the potential of making nata from durian seeds

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REVIEW ARTIKEL: The Potential of Making Nata From Durian Seeds

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Abstract

Durian seeds are one of the waste products from durian fruit. Durian seeds are often used by the community as the main ingredient in making bread and cakes. However, the use of durian seeds as the main ingredient in making nata has not been carried out. Nata is an extracellular cellulose obtained from the activity of the bacterium Acetobacter xylinum. Nata which is often found is nata de coco from the main ingredient of coconut water. This study aims to see the potential of durian seeds as the main ingredient in making nata. The results showed that durian seeds have the potential to be used as the main ingredient in making nata because they have a high carbohydrate content.

Keywords: Acetobacter xylinum, carbohiydrate, durian seeds, nata, nata de coco, potential

Introduction

Indonesia is one of the eight centers of plant genetic diversity in the world, especially for tropical fruits such as durian. South Sulawesi is one of the provinces in Indonesia which is famous for durian fruit, especially local durian. South Sulawesi Province is also one of the largest durian-producing regions in Indonesia besides East Java, North Sumatra and Kalimantan. Durian fruit enters the harvest season from September to February and April to July is a difficult season for durian fruit to bear fruit (Dang & Nguyen, 2015).

Durian (Durio zibethinus Murr.) is a commercial tropical fruit that is very popular with the public. The production of durian fruit every time it enters its season always increases in line with market demand for healthy and nutrient-rich fruit (Ho & Bhat, 2015). Of the whole fruit, only the flesh of the fruit can be consumed directly by the public, while the durian skin and seeds will become waste. It is reported that durian fruit cultivation produces nearly 67–70% of waste in the form of seeds (20–25%), skins or shells, all of which are inedible (Amid & Mirhosseini, 2012).

Durian seeds are a waste product that is quite a lot when entering the season. Durian seeds have been widely used by some people as an ingredient in making cake dough and as a nutritional enhancer for foods that are processed in the form of flour. In durian seeds there are nutritional elements that are very beneficial for the body which are still very rarely known by the public, so many researchers are conducting research on the content of durian seeds. One of them is the high carbohydrate content which can be used as a basic ingredient for making nata. Making nata is one way to overcome the problem of household waste with the help of the bacterium Acetobacter xylinum.

Therefore, a review was conducted on the potential of durian seeds as an ingredient in making nata.

Research Methods

Data Search Strategy

The search for data was carried out using Google, Google Scholar and Pubmed with the keywords "durian seeds", "Durian seed potential", "durian seeds", durian seed content, and "durian seed waste". Sources or references obtained are then determined with exclusion and inclusion criteria.

Exclusion and Inclusion Criteria

Inclusion criteria were determined from data in the form of both national and international journals, textbooks, scientific articles discussing durian seeds and their chemical content, utilization of durian seeds in flour form published after 2012 with the exception of empirical sources and classification. While the exclusion criteria are data obtained from invalid sources such as websites without authors or theses, journals both national and international, scientific articles published before 2012 with the exception of empirical sources and classifications.

Study Used

The source of the review study used is inclusion data from 16 references consisting of 14 journals, and 2 textbook which is the result of screening from a total of 30 references including exclusion criteria.

Results

Botanical Overview

Durian (Durio Zibethinus Murr) belongs to the Bombacaceae family which is only found in the tropics (Purnomosidhi, 2012). Durian (Durio zibenthinus Murr.) is a tropical plant which is a native fruit from Southeast Asia which is very popular so that it is said to be the king of fruits (Feng et al., 2016). According to (Susilawati & Sabran 2018) durian fruit has a stem morphology and plant height that is almost the same in all local durian species, with a towering and umbrella shape of the crown. Durian seeds have an ovoid shape, yellowish white or light brown and are in two pieces (Cahyani, 2019). Local types of durian seeds generally have seed sizes ranging from 3-5cm to 5-6cm with diameters ranging from 2.5-3cm to 3-4cm. The average number of fruits per tree varies from 150 to 500 seeds. Durian fruiting period is in November or December to March (Susilawati & Sabran, 2018).

Figure 1. Durian Seeds

Chemical Content Overview

Durian seeds are divided into 2 components, namely starch and sap. Durian seeds contain protein and polysaccharides which are abundant in durian sap. The polysaccharides in question are 48.6-59.9% galactose, 37.1-45.1% glucose, 0.58-3.41% arabinose, 0.3-3.21% xylose and 12 types of amino acids (Amid & Mirhosseini, 2012). Some people have started using durian seeds in the form of flour, including as a partial substitute for corn flour, which is a 50% substitution to make gluten-free pasta (Mirhosseini et al., 2015). In research conducted by (Sigiro et al., 2020) on the content of durian seed flour, especially the carbohydrate content, the results showed that the carbohydrate content in durian seeds was still very high even though it had been stored for a long time, namely 8 months.

Table 1. Durian seed flour content for 8 months storage

Test Parameters	Durian Seeds
Alkaloids (mayer)	++
Alkaloids (Wagner)	-
Alkaloids (dragendroff)	-
Flavonoids (NaOH 10%)	-
Flavonoids (H2SO4)	-
Flavonoids (Mg + HCl)	-
Saponins	-
Terpenoids	+
Versteroids	-
Tannins	-
Phenolic	-
Water content	17.86%
Fiber content	22.48%
Protein	-
Carbohydrate	++

Remarks: (-) no content; (+) low content; (++) high content

Durian seeds have enough potential as a source of nutrition for the body because they contain protein, carbohydrates, fat, calcium and phosphorus. The nutrients contained in 100 grams of durian fruit seeds are 28.3 grams of carbohydrates, 67 grams of minerals, 520 KJ of energy or the equivalent of 124.8 calories, 2.5 grams of fat, 2.5 grams of protein, and 1.4 grams of fiber. Meanwhile, every 100 grams of soybeans has 331 calories of calories, 34.9 grams of protein, 34.8 grams of carbohydrates, 227 milligrams of calcium, 585 milligrams of phosphorus, 8 milligrams of iron and 1.1 milligrams of vitamin B1 (Srianta et al., 2012).

According to Verawati (2017) in (Verawati & Yanto, 2019) The nutritional content in durian seeds is 85.4 grams of carbohydrates, 98 mg of calcium, 1.14 grams of fat and 13 mg of phosphorus. Toddler biscuit

products formulated with durian seed flour substitution can add some of the carbohydrate and protein content in biscuits to fulfill the nutritional adequacy rate for toddlers. The carbohydrate content produced in toddler biscuits formulated with durian seed flour is 72.6%, which of course still meets the requirements of the SNI quality for biscuit carbohydrates, which is a minimum of 70%.

Anwar & Laelia, (2012) states that durian seeds contain many nutrients that are beneficial to the body, one of which is the high carbohydrate and protein content.

Table 2. The nutritional content of durian seeds in % wet weight

Kinds of Analysis	Content in % wet weight
Carbohydrate	45.7%
Protein	2.548%
Fat	0.6%
Ash	96.46%

The nutritional content of durian seeds in 100 grams of fresh or cooked seeds is based on data from the Directorate General of Public Health (2017) in Widyastuti et al., (2021) can be seen in table 3.

Table 3. Nutritional content per 100 grams of durian seeds

Substance	Per 100 grams of fresh seeds	Per 100 grams of cooked beans
Carbohydrate	47.6 gr	48.2 gr
Protein	2.6 gr	1.5 gr
Fat	0.4 gr	0.2-0.23 gr
Ash	1.9 gr	1.0 gr
Water content	51.5 gr	51.5 gr
Coarse fiber	-	0.7-0.71 gr
Calcium	17 mg	3.9 – 88.8 mg
Phosphor	68 mg	86.65 - 87 mg
Iron	1.0 mg	0.6 - 0.64 mg
Sodium	3 mg	-
Potassium	962 mg	-
Beta carotene	250 gr	-
Ribo Flavin	0.05 gr	0.05-0.052 mg
Thiamine	-	0.03-0.032 mg
Niacin	0.9 mg	0.89 - 0.9 mg

Discussion

Durian seeds consist of two main components, namely starch and sap. Durian fruit is known to have high nutritional value. Durian fruit generally consumed is the flesh of the fruit, either consumed directly or consumed with sticky rice (high in starch) or commonly used as an ingredient in processed bread products

(Karim & Mohd Ghazali, 2012 in Ho & Bhat, 2015). A small number of people have started processing durian seeds into several processed foods such as chips or other foods (Bronikowska et al., 2012). Several chemical studies that have been carried out on durian fruit seeds show that there are phenolic, triterpenoid, lignan, flavonoid, coumarin, sulfur-containing compounds and some esters which are not common (Liu et al., 2013). In durian fruit seeds there is also a high carbohydrate content in durian seeds that can be used in making nata. Nata is a fermented food that has chewy characteristics such as gelatin, white in color and high in fiber. So far, nata is made from coconut water which is called nata de coco, but in recent years, people have started to use materials that contain carbohydrates, proteins and minerals in making nata, such as fruit juices and fruit peels. Based on sources from several studies regarding the nutritional content of durian seeds, it was found that durian seeds contain high levels of carbohydrates, protein and minerals, both in the form of fresh seeds and processed in the form of flour (Suprapti, 2005).

Conclusion

Based on the results of various literatures, it was found that durian seeds have high carbohydrate, protein and mineral content so that durian seeds have the potential as a basic material that can be used in the process of making nata, both processed in the form of fresh seeds and in the form of flour.

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