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Abstract. The objectives of this study were to analyze the method of making Cascara Arabica tea on organoleptic and consumer preferences, so that in order to produce Cascara Arabica tea products with good quality, and also to enrich functional drink variants that are circulating in the community but are still minimally consumed in the form of Cascara Arabica tea product. The stages of this research started from the process of making Cascara Arabica tea, then continued with organoleptic tests and consumer preferences. The panelists used were untrained with a total of 40 people. Furthermore, all data were analyzed by Analysis of Variance (ANOVA) with a significance level of 5%, if there was a significant effect, continued with Duncan Multiple Range Test (DMRT), data processing using IBM SPSS Statistics Version 23. The result showed that the different types of sweeteners had a significant effect on all sensory parameters. Based on the Cascara Arabica tea treatments that was tested on the panelists, it showed that the 5% added sugar treatment was the most preferred, because according to the taste parameter, the sweetness level, and overall preference level had the highest average value compared to the other three tea treatments.
Keywords— Cascara Arabika tea, consumer preferences, functional beverage product, organoleptic testing.

1. Introduction

Banyuwangi as one of the largest districts in East Java, has abundant biodiversity because geographically it is a fertile area with mountainous areas to the coast. Local government policies that are supported by advances in science and technology have made Banyuwangi district increasingly known to the national and international community. One of the superior crops owned by Banyuwangi district is Arabica coffee. Various coffee-themed festivals were held by the Banyuwangi local government, such as the 10 Ewu Coffee Festival, Foto Kopi, and Banyuwangi Coffee Week, to re-enhance tourism potential and other leading fields that had dimmed due to the ongoing COVID-19 pandemic[1]. The number of hotels and inns, restaurants, cafes, and coffee shops that provide and sell coffee products continues to increase in Banyuwangi district until now[2].

The high demand for coffee products is in line with the increase in by-products in the form of coffee skin waste that exist among coffee producers. So far, the waste is simply thrown away or simply processed and used as a mixture of plant fertilizers and animal feed. Ordinary people still rarely know and know about coffee fruit peel tea products because of their lack of knowledge and low interest in their consumption. This functional beverage product known as Cascara tea is rich in antioxidants and protein which is good for health if processed in the right and right stages. Cascara tea has a sweet taste and a distinctive aroma like herbal tea. The stages of the process of making Cascara Arabica tea consist of sorting, washing, and drying the skin of the coffee fruit[3]. Many efforts have been made to utilize Arabica coffee by-products, but they are still not optimal. This causes the need for an appropriate technological approach to further increase the added value of Arabica coffee husk waste.

Several studies have been carried out regarding the utilization of coffee husk waste into Cascara tea products, but research on Arabica coffee husk waste is still limited in number. This research is expected to be able to enrich scientific references on the method of utilizing Arabica coffee skin waste and its product diversification or development.

This research focuses on the field of food research, especially Agricultural Industrial Technology Based on Smart Industries in partnership with the coffee processing industry. This research can add information to the public that Arabica coffee skin waste can be used as a product of high economic value in the form of a functional drink of Cascara tea because it contains high levels of antioxidants and protein.

The objectives of this study include: 1) To analyze the method of making Cascara Arabica tea on organoleptic and consumer preferences, so that in order to produce Cascara Arabica tea products with good quality; 2) To enrich functional drink variants that are circulating in the community but are still minimally consumed in the form of Cascara Arabica tea products.

2. Literature Review

a. Arabica Coffee

The coffee plant is a genus of flowering and fruiting plants in the Rubiaceae family. Coffee plants are shrubs or small trees of the tropics, which grow on the continents of Africa and Asia that can grow up to 3.5-5 meters in fertile areas. Coffee plants begin to flower 3-4 years after planting[4].

The first coffee developed in the world was Arabica coffee which came from the *Coffea arabica* coffee tree species. This type of coffee is the most widely produced, which is about more than 60% of world coffee production. Arabica coffee produces oval coffee beans with a strong body flavor profile, high flavor complexity, fragrant medium notes, with dominant acidity[5]. Trees of this species usually grow in highland areas. Arabica coffee has a caffeine content of no more than 1.5%. In terms of the selling price in trade, Arabica is a coffee bean that has a higher selling value than other coffee beans, considering the difficulty of producing it[6].

b. Coffee Husk Waste

Coffee husk waste is usually in the form of fruit pulp which physically reaches 48% composition, consisting of 42% fruit skin and 6% seed coat. Coffee husk itself contains 45% cellulose, 25% hemicellulose, 2% lignin, 45% resin and 0.5% ash[7]. Fresh coffee rind contains several components, namely crude protein (6.11%), crude fiber (18.69%), tannins (2.47%), caffeine (1.36%)[8]. The components of the coffee husk can be used as a step to increase the added value of the material, including as a basic ingredient for making compost[9], animal feed[10], and Cascara tea[8].

So far, the utilization of coffee husk waste has not been widely carried out and utilized optimally, this is due to a lack of knowledge and interest in processing coffee skin into a new product[3]. Therefore, researchers are interested in Cascara tea which is expected to provide new tea drink variants that can be beneficial for health and can be accepted by the market as a step to expand functional drinks in the form of herbal drinks.

c. Cascara Arabica Tea

One of the new breakthroughs in tea culinary is Cascara tea. Cascara tea is a tea derived from the skin of the coffee fruit which is rich in flavors, including sweetness, distinctive aroma (herbal tea aroma), the aroma of mangoes, cherries, rose petals and tamarind[8]. There are several benefits that Cascara tea has, namely it is believed to increase stamina, maintain the stomach, prevent heart disease, prevent premature aging, and to tighten the skin and can be used for beauty masks.

Cascara tea contains several active compounds including the following, tannins of 1.8-8.56%, pectin of 6.5%, caffeine of 1.3%, chlorogenic acid 2.6%, caffeic acid 1.6%, anthocyanins (cyanidine, delpinidin, cyanidin 3-glycosides, delpinin 3-glycoside, and pelargonidine 3-glycoside) by 43%. Some of the ingredients in Cascara tea have several health benefits, including the ability to ward off free radicals, so this cascara tea is able to prevent the growth of cancer cells and increase the body's resistance[11].

Cascara tea-making stage has several things that must be considered, namely drying and brewing. Drying is one way to reduce the liquid content in solid materials by evaporation, blowing or heating at high temperatures, both under normal pressure and vacuum. Brewing itself is the process of extracting some chemical or flavoring from plant material into a solvent such as water, oil, or alcohol. These two stages are very important to note because they can affect the final quality of the tea produced. Cascara tea was made using ingredients from the skin of Gayo Arabica coffee and the results were the best chemical quality produced at 8 minutes of brewing using natural pulp[12].

Figure 1. Cascara Arabica Tea

3. Research Method

a. Place and Time of Research

This research was conducted at Politeknik Negeri Banyuwangi in Banyuwangi District, while the laboratory analysis was carried out in the laboratory at the Integrated Testing Service Unit, Faculty of Agricultural Technology, University of Jember in Jember District. The timeline for this research is May to October 2022.

b. Research Types

The data used in this research is quantitative. Quantitative data is systematic and associated with the problem posed. Quantitative research using an approach that shows research comes from the fact that occur in the field.

c. Production Process of Cascara Arabica Tea

The dried rind of Arabica coffee is used in the process of making Cascara tea. Cascara tea uses dried Arabica coffee fruit husk in a whole, not in powder form. The process of making Cascara tea based on previous research[3] is described in the following stages in Fig. 2.

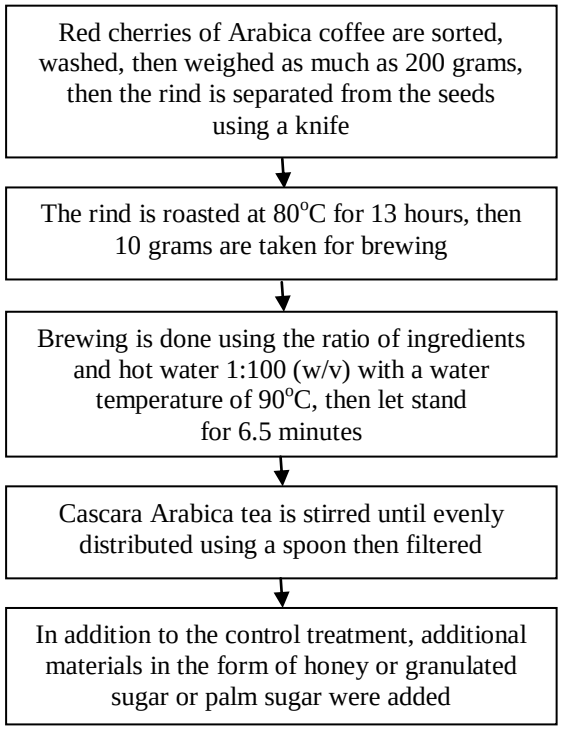

Figure 2. Production Process Stages of Cascara Arabica Tea

d. Organoleptic Testing Process

This research was an experimental study with four (4) treatments in Cascara Arabica tea, namely treatment B0 (original Cascara Arabica tea/control), B1 (Cascara Arabica tea with the addition of sugar), B2 (Cascara Arabica tea with the addition of palm sugar), B3 (Cascara Arabica tea with the addition of honey), then organoleptic testing was carried out based on indicators of color, aroma, taste, and texture of Cascara Arabica tea. The sampling technique used was simple random sampling consisting of 40 non-trained panelists, with the following respondent criteria:

- Adolescents aged 15-25 years;
- Not including teenagers who are picky in consuming food and drink;
- Willing to consume four (4) types of Cascara Arabica tea;
- Willing to be a research respondent.

Figure 3. Some Treatments of Cascara Arabica Tea

The instrument in this study was through the administration and filling of organoleptic test questionnaires using a Likert scale with a range of test assessments used, namely very like (5), like (4), quite like (3), dislike (2) and very dislike (1). The hedonic test data was first transformed using the root method with the formula = SQRT (data + 0.5). Furthermore, all data were analyzed by Analysis of Variance (ANOVA) with a significance level of 5%, if there was a significant effect, continued with Duncan Multiple Range Test (DMRT), data processing using IBM SPSS Statistics Version 23.

4. Research Result

a. Organoleptic Test Result

Table 1. Cascara Arabica Tea Organoleptic Test Results

Treatment	Color	Aroma	Taste	Sweetness Level	Level of pleasure
B0	$3,97\pm0,58^{b}$	$3,70 \pm 0,99^{a}$	$1,48 \pm 0,82^{c}$	$1,20 \pm 0,41^{c}$	$1,73 \pm 0,64^{c}$
B1	$3,90\pm0,67^{b}$	$3,03 \pm 0,86^{b}$	$3,75 \pm 0,95^{a}$	$3,57 \pm 0,71^{a}$	$3,60 \pm 0,84^{a}$
B2	$4,85\pm0,48^{a}$	$3,90 \pm 1,17^{a}$	$3,40 \pm 1,08^{b}$	$3,38 \pm 0,95^{ab}$	$3,48 \pm 1,06^{ab}$
B3	$3,42\pm0,81^{c}$	$3,48 \pm 0,96^{a}$	$3,25 \pm 0,98^{b}$	$3,10 \pm 1,08^{b}$	$3,20 \pm 0,85^{b}$

Description: B0: control; B1: addition of 5% sugar; B2: addition of 5% palm sugar; B3: addition of 5% honey;
^{a,b,c}: Different superscripts show significant difference P(>0.05)

The results of the panelists' preference level test showed that the different types of sweeteners had a significant effect ($p<0.05$) on all sensory parameters. From the table, it can be seen that the cascara tea treatment tested to the panelists showed that the 5% added sugar treatment was the most preferred, because according to the taste parameters, the sweetness level and the overall preference level had the highest average value compared to the other three tea treatments. The average hedonic value of taste, sweetness level and overall preference level in the 5% sugar addition treatment were 3.75 ± 0.95, respectively; 3.57 ± 0.71 and 3.60 ± 0.84. For color and aroma, the most preferred treatment was the addition of 5% palm sugar with the respective values of 4.85 ± 0.48 and 3.90 ± 1.17.

b. Color Parameter

In color parameter, the panelists gave an average value of 4.85 ± 0.48 in the tea treatment with the addition of 5% palm sugar, meaning that the panelists really liked the color of the tea treatment, the value was significantly different from other treatments. Panelists really like the color of Cascara Arabica tea with the addition of 5% palm sugar because it is red. The first thing that can attract consumers to food products, be it drinks or food, is color. Color can only be seen using the sense of sight [13]. A nutritious food, good taste will not be consumed if the color is unsightly or gives the impression of deviating from the original color [14]. The color of the tea can be affected by the tannin content of the tea. Tannins are compounds that are commonly found in tea. The lower the tannin content, the darker the color of the tea [15].

c. Aroma Parameter

In aroma parameter, the average organoleptic aroma test value in the treatment of adding 5% palm sugar was the highest average with a value of 3.90 ± 1.17, which means that the panelists liked the aroma of the tea. The delicacy of a drink can be determined from the aroma, so that consumer assessment parameters can be obtained from the aroma [16]. When the gallic acid is dried, it is oxidized to thearubigin compounds, forming the distinctive aroma of tea. Thearubigin compounds are responsible for the fragrant aroma of tea [17].

d. Taste Parameter

The results of the hedonic test assessment on taste parameters, the highest average value was the treatment of adding 5% granulated sugar with an average value of 3.75 ± 0.95 which indicated that the panelists liked the taste of the tea. Cascara tea contains acids in it such as chlorogenic acid and caffeic acid, so the taste that comes out of cascara tea is sour. The sour taste that comes out is innate from Arabica coffee cherries [18]. The taste of tea in general is usually sour, as well as tea with coffee skin waste. It stated that the taste of sepet in coffee skin tea is caused by catechins [19]. Catechins are substances that contain tannins which have agglomerating properties.

e. Sweetness Level

On the sweetness level parameter, the panelists gave an assessment with an average value of 3.57 ± 0.71, which means that the panelists liked the level of sweetness of tea with 5% sugar added. The use of different types of sugar will produce different sensory characteristics of the drink, so that it can affect the level of preference of the panelists. Giving granulated sugar causes drinks with a higher sweet character, so that the astringent sensation decreases [20]. Granulated sugar is sucrose sugar, while natural examples of fructose sugar are palm sugar and honey. Sucrose is a type of sugar with a lower sweetness level than fructose [21]. The level of sweetness of the product affects the level of acceptance. The increase in sweetness at a certain point can be accepted by the panelists, but if the level of sweetness is excessive, it can also decrease the level of acceptance [22].

f. Level of Pleasure

The results of the panelists' preference level test showed that the different types of sweeteners had a significant effect on the overall preference for cascara tea. The average overall preference value was 3.60 ± 0.84 in the treatment with 5% granulated sugar, which means that the panelists liked the product, and the lowest average or strongly disliked it with a value of 1.73 ± 0.64 was the control treatment, ie without the addition of sweeteners. This is because the panelists like the taste and level of sweetness in the treatment of adding 5% granulated sugar. Taste and health benefits are the most important quality parameters in beverage products, the next parameters are color, aroma, homogeneity, hygiene, price, packaging, and durability [23]. It mentions that taste is one of the important sensory properties in the acceptance of a food product. Although the color, aroma, and other sensory properties are good but if the taste is not good then consumers will reject the food. Taste is judged by the sense of taste, namely the tongue, which is a unified interaction between the sensory properties of aroma, taste, and texture which is the overall taste of the food being assessed [24].

5. Conclusion

From the research that has been done, it can be concluded that the different types of sweeteners had a significant effect on all sensory parameters. Based on the Cascara Arabica tea treatments that was tested on the panelists, it showed that the 5% added sugar treatment was the most preferred, because according to the taste parameter, the sweetness level, and overall preference level had the highest average value compared to the other three tea treatments

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