-Fabusiwa *et al.*, 2018).

CONCLUSION AND RECOMMENDATION

Conclusions

This study explored the effect of the ratio of red ginger powder and cinnamon powder on chocolate beverages. The moisture content of the beverage ranged from 1.35% to 1.69%, complying with the Indonesian National Standard. Sugar content ranged from 56.44% to 59.42%, complying with the maximum limit of 85.0. The color of the beverages was not significantly different, but a higher ratio of red ginger tended to result in higher color scores. The aroma was highest at 75% red ginger, while the flavor was highest at 85% red ginger. These results provide insights into the formulation of chocolate beverages that suit consumer preferences and meet quality standards.

Recommendation

Future Researchers are expected to be able to increase the concentration of the spice flour comparison treatment and analyze more parameters following the Indonesian National Standard.

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