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Utilization of Red Dragon Fruit Peel Extract (*Hylocereus polyrhizus sp*) in Cinnamon Boba

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ABSTRACT

A popular boba is the "brown sugar" boba which is dark brown. Boba can be made with different color variations, one of which is red dragon fruit skin because it contains anthocyanins that can be used as natural dyes. It also contains high enough antioxidants, so it is good for health. Unfortunately, it has a less favorable aroma and taste, so adding other mixtures such as cinnamon with a distinctive taste and aroma is necessary. This study aims to determine the panelists' preference for cinnamon boba with the addition of red dragon fruit peel extract. Descriptive research with an experimental approach to produce products with different compositions and organoleptic tests to determine the panelists' preference for products has been used in this study. The mixed formulas of red dragon fruit peel extract with water used were P0 (red dragon fruit peel extract 0 g, 250 ml water), followed by P1 (50 g, 200 ml), P2 (100 g, 150 ml), P3 (150 g, 100 ml) and P4 (200 g, 50 ml). Then, the preference test was carried out on 30 panelists related to color, aroma, taste, and texture with the rating categories of strongly dislike (1), dislike (2), quite like (3), like (4), and very like (5). The results showed that the higher the red dragon fruit peel extract content, the more favorable the color produced; The level of preference for aroma and taste was relatively the same in all treatments, and the P3 treatment produced the most preferred texture.

Key words: Boba, cinnamon, dragon fruit peel extract, formula, organoleptic test

1. INTRODUCTION

Various contemporary drink brands and types continue to appear in Indonesian society, one of which is boba. Boba drinks have the shape of balls with a chewy texture made from tapioca flour and brown sugar. It has a blackish color, known as "boba", "bubble", or "pearl (Dewi et al., 2015). Boba generally has no taste (unsalted), so it must be served with sweetened drinks that have been formulated, such as Thai tea, smoothies, and various other contemporary sweet drinks. There is also a boba that tastes sweet because it is added with sugar, caramel, or honey which is soaked before serving (Dopita, 2019). Boba drinks contain high levels of sugar and calories and are part of the sugar-sweetened beverage (SSB) group. Boba drink outlets generally offer a variety of flavors, toppings, sizes, sugar content, and ice cubes that consumers can choose from (Veronica & Ilmi, 2020).

One of the critical attributes of the appearance of food and drink is color. Dyes are food additives that can improve or give color to food and drinks so that they are more attractive (Winarti

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et al., 2008). Therefore, boba with a different color display is expected to increase consumer preference for boba. According to Hatuwe, (2020), anthocyanins are natural dyes widely used in food but are sensitive to heat during extraction. Furthermore, Hatuwe, (2020) also said that besides anthocyanins, betacyanin are dyes that play a role in giving red color and are another beta group that can potentially become natural dyes and can be used as an alternative to safer synthetic dyes.

One fruit that has the potential as a natural colorant in food is red dragon fruit skin because it contains anthocyanin and betacyanin pigments (Nizori et al., 2020). Dragon fruit skin weighs about 30-35% of the total weight of the fruit. The red color can also be used in food products, for example, jam, because dragon fruit peel contains a quite high pectin, which is 10.79% (Prasetyo, 2013). With a fairly high weight percentage, the use of dragon fruit peel in processed food products is expected to overcome the waste problem, considering that so far, dragon fruit skin is only considered a useless waste material (Ali & Wulan, 2018). Another advantage of dragon fruit peel, according to Nurliyana et al., (2010), is that it contains high enough antioxidants so that it has the potential to be a source of natural antioxidants. Dragon fruit peel also contains vitamin C, vitamin E, vitamin A, alkaloids, terpenoids, flavonoids, thiamine, niacin, pyridoxine, cobalamin, phenolic, carotene, and Phyto albumin (Jaafar et al., 2009).

Research Siwi (2018) on corn jelly candy has shown that the redder dragon fruit peel extract, the higher the antioxidant content and the darker the color. Furthermore, Sari et al., (2021) showed that the Sari Tempe jelly candy which was given dragon fruit peel extract could increase consumer preference for the aroma, and taste of the jelly candy there was no difference between treatments, but the color and texture showed very significant differences. While the results of research Atviolani, (2016) stated that red dragon fruit has a distinctive aroma even though the aroma may not be liked by some panelists. However, the aroma can be minimized by the presence of additional ingredients.

Referring to the description above, this study aims to determine the panelists' preference for cinnamon boba which is added with red dragon fruit peel extract. Utilization of red dragon fruit peel extract in the manufacture of boba because it contains anthocyanins which act as natural dyes and antioxidants that are good for body health, while the addition of cinnamon in the manufacture of boba is expected to eliminate the aroma of dragon fruit peel which tends to be less favored by consumers.

2. RESEARCH METHOD

The research was carried out at the Integrated Food Laboratory at the Agroindustry Study

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Program, Faculty of Vocational Studies, University of 17 August 1945, Surabaya in March-June 2022, covering preliminary research (to determine the right boba formulation) and main research. The tools used are pots, stoves, mixers, knives, cutting boards, blenders, basins, containers, sieves, spoons, scales, and measuring cups. The materials used are red dragon fruit skin (*Hylocereus polyrhizus sp*.), tapioca flour, water, sugar, and cinnamon.

This study is a descriptive study with one factor, namely the addition of dragon fruit peel extract with the formulation as shown in Table 1. The mixed formulas of red dragon fruit peel extract with water used were P0 (red dragon fruit peel extract 0 g, 250 ml water), followed by P1 (50 g, 200 ml), P2 (100 g, 150 ml), P3 (150 g, 100 ml) and P4 (200 g, 50 ml). Then, the preference test was carried out on 30 panelists. related to color, aroma, taste, and texture with the rating categories of very dislike (score 1), dislike (score 2), quite like (score 3), like (score 4), and very like (score 5).

Table 1. Formulation of red dragon fruit peel extract on cinnamon boba

Ingredient	P0	P1	P2	P3	P4
Dragon fruit peel extract (ml)	0	50	100	150	200
Water (ml)	250	200	150	100	50
Tapioca flour (gr)	270	270	270	270	270
Sugar (gr)	80	80	80	80	80
Cinnamon (gr)	12,5	12,5	12,5	12,5	12,5

The process of making cinnamon boba using red dragon fruit peel extract which refers to the research conducted by (Raharja et al., 2021) with a slight modification (based on preliminary research,) can be seen in Figure 1 below.

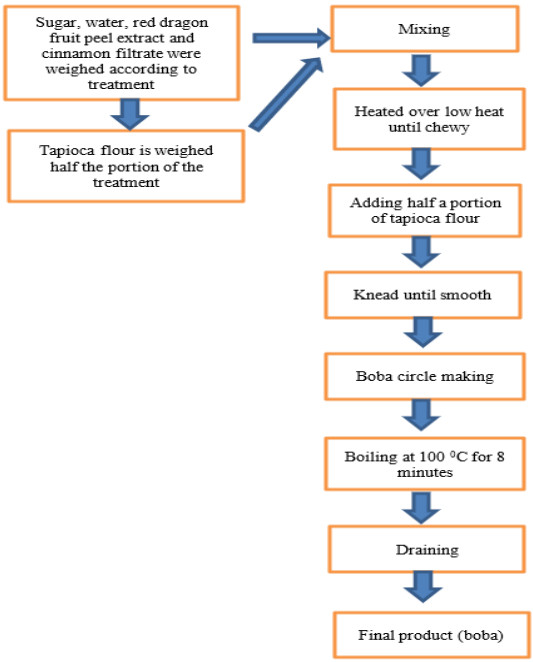

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Figure 1. Cinnamon boba making Flowchart

The procedure for making boba begins with preparing the ingredients, namely tapioca flour (half a portion), sugar, water, red dragon fruit peel extract, and cinnamon filtrate in doses according to treatment. The ingredients are placed in a saucepan and then heated over low heat. Stir evenly until it reaches a chewy texture. Next, the remaining half of tapioca flour is mixed until smooth, formed into small balls, boiled at 100^0C for 8 minutes, and drained. Ripe boba is characterized by forming a clear layer on the surface of the boba.

3. RESULT AND DISCUSSION

Color

Color is often a consideration in judging the merits of a product. The percentage of panelists' preference for the color of cinnamon boba with red dragon fruit peel extract can be seen in Table and Figure 2.

Tablel 2. Panelists' rating of cinnamon boba color

Level	Panelists (%)				
	P0	**P1**	**P2**	**P3**	**P4**
Very dislike	0	0	0	0	0
Dislike	33,33	10	10	16,66	13,33
Quite like	53,33	50	50	33,33	26,67
Like	13,34	33,34	33,34	33,34	46,67
Very like	0	6,66	6,66	16,67	13,33
Total	**100**	**100**	**100**	**100**	**100**

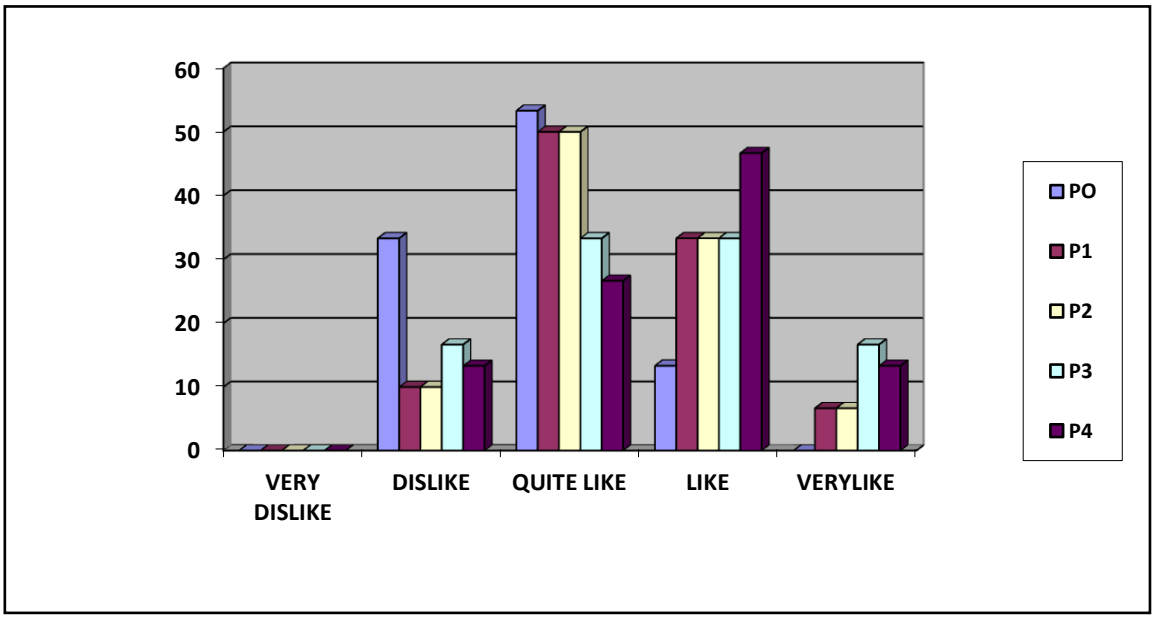

Figure 2. Percentage of panelists' assessment of the color of the cinnamon boba

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Based on Table and Figure 2, boba without red dragon fruit peel extract (control) was favored by 13.34% of the panelists. The addition of red dragon fruit peel extract in P1 and P2 treatments was highly favored by 40% of the panelists. In comparison, the P3 treatment was favored and highly favored by 50% of the panelists, and the P4 treatment was favored and highly favored by the panelists. 60% of the panelists. This shows that the higher the red dragon fruit peel extract, the more the panelists' preference for boba color increases because the resulting boba is increasingly purplish. According to Fitria, (2021) and Sari et al., (2021), the red color on the skin of red dragon fruit is caused by the content of anthocyanin pigments. Furthermore, Sari et al., (2021) stated that the higher the concentration of dragon fruit peel extract, the higher the anthocyanin percentage, so the purplish red color will be more pronounced.

Aroma

The percentage of panelists' preference for the aroma of cinnamon boba with red dragon fruit peel extract can be seen in Table and Figure 3.

Table 3. Panelists' rating of cinnamon boba aroma

Level	Panelists (%)				
	P0	P1	P2	P3	P4
Very dislike	0	0	0	0	0
Dislike	20	16,66	23,33	10	16,67
Quite like	36,67	46,67	43,33	56,67	46,66
Like	40	26,67	26,67	26,67	30
Very like	3,33	10	6,67	6,66	6,67
Total	**100**	**100**	**100**	**100**	**100**

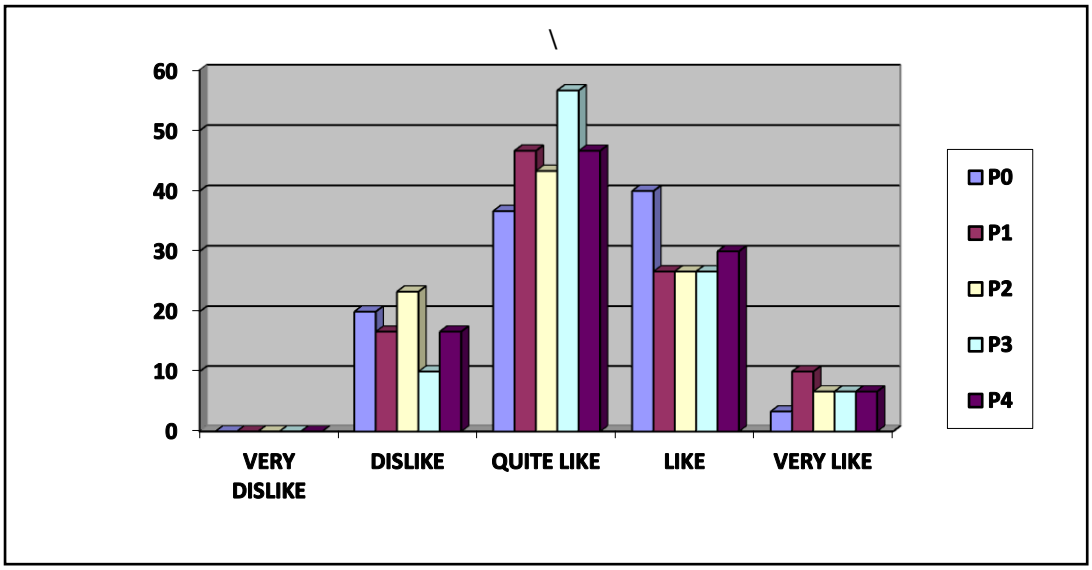

Figure 3. Percentage of panelists' assessment of the aroma of cinnamon boba

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Based on Table and Figure 3, the addition of dragon fruit peel extract in various treatments showed relatively the same results, where the panelists who liked and very liked the P1, P2, P3, and P4 treatments ranged from 33.34%-36.67%. It can be caused because the aroma of dragon fruit peel is not too sharp, so the aroma of cinnamon covers it. This condition follows the research of Sari et al., (2021), which stated that the level of consumer preference for the aroma of dragon fruit peel jelly candy does not show any difference between treatments because the aroma of dragon fruit peel juice is covered by the aroma of tempeh juice and gelatin so that the aroma and taste are the same in all treatment.

Another study conducted by Atviolani, (2016) stated that red dragon fruit has a distinctive aroma even though some panelists do not like the aroma, the aroma can be minimized by adding additional ingredients. In this study, the additional ingredient used in boba is cinnamon so that it can eliminate the aroma of dragon fruit skin.

Taste

The percentage of panelists' preference for the taste of cinnamon boba with red dragon fruit peel extract can be seen in Table and Figure 4.

Table 4. Panelists' rating of cinnamon boba taste

Level				**Panelists (%)**				
				P0	**P1**	**P2**	**P3**	**P4**
Very dislike				0	0	0	0	0
Dislike				13,33	6,67	6,66	6,66	16,66
Quite like				36,67	53,33	46,67	46,67	46,67
Like				33,33	26,67	36,67	30	26,67
Very like				16,67	13,33	10	16,67	10
Total	**100**	**100**	**100**	**100**	**100**			

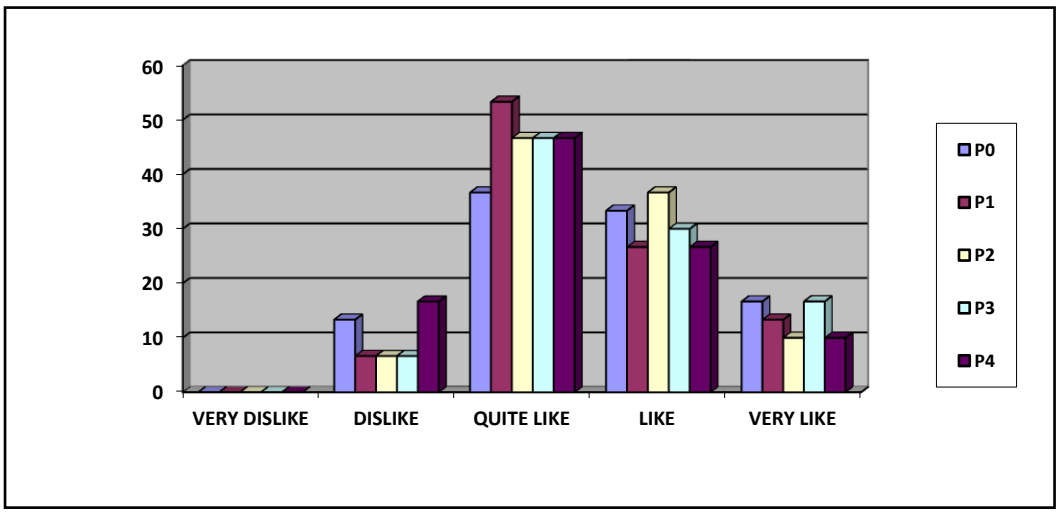

Figure 4. Percentage of panelists' assessment of the taste of cinnamon boba

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Based on Table and Figure 4, the boba that did not use red dragon fruit peel extract was liked and highly favored by 50% of the panelists, while the panelists' preference for the taste of boba that used red dragon fruit peel extract (treatments P1, P2, and P3) was relatively the same which is favored and highly favored by 36%-40% of the panelists. It could be because the dragon fruit peel tends to have no taste. Sari et al., (2021) showed that adding dragon fruit peel juice to the Sari Tempe jelly candy was not significantly different in taste. The same opinion was also expressed by Nanda, (2016), who stated that dragon fruit peel extract only acts as a natural dye with a neutral taste, so it does not affect the boba taste.

Texture

The percentage of panelists' preference for the texture of cinnamon boba with red dragon fruit peel extract can be seen in Table and Figure 5.

Table 5. Panelists' rating of cinnamon boba texture

Level	Panelists (%)				
	P0	**P1**	**P2**	**P3**	**P4**
Very dislike	3,33	0	0	3,33	3,33
Dislike	53,34	10	6,67	10	36,67
Quite like	10	53,34	40	33,34	23,33
Like	30	23,33	40	43,33	13,33
Very like	3,33	13,33	13,33	10	23,34
Total	**100**	**100**	**100**	**100**	**100**

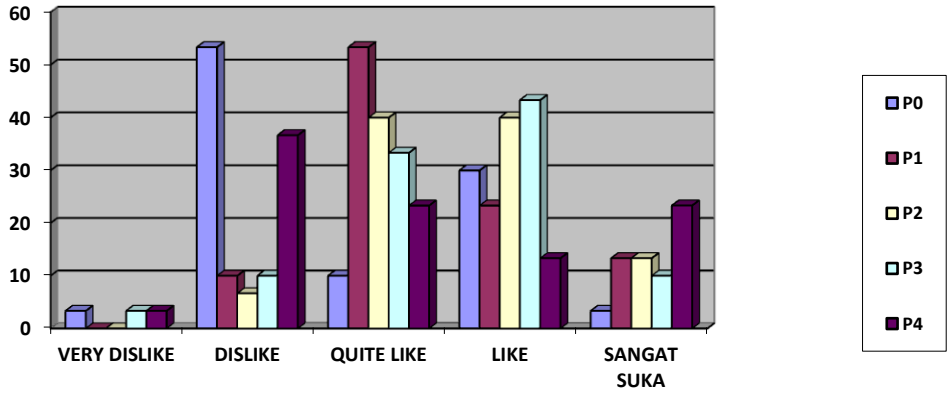

Figure 5. Percentage of panelists' assessment of the texture of cinnamon boba

Based on Table and Figure 5, the more dragon fruit skin is added, the more the panelists like the boba texture. This can be seen in the P1 treatment, which was favored by 36.66% of the panelists, and the percentage increased in the P2 and P3 treatments which were favored and highly favored by 53.33% of the panelists. The P2 and P3 treatments were preferred because of their

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chewy texture, but the panelists did not like the texture of P4 because it was too hard. This follows the opinion of Sari et al., (2021), which states that the greater the percentage of dragon fruit peel, the more pectin it contains, so the elasticity increases. Rista et al., (2018) also stated that adding red dragon fruit peel extract can increase pectin levels, affecting the texture.

4. CONCLUSION

The panelists' preference level on the boba color parameter showed that the higher the red dragon fruit peel extract, the more preferred it was. In the aroma and taste parameters, the panelists' preferences were relatively the same in all treatments, while the panelists' preference for texture parameters was the P3 treatment. Further research will be conducted chemical tests to determine the nutritional value of cinnamon boba with the addition of red dragon fruit peel extract.

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