The Analysis of Fiber Content of Nuggets and Crackers With the Basic Ingredients of Kepok Banana Hump (Musa paradisiaca Var. Balbisina Colla)

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ABSTRACT

Nugget and crackers are fast foods that are widely consumed and favored by the public, usually used as dishes or snacks. Banana tubers is a local food commodities which contains of high fiber can be processed as an ingredients nuggets and crackers. The purpose ofthis reseach was to determine the fiber content of nuggets and crackers with the basic ingredients of kepok banana hump (Musa paradisiaca Var. Balbisina Colla). This study was experimental design. The nugget formulation consisted of 3 comparisons, the ratio of banana hump : wheat flour (25%: 75%) (F1), (50%: 50%) (F2), and (75%: 25%) (F3). The cracker formulation consists of 3 comparisons, the ratios of banana hump: tapioca flour (25%: 75%) (F1), (50%: 50%) (F2), and (75%: 25%) (F3). Test the fiber containt by the gravimatry method which is then described. The results in this study was analyzed of the fiber value of nuggets and crackers kepok banana hump every (100g). The highest fiber content of nuggets was F3: 0.514g, F2: 0.322g and F1: 0.186g. The highest fiber content of Kepok banana hump crackers is F3: 0.861g, F2: 0.747g and F1: 0.727g. The fiber value of the kepok banana hump crackers is higher than the kepok banana hump nugget.

Keywords: *Nugget, Crackers, Kepok Banana Hump, Fiber.*

INTRODUCTION

Food products, especially local food in Indonesia, are very diverse and abundant. Local food usually has a relationship with the characteristics, culture or customs of the local community. Corn, sago, cassava and banana are examples of these foods. Local food products must be developed, especially in the health and safety aspects, which also act as a functional food. Functional food is a processed food containing one or more food components based on scientific studies proven to have certain physiological functions beyond their basic functions, are not harmful and can be beneficial to health (BPOM, 2005). Functional food has a high level of bioactive components that are beneficial to health, such as fiber (Marsono, 2007).

Fiber (polysaccharides, oligosaccharides, and lignins) is part of the edible plant or carbohydrate analogues that cannot be digested and absorbed by the human small intestine by complete or partial fermentation of the large intestine. Besides, adequate fiber consumption can improve metabolic advantages in controlling blood sugar and being able to regulate cholesterol levels in the blood (American Association of Cereal Chemists, 2001). According to Marsono (2004), fiber's benefits can overcome health problems,

including diabetes mellitus, hyperlipidemia, and digestive tract diseases.

The recommended fiber consumption is 20-35 grams/day from various food sources (Perkeni, 2015). One fiber type, namely soluble fiber (pectin), is useful as an antidiabetic (Maryanto and Marsono, 2019). Whereas, based on Santoso's (2011) research, crude fiber can help reduce obesity. The example of fiber sources and local food are vegetables, fruits and also tubers.

One of the local foods that have a high crude fiber level is a banana hump. The banana humps is a banana plant in the shape of a stem or original stem (Satuhu and Supriyadi, 2008). In 100 grams of raw or a wet banana hump contains 2.99 grams of protein, 0.96 grams of fat and 9.99 grams of fiber (Aswandi et al., 2013). Inragih's (2014) study shows that the best banana hump varieties were obtained from the *Kepok* variety. Hence, a wet banana hump contains 43% calories, 0.6% protein, 11.6% fat, 15% charcoal hydrate, 60% Ca, 0.5% P, 0.01% Fe, 12% vitamins and 86% water.

Based on the Directorate General of Horticulture (2018), banana production in 2018 was 72,642,792 quintals with 81,289,450 banana trees. Based on the total banana yield, it can be estimated that the availability of banana humps is also substantial. In fact, the banana humps will follow the banana production itself (Fawzia et al., 2012). Therefore, it is necessary to use banana humps as an alternative to high-level fiber foods. Particularly in banana production centers, banana humps are assumed to be a banana part that cannot be used, so that many banana humps were thrown away (Fawzia et al., 2012).

One of the banana humps utilization methods is processing them into wet and dry food products to extend life, add nutritional value and economic value, and increase food diversity. Food diversity will attract more people to banana weevil than just steaming, cooking or frying. For instance, nuggets and crackers are popular foods for all groups.

Nugget is a ready-to-eat food that is widely consumed by the public. The shelf life of nuggets that can last long enough (stored in the freezer) is one reason for the increasing public consumption of nuggets. The nuggets on the market are made from beef and chicken, which are expensive and less healthy. Usually, a product made from animal ingredients contains high fat and protein but low in fiber. Thus, banana humps can be the right alternative as raw material for making nuggets because they come from vegetable ingredients and have high fiber.

Cracker is a dry food made from ingredients that contain high starch, usually consumed as a meal companion. The advantage of crackers is that they are durable and do not get rot easily. So far, the crackers in the market are only high in carbohydrates but low in fiber and protein (Koswara, 2009). Therefore, to maximize the fiber content in crackers, a banana hump can be used in the ingredients' mixtures in crackers' manufacture.

The researcher was interested in conducting a study on the analysis of nuggets' and crackers' fiber

content with the basic ingredients of *Kepok* banana humps *(Musa paradisiaca var. balbisina colla)* due to the huge number of banana humps that have been thrown away. The researcher's willingness to conduct this research came from the same case that happened in the area where the researcher lives. It happened because the local people lacked information on utilizing, cultivating, and knowing what kind of nutrient contents in the *Kepok* banana humps.

RESEARCH METHODOLOGY

Design, Time, and Place

This research is an experimental design with two products and three formulation comparisons. The nugget formulation is formula 1 (F1) with a ratio of banana weevil: wheat flour (25%:75%), formula 2 (F2) (50%:50%), and formula 3 (F3) (75%:25%). The cracker formulation is formula 1 (F1) with a ratio of banana hump: tapioca flour (25%:75%), formula 2 (F2) (50%:50%), and formula 3 (F3) (75%:25%). This research was conducted from July to September 2020. The formulation of nuggets and crackers was carried out at the Pangan Program Studi Gizi Laboratory, Fakultas Ilmu Kesehatan, Universitas Ngudi Waluyo, Ungaran. The fiber content analysis was conducted at the Laboratorium BBTPPI (Balai Besar Teknologi Pencegahan Pencemaran Industri) Semarang.

Tools and Materials

The tools used to make *Kepok* banana nuggets and crackers are a food scale, a bowl, a baking sheet, a mortar, a pestle, a grater, a blender, a spoon, a fork, a frying pan, a spatula, a filter, a steamer and a stove. Banana weevils were obtained from the researcher's garden in Desa Pledokan, Kecamatan Sumowono, Kabupaten Semarang. Other ingredients are medium protein flour, tapioca flour, paneer flour, cooking oil, chicken eggs, chicken meat, sugar, salt, pepper, coriander, candlenut and garlic that have been bought from stalls and supermarkets. Hence, the fiber analysis test was using the gravimetric method.

Research Stages

The research was carried out using several stages, including the formula determination of *Kepok* banana nuggets and crackers by specifying the ratio between banana humps and wheat flour with banana humps and tapioca flour. The next step was analyzing the fiber content of each formulation for three times of repetition.

Data Analysis

The analysis results of fiber content were analyzed descriptively. All of the data in this study were processed using the Microsoft Excel program.

RESULTS AND DISCUSSIONS

Results

The Fiber Content on *Kepok* Banana Hump Nugget

The fiber content assessment in this research was done using fried nuggets. The result of fibre content analysis on *kepok* banana hump nugget can be seen in Table 1.

Table 1. The content of fiber value on *kepok* banana hump nuggets in every 100 grams.

Nugget Formula	Repetition			Mean ±SD
	1	2	3	
F1	0.189 g	0.180 g	0.189 g	0.186 g ± 0.0042
F2	0.329 g	0.308 g	0.329 g	0.322 g ± 0.0099
F3	0.518 g	0.508 g	0.516 g	0.514 g ± 0.0043

Based on Table 1. can be seen that *kepok* banana hump nugget F3 has the highest fiber content in total 0.514 g among the three formulas. Whereas the fiber content on the F2 *kepok* banana hump nugget is 0.322 g, and F1 is 0.186 g. The deviation standard from the data is 0.0042 – 0.0099. The descriptive analysis shows that the deviation standard value is smaller than the mean value. It can be concluded that the data is homogeneous, which means that the analysis of fiber content on *kepok* banana hump nugget has a low deviation value.

Formula 3 has the highest fiber content because of the composition of the banana hump 75%. The higher *kepok* banana hump added to the nugget, the more fiber content in the nugget also from the process.

The Fiber Content on *Kepok* Banana Hump Crackers

The fiber content assessment in this study was done using fried crackers. The fiber content analysis on the crackers can be seen in Table 2.

Table 2. The fiber content value on *kepok* banana hump crackers in every 100 grams.

Crackers Formula	Repetition			Mean ±SD
	1	2	3	
F1	0.729 g	0.714 g	0.737 g	0.727 g ± 0.009
F2	0.778 g	0.735 g	0.728 g	0.747 g ± 0.022
F3	0.894 g	0.865 g	0.824 g	0.861 g ± 0.029

Based on Table 2, it can be seen that from the three formulas, formula 3 has the highest fiber content in total 0.861 gr. Then, formula 2 has 0.747 gr fiber content, and the lowest F1 has 0.727 gr fiber content. The deviation standard from the data is 0.009 – 0.029 .

The descriptive analysis shows that the deviation standard value is smaller than the mean. It can be summed up that the data is homogeneous, which means that the analysis of fiber content on *kepok* banana hump crackers has a low deviation value. Formula 3 has the highest fiber content because of the composition of the banana hump 75%. The higher *kepok* banana hump added to the crackers, the more fiber content in the crackers also from the process.

Discussions

This study analyzed the fiber nutrients to discover the fiber content in the *kepok* banana hump nugget and cracker. The banana hump used is the *kepok* banana hump that has been harvested from the tree. Frying and steaming techniques were used in the nugget making process. There were additional ingredients to make the nugget, such as chicken, and seasoning (pepper, garlic, salt, and sugar). Then, steaming, drying, and frying techniques were used to make the cracker and added coriander, garlic, and salt for seasoning.

Harvested *kepok* banana hump is the best hump to be made as crackers and nuggets because it has lower water content and higher fiber content than any other types of banana, such as *raja*, *mahuli*, *susu*, and *ambon* bananas. Every 100 grams raw banana hump consists of 9.9 grams of fiber (Aswandi et al., 2013).

Banana hump is categorized as a high fiber comestible. The fiber found in the banana hump mostly consists of carbohydrates, such as cellulose, hemicellulose, pectin, and lignin. The digestive enzyme cannot hydrolyze these fibers. The fiber content in every 100 grams of wheat flour is 0.3 grams, and fiber content in every 100 grams of every tapioca flour is 0.9 grams (TKPI, 2017). It can be seen that the fiber content in the tapioca flour is higher than wheat flour. The additional ingredients other than banana humps also increase the fiber content.

The ingredient that contains high fiber will speed up the leftovers' transit time in the intestine so that it becomes shorter (Luthfianto et al., 2017). The food with high coarse fiber content usually contains calorie, sugar level, and low fat to decrease the obesity potential (Santoso, 2011).

Uncooked banana hump has high fiber content that will decrease after the cooking process becomes nugget and cracker. The decreasing of coarse fiber is assured that the pectin and hemicellulose gel structure is damaged by heating on the cooking process and the processing time (Suprapto, 2004). According to Kusumawati et al. (2012), the fiber level of jackfruit seed flour decreases after the blanching process at 80^{o} C temperature for 10 minutes. The decreasing process of coarse fiber is affected by temperature and blanching time.

This study used variative fiber content ingredients and the processing method. Based on fiber analysis assessment on formula 3, both on nugget and cracker, the results showed that formula 3 has the highest fiber content because it contains much more banana hump than other formulas. The additional ingredient to make the nugget is wheat flour, while crackers are made by adding tapioca flour. Moreover, the nuggets making process is simpler than crackers, which passes some procedures, such as the drying process.

Those differences cause the fiber content in the crackers is higher than in the nugget. Rahma et al. (2015) stated that coarse fiber levels would be higher in the warmer temperature. The study indicated that boiled food has higher fiber content than steamed food.

The increasing process of coarse fiber level is caused by the cell walls of the process's biodegradable material. The drying duration also plays a role in increasing fiber content in the food (Suprapto as cited in Rahman et al., 2015). Indradewi (2016) also stated that the higher temperature used in the process, the lower the fiber decreasing process. Banana *sale* with the sun-drying process and drying with the baking process at temperature 65^0C at night compare to temperature 45^0C and 55^0C. Pectin also causes the increased fibre content process in the banana *sale*, which is heated at a higher temperature. According to Bennet (cited in Indradewi, 2016), pectin will increase, and cellulose and hemicellulose will decrease during the heating process. Deep frying is one of the methods in the making of nuggets and crackers. The use of cooking oil in the deep-frying process intends to make the crackers perfectly cooked and crunchy. Susanti et al. (2019) asserted that the fiber content in the shrimp floss, processed using a pan-frying method, has a lower fiber content than the deep-frying method.

According to AKG 2019, adult female and male fibre needs are 32 grams until 37 grams. The nugget is not included in a high fiber food from the data above because it only contains 0.514 grams and 0.861 grams fiber in every 100 grams. Due to the making process factor, making the fiber content disappear, and coarse fiber decreases.

Based on the European Commission (2006), food is high fiber when 100 grams of the food contain 6 grams or 3 grams fiber per 100 kcal. Nugget only contains 0.186 grams – 0.514 grams in 100 grams banana hump nugget. It only fulfills 2.57% of the total minimum fiber need and fulfills 1.51% of adult fiber need. Meanwhile, the cracker only contains 0.727 grams – 0.861 grams in 100 grams banana hump crackers. It only contains 4.3% of the total minimum fiber need and fulfills 2.54% of adult fiber needs. The coarse fiber requirements from BSN (1992) for fish crackers are maximum of 1, so banana hump crackers already meet the quality requirements with the highest coarse fiber, namely 0.861 grams.

CONCLUSION

The research results can be concluded that the highest average content of *Kepok* banana hump nugget fiber is F3 = 0.514%, F2 = 0.322%, while F1 = 0.186%. The highest average fiber content of *Kepok* banana hump crackers was F3 = 0.861%, F2 = 0.742%, while F1 = 0.727%.

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REFERENCES

American Assosiation of Cereal Chemist (AACC). (2001). 'The Definition of Dietary Fiber'.

Cereal Foods World, *46*(3), 112–129.

Aswandi *et al.* (2013) 'Efek Complete Feed Bongol Berbagai Varietas Tanaman Pisang Terhadap pH, NH3 dan VFA pada Kambing Kacang', *Journal of Chemical Information and Modeling*, 53(9), pp. 1689–1699. doi: 10.1017/CBO9781107415324.004.

Badan Standarisasi Nasional. (1992). *SNI 01-2713-1992*. Kerupuk Ikan. Jakarta: Departemen Perindustrian Republik Indonesia.

BPOM. (2005). 'Ketentuan Pokok Pengawasan Pangan Fungsional', *Peraturan Kepala Badan Pengawas Obat dan Makanan Republik Indonesia Nomor HK 00.05.52.0685*, pp. 1–13.

Departemen Kesehatan R1. (2017). *Tabel Komposisi Pangan Indo nesia. Departeman Kesehatan RI*. Jakarta.

Direktorat Jenderal Hortikultura. (2020). Statistik Produksi. *Luas Lahan dan Produktivitas Buah Pisang 2014-2020*. Kementerian Pertanian, Jakarta.

European Commission (2006). 'Regulation (EC) No 1924/2006 of the European Parliament and the of the Council on nutrition and health claims made on foods', *Official Journal of the European Union*, (404), pp. 9–25.

Fawzia, F.N., Ulfia, M.,Marliando, M. (2012). 'Tepung Tempe dan Limbah Bonggol Pisang Sebagai Industri Rumahan'. *Jurnal Kelitbangan vol. 01*.

Indradewi (2016) 'Pengaruh Teknik Pengeringan Terhadap Kadar Gizi dan Mutu Organoleptik Sale Pisang (Musa paradisiaca L .)', *Fakultas Farmasi, Universitas Halu Oleo*, 4(2), pp. 58–65.

Koswara, S. (2009). 'Pengolahan aneka kerupuk'. In *Ebookpangan.com* (p. 31).

Kusumawati, D. D., Amanto, B. S. and Muhammad, D. R. A. (2012) 'Pengaruh Perlakuan Pendahuluan Dan Suhu Pengeringan Terhadap Sifat Fisik, Kimia, dan Sensori Tepung Biji Nangka (Artocarpus heterophyllus)', *Jurnal Teknosains Pangan Vol 2 No 2 April 2013*, 1(1), pp. 41–48.

Luthfianto, D., Noviyanti, R. D. and Kurniawati, I. (2017) 'Karakterisasi Kandungan Zat Gizi Bekatul pada Berbagai Varietas Beras di Surakarta', *jurnal Kesehatan*, 2(1), pp. 371–376. doi: 2407-9189.

Marsono Y. (2007). Prospek Pengembangan Makanan Fungsional. Makalah disampaikan pada Seminar Nasional dalam rangka *National*

Food Technology Competation (*NFTC*).

Marsono, Y. (2004). Serat Pangan dalam Perspektif Ilmu Gizi. Pidato disampaikan dalam *Pengukuhan Guru Besar*. Majelis Guru Besar Universitas Gadjah Mada, Jogjakarta.

Maryanto, S dan Marsono, Y. (2019). 'The Atherogenic Index of Plasma Treated with Red Guava (Psidium guajava L.)'. *IOP Conference Series: Earth and Environmental Science.*

PERKENI. (2015). *Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia.*

Rahman, I. G., Sukmiwati, M. dan Dahlia (2015) 'Pengaruh Metoda Pemasakan Berbeda Terhadap Karakteristik Tepung Ikan Betok (*Anabas testudineus*)', 2(1), pp. 1–2.

Santoso, A. (2011). 'Serat Pangan (Dietary Fiber) dan Manfaatnya Bagi Kesehatan'. *Jurnal Magistra* No. 75 Th. XXIII. ISSN 0215- 9511.

Saragih, B. (2013). 'Analisis Mutu Tepung Bonggol Pisang dari Berbagai Varietas dan Umur Panen yang Berbeda'. *Jurnal TIBBS Teknologi Industri Boga dan Busana* ISSN 0216-7891 Vol. 9(1):22-29.

Satuhu, S. dan Supriyadi, A. (2008). *Pisang, Budi Daya dan Prospek Pasar.* Jakarta : Penebar Swadaya.

Suprapto. (2004). 'Pengaruh Lama Blanching Terhadap Kualitas Stik Ubi Jalar (Ipoema batatas L.) dari Tiga Varietas', *Prosiding*, pp. 220–228.

Susanty, A., Yustini, P. E. and Nurlina, S. (2019) 'Pengaruh Metode Penggorengan dan Konsentrasi Jamur Tiram Putih (*Pleurotus streatus*) Terhadap Karakteristik Kimia dan Mikrobiologi Abon Udang (*Panaeus Indicus*)',pp.80–87.