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Substitution of Durian Seed Flour and Butterfly Pea Flower Extra in Donuts as Children's Healthy Snack

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ABSTRACT

Background: Snacks, of course, cannot be separated from human life, especially for children who are growing up. Technological developments have made local food commodities utilize waste durian seeds and use butterfly pea flowers. Durian seed flour and butterfly pea flower have good nutritional content for children's food. **Method:** This study is an experimental study with a Completely Randomized Design (CRD) with two treatments. (Treatment A) 170 grams of wheat flour + 30 grams of durian seed flour + butterfly pea flower extract, (Treatment B) 140 grams of wheat flour + 60 grams of durian seed flour + butterfly pea flower extract. The organoleptic test assessment was carried out by 25 untrained panelist subjects who were carried out at the Mandiri College Elementary School, Siombak, Medan Marelan. **Results:** From the above results we can see that treatment A with the addition of 30 grams of durian seed flour and extra butterfly pea flowers was the most preferred in terms of aroma, texture, color, and taste. The color category has a very fond interest with a value of 4.04, the aroma category has a liking interest with a value of 3.96, the texture category has a very fond interest with a value of 4.08, the taste category has a very like interest with a value of 4.28. **Conclusion:** Substituting durian seed flour and extra butterfly pea flowers for donuts can be another solution for healthy snacks for elementary school children.

Introduction

The development of technology and information has also developed for local food commodities to utilize waste durian seeds and use butterfly pea flowers. Various internet channels: news channels, company or organization websites, blogs, and other social media. People's desire now to share information, knowledge, or personal experience. Various food products continue to be identified to find out the benefits that exist in these foodstuffs, for example, those that are widely used and researched are durian seeds and butterfly pea flowers.

Snacks cannot be separated from human life, especially for children who are in their infancy. Almost all ages have a preference for snacks or commonly called snacking. In school children, additional energy has a positive impact on children's growth, and can become more active because blood sugar levels in children are maintained properly. The nutritional adequacy rate for children aged 7-9 years requires 49 grams of protein, for boys aged 10-12 years requires 56 grams of protein, and 60 grams of protein for girls. And the fiber that children aged 9-13 years need is 26-

35 grams per day [1]. The Complementary Feeding Program for children has a positive impact on children's health and nutritional status, which can prevent underweight or malnutrition.

Durian is the name of a flora plant originating from the Southeast Asian region. The popular title is King of Fruit. Durian (*Durio zibethinus*) is one of the most famous fruits in the world because of its unique aroma and taste. It is a climacteric fruit belonging to the Bombaceae family which is cultivated in tropical climates. Many varieties of durian vary in texture, taste, aroma, size, shape, and color of the flesh [2]. Durian seed flour contains 388 kcal of energy, 8.97 grams of protein, 1.14 grams of fat, 85.4 grams of carbohydrates, 98 mg of calcium, and 13 mg of phosphorus [3]. The total sugar in durian is 48.3 g per 100 g of dry matter, as well as being a gluten-free ingredient. Therefore, durian should be processed into flour to extend shelf life and increase its use in the development of various durian value-added products such as cakes, cookies, pie fillings, and biscuits [4]

The butterfly pea flower with the scientific name (*Clitoria ternatea L.*) is increasingly popular in Indonesia as a flower with many health benefits. It's easy to find in restaurants that serve drinks made from butterfly pea flowers or as other snacks. Butterfly pea flowers are now sold relatively more, both fresh and dry. Butterfly pea flowers are increasingly being found and planted in the yard for the needs of one family. The butterfly pea flower is also famous for traditional health or herbal medicine. Telang flowers are used to treat insomnia, pulmonary tuberculosis, gonorrhea, ulcers, fever, and skin diseases (eczema), and facilitate menstruation and bladder infections [5]. Butterfly pea flower has the main component as a natural dye due to the content of anthocyanin pigments which are red to deep purple. Not only as a natural dye, but butterfly pea flowers also have benefits as a health drink to maintain body immunity [6].

Based on the description above, the researcher is interested in conducting research on the substitution of durian seed flour and extra blue butterfly pea flowers in donuts as healthy snacks for elementary school children at the Mandiri College Foundation, Siombak.

Materials and Method

This research was carried out on May 3, 2023, at the Mandiri College Foundation, Siombak, Labuhan Deli, Medan Marelan. With untrained and lay panelists, there were 25 students from grade 1 to grade 6 SD. It consisted of 3 students in grades 1, 2, and 3, 5 students in grades 4 and 5, and 6 students in grade 6. Untrained panelists were only allowed to assess simple organoleptic devices, such as feeling pleasure. The type of research is experimental using a Completely Randomized Design (CRD) with 2 (two) treatments (Table 1).

Table 1. Components and Material Composition of Each Treatment in Research

Treatment	Wheat Flour (gr)	Durian Seed Flour (gr)	Butterfly Pea Flowers (gr)
A	170	30	6
B	140	60	6

The data collection procedure was carried out by organoleptic tests, namely the color, texture, taste, and aroma of donuts from durian seed flour and extra butterfly pea flowers by 25 subjects, with the criteria of elementary school children from grade 1 to grade 6 elementary school, and in a state of not being sick and willing to take part in the organoleptic test. Samples were made in mica and labeled according to the treatment, namely treatments A and B. Each panelist was given a form for availability following the organoleptic test, and the study was conducted on a hedonic scale with the following criteria: 1: Fewer Dislikes; 2: Dislikes; 3: Likes; 4: Really Likes; 5: Really-really Likes. The data obtained from the organoleptic test results that have been collected will be processed using an Excel calculator to find the highest average value and get the results that the panelists like.

Results and Discussion

Results

From the results of the organoleptic tests that have been carried out by researchers on the substitution of durian seed flour donuts and extra butterfly pea flowers, there was the significant

mean difference between treatment A and B on color, scent, texture, and taste. Color in the manufacture of food or drink has enormous influence and appeal to the tastes of consumers, both children, and adults. From the results of Table 2, the making of donuts from durian seed flour with extra butterfly pea flowers based on color with the very like category has a high value in treatment A ($\bar{x}$ =4.04), while the lowest value is in treatment B ($\bar{x}$ =2.16). Based on the results of the acceptance test, it can be seen that the panelists liked the color in Treatment A which had a light brown color with a slightly bluish color produced by the butterfly pea flowers, whereas Treatment B with the addition of 60 grams of durian seed flour with extra butterfly pea flowers had a dark brown color and no bluish color produced by the butterfly pea flowers.

The aroma that is in food has its own charm that can stimulate the human sense of smell so that it can cause appetite. From the results of Table 2, the manufacture of donuts from durian seed flour with extra butterfly pea flowers based on aroma with the like category has a high value in treatment A ($\bar{x}$=3.96), while for the lowest value is treatment B ($\bar{x}$ =1.52). Based on the aroma-based acceptance test, it can be seen that the panelists preferred the aroma in treatment A because it did not have a very sharp aroma. Meanwhile, treatment B had a fairly thick durian aroma. The more durian seed flour is added, the more durian the aroma will be felt.

Texture is also a component that can evoke the taste of food because of the sensitivity of the taste buds that can be seen directly by consumers so it can affect the acceptability of the product. From the results of Table 2, the making of donuts from durian seed flour with extra butterfly pea flowers based on the texture with the really like category has a high score in treatment A (($\bar{x}$ =4.08), while the lowest score is in treatment B ($\bar{x}$ =2.76). Based on the texture-based acceptance test, it can be seen that panelists prefer the texture in treatment A because it is not hard, elastic, and not tough. It is different compared to treatment B which has a hard texture and is less elastic.

Taste is a factor that determines the taste of food after color, aroma, and texture. Taste cannot be seen by the senses of sight, but if the appearance stimulates the nerves, then it will arouse the appetite to taste the taste of the food. From the results of Table 2, the making of donuts from durian seed flour with extra butterfly pea flowers based on the texture with the really like category has a high score in treatment A ($\bar{x}$ =4.28, while the lowest score is in treatment B ($\bar{x}$ =1.44). Based on the acceptance test based on taste, it can be seen that panelists prefer the taste in treatment A which taste like donuts in general. It was different compared to treatment B which smelled strongly of durian.

Table 2. Results of Average Donut Organoleptic Values with the Addition of Durian Seed Flour and Extra Butterfly Pea Flowers

Sample (N=25)	Score Mean	Category	P-value (CI 95%)
Color			
Treatment A	4.04	Really Likes	0.000 (1.475-2.285)
Treatment B	2.16	Dislikes	
Scent			
Treatment A	3.96	Likes	0.000 (2.042-2.838)
Treatment B	1.52	Fewer Dislikes	
Texture			
Treatment A	4.08	Really-Really Likes	0.000 (1.055-1.585)
Treatment B	2.76	Dislikes	
Taste			
Treatment A	4.28	Really-Really Likes	0.000 (2.520-3.160)
Treatment B	1.44	Fewer Dislikes	

Discussion

Recapitulation of the organoleptic quality test of durian seed flour donuts with extra butterfly pea flowers as snacks for elementary school children. From the above results we can see that treatment A with the addition of 30 grams of durian seed flour and extra butterfly pea flowers was the most preferred in terms of aroma, texture, color, and taste. The color category has a very fond

interest with a value of 4.04, the aroma category has a liking interest with a value of 3.96, the texture category has a very fond interest with a value of 4.08, the taste category has a very like interest with a value of 4.28.

The color of the prepared durian seed flour donuts with extra blue butterfly pea flowers has a quite unique color, which arouses interest in elementary school children. The color of the durian seed flour has a characteristic light brown color, the color possessed by the butterfly pea flower has the potential as a natural food coloring agent. And because of that, the color of the butterfly pea flower is highly recommended as a product coloring made from natural ingredients that can attract consumer interest [7, 14-17].

The aroma produced in the manufacture of donuts and butterfly pea flower extract had a low value in treatment B because the panelists did not like the aroma. And in line with previous research. Puree durian seed donuts have a savory aroma like donuts in general but they are still there The aroma of durian seeds is due to durian seeds has a distinctive aroma of durian seeds, the results of the hedonic assessment found that not all panelists liked the distinctive aroma of durian seeds which is strong enough [8, 18-21].

So that the more durian seed flour is added, the proportion of gluten derived from wheat flour in the dough will decrease. The interaction between starch and protein is important to provide structure to the dough caused by strong flour, over-frying, insufficient amount of water, or excessive mixing which can make the texture of the dough tough and tough [9, 22-25]. The taste of durian seed flour and durian flesh has a very different taste, this is in line with previous studies which state that the taste of durian seeds is not the same as the taste of the sweet durian flesh. Durian seeds do not have a sweet, salty, or bitter taste, so the addition of durian seed flour does not change the taste of adnoun to become bitter [10, 26-27].

The butterfly pea flower has a high anthocyanin pigment compound, so if you add a lot of butterfly pea flower extra, it can change the color of the food. Butterfly pea flowers are also often used to make local food such as drinks, puddings, bread, or cookies [11]. Butterfly pea flower extract contains anthocyanins which have antioxidant properties that can be used as antibacterials. The anthocyanins in butterfly pea flower extract have the benefit of being able to protect the stomach from damage and increase good eye vision in children. In a previous study, it was stated that the protein content in durian seed flour in the addition of choco chips was very good for additional food for underweight toddlers, with a ratio of 250 grams of wheat flour to 60 grams of durian seed flour [12, 28-29].

Previous research on the addition of durian seed flour as much as 30 grams or having as much as 7.56% protein. And to meet the needs of elementary school-age children, ± 6 donuts are needed to meet the protein needs of 45-50 grams per person in a day for the 7-12 year age category [13, 30]. So consuming donuts with the addition of durian seed flour and extra butterfly pea flowers can be used as another alternative as a healthy snack for elementary school children. Not only is it healthy, but the addition of durian seed flour and extra butterfly pea flowers can also help meet the protein needs of elementary school-age children.

Conclusion

The substitution of durian seed flour and extra pea flowers in donuts can be used as an innovation in snacks for elementary school children. The panelists' interest in donuts from durian seed flour and extra pea flowers in the color, aroma, texture, and taste categories. The panelists preferred the sample in treatment A, namely with the addition of 30 grams of durian seed flour. It is necessary to develop the use of durian seeds to make other processed food products for health, other food ingredients also need to be added. Improve the texture of the biscuit so that it is more liked and there needs to be socialization about information on making donuts in addition to durian seed flour and extra butterfly pea flowers.

Declaration

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