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Research Article

Biochemistry and Bioactive Compounds on Bamboo Shoots as the Main Component in Lumpia Semarang

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ABSTRACT

Semarang style lumpia (or spring roll) is a typical culinary in Semarang city that uses bamboo shoots as filling. The objective of this study is to determine biochemical contents and bioactive compounds in bamboo shoots as the main filling component of Semarang Style Lumpia. This journal will discuss bamboo shoots in terms of the physical characteristics, chemistry, nutrition, sensory, bioactive compounds that exist in them. The result shows that bamboo shoots have physical characteristics, i.e soft texture, crunchy, and generally yellow. The chemical compositions of raw bamboo shoots per 100 grams are 2.6% of protein, 0.3% of fat, 5.2% of carbohydrate, and 91% of water. Bamboo-shoots are sources of food that have low fat but high fiber and minerals so bamboo shoot can be a source of healthy food. Bamboo shoots also contain 17 amino acids, 8 of which are essential for human body. The flavors found in bamboo shoots are influenced by total sugar content, amino acids, and tannins. In general, bamboo shoots have a spicy flavor that comes from cyanide. Bamboo-shoots contain some phytochemical groups that have roles for health, one of them is phenolic compounds. These compounds provide positive health effects such as anti-oxidants, anti-inflammatory, anti-allergy, and anti-microbial. The antioxidant type of phthiocerol on bamboo shoots can lower cholesterol and protect from free radicals.

Keywords : Biochemistry, Bioactive, Characteristic, Semarang Style Lumpia, Bamboo Shoots.

1. Introduction

Semarang is one of the tourism cities that has historical and cultural values of the previous heritage. There are various cultural products owned by Semarang city, one of them is in the field of culinary. The culinary diversity is the result of Semarang societies' cultural activities that are preserved as a common identity. Over time, the culinary in Indonesia can blend with various cultures. Apart from the typical taste of food, there are also meanings and cultural values contained in it (Rochmawati et al, 2013). Food or culinary is often given a symbolic value in religion and social life. Symbolically, the food or culinary usually can be seen from the uniqueness in its presentation.

Lumpia is one of the food resulted from the fusion of Chinese and Javanese cultures. Semarang style Lumpia also has an interesting historical perspective to describe (Bromokusumu, 2013). Semarang style lumpia is believed derived from a married couple in Semarang back in the 19th century. It was preceded by the arrival of Tjoa Thay Yoe, a Chinese ethnic male who came from China to Java Island and then married to Mbok Warsih, a native Indonesian woman. the peculiarities of Semarang style lumpia can be seen from their larger size, bamboo-shoots, sweet-savory tasting fusion which shows the acculturation of Chinese-Javanese cultures (Susanti, 2015). Until now, Semarang style lumpia becomes one of the main tourist destinations during a culinary tour in

Semarang, especially those located in Gang Lombok, Chinatown. This is because the area was the forerunner to the development of Lumpia in Semarang City. Its larger size compared to other types of lumpia, has made Semarang style lumpia has its own distinctive. In addition to the typical size, the lumpia also have a distinctive flavor, since its using bamboo shoots as the filling. Semarang can not only be accultrated by local people, but also other nations. Acculturation of this culture occured because Semarang was a port city which had been visited by other nations, one of them was China. Bamboo shoots are raw materials people often consume in Thailand, Taiwan and China, whether in the form of dried, canned, stewed, fermented or medicated. Bamboo shoots have a soft texture, crunchy, distinctive odor, and generally yellow-colored. In addition, bamboo shoots also contain nutrients, such as vitamins, amino acids, and antioxidants that are good for health, when processed correctly (Choundhury, Sahu & Sharma, 2011).

Viewed from the nutrient contents of bamboo shoots as the filling of Semarang Style Lumpia, it has a good advantage when consumed and processed properly. Therefore, this research will explain the biochemical content and bioactive compounds on bamboo shoots as the main filling component of Semarang style Lumpia.

2. Methodology

The writing methodology used is the literature study method. The literature study method uses written sources in the form of books, journals, scientific articles, thesis, proceedings, and magazines from the Ministry of Internal Affairs. The books used amounted to 3 books. While the journals used in this study amounted to 25 journals. The journals are both international and national ones. Scientific articles used in this study amounted to 3 articles. Thesis used in this research amounted to 1. Proceedings used in this study amounted to 1. Furthermore, the authors also use a magazine of Ministry of Internal Affairs as a reference. All sorts of written sources used have varying years of publication.

3. Results and Discussion

a. Physical characteristic of bamboo shoots

In general, the length of the bamboo shoot is 20-30 cm, one of its end is tapered but the size and weight of the bamboo shoots depend on the location, soil fertility, rainfall, temperature, drainage and pH (Choudhury, Sahu & Sharma, 2010). Bamboo shoots are harvested when bamboo is young, if left to grow it will make bamboo hard and woody and can lose the flavor and the typical aroma of bamboo shoots have (Choudhury, Sahu & Sharma, 2012). Bamboo shoots will grow quickly in the rainy season. Bamboo shoots are covered with brown to blackish leaves and some of the species have fine spikes that are feather-like shaped on their leaves. The characteristics of bamboo shoots are soft-textured, crispy, generally yellow-colored (Choundhury, Sahu & Sharma, 2011).

b. Chemical characteristic of bamboo shoots

The chemical compositions of raw bamboo shoots per 100 grams are 2.6% of protein, 0.3% of fat, 5.2% of carbohydrate, 91% of water (Purnamasari, 1996). The content of water on bamboo shoot is so high that this makes the bamboo shoots easily damaged. Damage that can occur is mechanical damage starts from harvesting and distribution, to damage due to poor postharvest handling. In addition to mechanical damage, the quality of bamboo shoots may decrease due to browning on the surface of bamboo shoots, the browning reaction occurs enzymatically. Research conducted by (Wardhani et al, 2016) states that browning on bamboo shoots can be prevented by using sodium metabisulfite with a concentration of 3000 ppm combined with immersion of 45 minutes and at pH 3. In addition, study conducted by (Shen et al, 2006) i.e using modified plastic containers effectively prevent browning on bamboo shoots. Bamboo shoots are low-fat but high-potassium, carbohydrate and dietary fiber (Choudhury & Sharma, 2012). Dietary fiber is part of an edible plant or analogous carbohydrate that is resistant to digestion and absorption in human intestine (Nirmala, Bisht & Laishram, 2013). Fibers in bamboo shoots are 8% of soluble fiber and 92% of insoluble fiber and most of fibers in bamboo shoots consist of hemicellulose, cellulose, pectin, and lignin (Park & Jhon, 2009). The processing of bamboo shoots such as boiling, fermentation and canning can make differences in protein, carbohydrate, fiber, and vitamin in bamboo shoots (Satya et al, 2010).

c. Charcteristic of bamboo nutrition

Bamboo is a source of food that is low in fat but high in fiber and minerals, so bamboo shoots can be a source of healthy food. Bamboo is also a good source for vitamin E, Vitamin C, Vitamin B6, Thiamin, niacin and Riboflavin as well as mineral sources such as potassium (K), calcium (Ca), manganese, zinc, chromium, iron (Fe), and phosphorus) and selenium in small amounts (Nirmala et al, 2014). Bamboo shoots also contain 17 amino acids, 8 of which are essential for human body. However, the disadvantage of bamboo shoots is the presence of anti-nutritional substances in bamboo shoots called cyanide (HCN). The presence of cyanide acid in bamboo plants aims to protect themselves against the attacks of animals, insects and pathogens. Various kinds of research conducted to find out how to reduce cyanide content in bamboo shoots such as research conducted by (Putra, 2009) showed that bamboo shoots which are soaked and boiled or steamed can reduce the content of cyanide acid. Another way that can be done to reduce the cyanide content in bamboo shoots is by combining the washing of bamboo shoots in the flowing water and boiling them because the longer bamboo shoots boiled down the cyanide content significantly decreased so the better to be consumed (Vanagaya et al, 2017). In addition to this, drying and fermentation can reduce cyanide content in bamboo shoots, well sun-drying, oven, frozen vacuum drying, and heat evaporation while the lactic acid bacteria fermentation process plays an important role in

decreasing cyanide levels (Rawat et al, 2015). Of course, cyanide levels in bamboo shoots vary by type. According to FAO the maximum allowable cyanide acid content is 5 mg/100g or 500mg/kg so if the cyanide content below that number is still safe for consumption.

d. Sensory characteristic of bamboo shoots

Bamboo shoots has soft and crispy texture. The flavors found in bamboo shoots are influenced by total sugar content, amino acids, and tannins (Kumar et al, 2017). But in general, bamboo shoots have aspicy flavor that comes from cyanide. After the bamboo shoots are harvested, they must be processed immediately, if not the toxic from cyanide will come out, ie taxiphyllin (FSANZ, 2005). The content of cyanide varies depending on the species. The most cyanide content is found in shoots, which is 0.16% of the total cyanide content (Haque, 2002). Cyanide in bamboo shoots can be removed in several ways including drying, boiling in salty water, boiling at 98 ° C for 20 minutes, and soaking at room temperature for a week (Choudhury, et al. 2011, Satya et al. 2010).

e. Bioactive component of bamboo shoots

The bioactive component is a component contained in food and plays a role in human health. Bamboo shoots contain several phytochemical groups that have a role for health, namely phenolic compounds (flavonoids, phytoestrogens, and phenolic acids), carotenoids, saponins, phytosterols and phytostanol, and dietary fiber and prebiotics. (Chongtham et al., 2011). In general, phenolic, flavonoids, and phytosterols compounds are present in all plant species including bamboo shoots. Phytosterols have one OH group and the structure is similar to cholesterol. According to (Xinmei, 2015), phytosterols have properties as precursors of steroid hormones that cause the hormone testosterone to increase. Testosterone functions in the formation of spermatozoa in testes and helps sperm maturation (Padmiswari et al, 2015). The most common phenolic compounds in bamboo shoots are protocatechuic acid, p-Hydroxybenzoic acid, catechin, caffeic acid, chlorogenic acid, syringic acid, p-Coumaric acid, and ferulic acid (Chongtam et al., 2011). These compounds provide positive health effects such as antioxidants, antiinfammatory, antiallergy, and antimicrobial (Lendete, 2012). Phenolic acid has anti-inflammatory properties and contains antioxidants that can prevent cancer (Kurniasih et al, 2015). Tocopherol is also contained in bamboo shoots that have the benefit of either saturated or unsaturated lipid or both saturated lipid and antioxidant activity in vitamin e activity. Phenolic compounds in bamboo shoots range from 191,37 mg/100 g to 505,993 mg/100 g (Nirmala et al, 2013). The content of phenolic compounds will be reduced to 68% if processing such as immersion and boiling is perfomed. The best treatment that can be done so that the content of phenolic compounds still reserved is preservation by fermentation method.

f. Bamboo shoots and human health

Bamboo contains a variety of bioactive components that provide health effects on humans. The antioxidant of phthiocerol type on bamboo shoots can lower cholesterol and fight free radicals. The risk of getting cancer can be reduced because bamboo shoots contain high fiber. Bamboo shoots also play roles in controlling appetite, treat fever, and cough with phlegm because the fiber content is high enough. In addition to fiber, bamboo shoots also contain proteins that are useful for maintaining the health of cells in the body. The risk for stroke can be reduced because bamboo shoots contain minerals that are quite a lot of potassium (Nofriati, 2014). In China, stew of bamboo shoots can be used to clean wounds caused by infection and to treat rheumatic (Puri, 2003). Flavonoids and glycosides in bamboo shoots can become anti-aging.

g. Future prospects

Bamboo shoots can be cultivated both in the highlands and in the lowlands, even in barren locations. But to obtain maximum growth, bamboo should be planted in a fertile location. Of various types of bamboo there are only a few species of bamboo that can be taken its shoots among others, namely *petung, ampel, wulung, ayam* bamboo, and so forth (Nafed, 2011).

Although bamboo shoots are low in fat and calories, bamboo shoots contain nutrients and fiber that have potential to complement the nutrients in the diet that start to attract researchers and elite groups. Although bamboo shoots have become an integral part of traditional society diet, scientific validation of the processing in terms of quality and safety has never been attempted, including the processing of Semarang style lumpia. Validation is required to maintain the food safety aspects that can increase the export potential of products. Food processing such as boiling, canning, drying, fermentation and others also need to be standardized to eliminate toxins and keep the bamboo nutrients intact (Satya et al, 2010).

Bamboo shoots Industry in the Food Industry continues to increase rapidly and is worth million dollar. Until now, Indonesia has not been able to meet the export demand of bamboo shoots with an average of 4500 tons / year. The export destination country of bamboo shoots from Indonesia are Japan, Taiwan, America, Canada, Australia, Malaysia, Singapore, Korea, and Hongkong. From statistic data, Japan needs about 85000 tons/year of bamboo shoots, Taiwan 80000 tons/year, Singapore and Korea 30,000 tons/year, so to fulfill 1% of the export demands, it needs a minimum of 1,125 ha. From the data we can see the enormous opportunity that Indonesia can become the largest exporter of bamboo shoots after China, provided that all parties support each other (Kencana and Antara, 2012).

3. Conclussion

Bamboo has physical characteristics, which is soft texture, crunchy, and generally yellow-colored. The chemical compositions of raw bamboo shoots per 100 grams are 2.6% of protein, 0.3% of fat, 5.2% of

carbohydrate, and 91% of water. Bamboo shoots are source of food that is low in fat but high in fiber and minerals, so bamboo shoots can be a source of healthy food. Bamboo shoots also contain 17 amino acids, 8 of which are essential for human body. The flavors found in bamboo shoots are influenced by total sugar content, amino acids, and tannins. In general, bamboo shoots have spicy flavor comes from cyanide. Bamboo shoots contain some phytochemical groups that have roles for health one of them, are phenolic compounds. These compounds provide positive health effects such as antioxidants, antiinfammatory, antiallergy, and antimicrobial. The antioxidant of phthiocerol type on bamboo shoots can lower cholesterol and fight free radicals.

4. Suggestion

Validation is required to maintain food safety aspects that can increase export potential. Food processing such as boiling, canning, drying, fermentation and so on, also need to be standardized to remove toxins and keep the nutrients contained by bamboo shoots intact.

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