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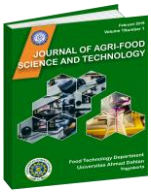

The Effect of Temperature and Time on Quality of Banana Peel Flour

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ABSTRACT

Banana peel waste is usually only used as animal feed and as raw material for bioethanol manufacture. Banana peels have a large nutritional content. Banana peels can be used as an ingredient in flour. Local-based alternative food sources are a priority. Among the various types of functional food, flour substituents such as banana peel flour is an interesting topic because of the people's need for it wheat flour is an inevitable necessity. The aim of this study conducted direct studies of the physical characteristics of cooking banana peel flour as well as studying how the effect of temperature and time on the quality of cooking banana peel flour. Methode this research is direct research with the type of data used is primary data namely data obtained from research results. The results of the study generally show that the characteristics of banana peel flour are powdery, normal smell (typical of bananas), has a slightly bitter taste, and brown. The conclusion of this study is the banana skin suitable as a flor substituent with relatively good characteristics when used as a substitute for wheat flour.

1. INTRODUCTION

Banana (Musa, sp.) Is a fruit commodity that can be cultivated throughout the tropics, including Indonesia. Research from Emaga et al. (2007) stated that banana peels contain food fiber in the amount of 50g / 100g, so it is a potential source of dietary fiber. However, even though bananas have many benefits, consuming bananas will leave organic waste, namely banana peels. Thus, it is necessary to process banana peels into a more useful product so that the use-value of bananas will increase.

Wheat flour is one of the imported food ingredients that is much needed by the people of Indonesia. Wheat flour can be processed into many products, including noodles, bread, cakes, donuts, and various small food products. The food industry made from wheat flour is growing very rapidly in Indonesia, this has led to an increase in imports of wheat flour from year to year (Bappenas, 2000).

Indonesia is the second-largest importer of wheat in the world, and Indonesia is a sizeable supplier or exporter of wheat flour for East Asia. Indonesia supplies flour to several neighboring countries such as the Philippines, Singapore, South Korea, Timor Leste, and

Papua New Guinea. Indonesia in 2015 exported 79,151 thousand tons of wheat flour with an export value of US $ 35.29 million. With the largest number of exports to the Philippines amounting to 44,134 thousand tons, East Leste 16,307 thousand tons, South Korea 6,282 thousand tons, Papua New Guinea 4,456 thousand tons and Singapore 3,518 thousand tons.

The number of Indonesian flour exports from 2009–2016 shows a very significant increase. Indonesia can export wheat flour in large volumes because the selling price of wheat flour in Indonesia is the cheapest in the world, namely with a factory selling price of USD 0.56 / kg, Indonesia is only competing with Vietnam which also has a selling price of wheat flour in the range the same price.

The utilization of banana peels as a substitute for wheat flour is expected to reduce imports of wheat flour. Banana peels can be used as raw material for making flour because banana peels contain starch of 0.98% (Widyaningsih., Et al., 2012). A study by Musita (2009), stated that the starch content of banana peels depends on the banana variety. The content of resistant starch from plantains was 30.66%, horn bananas 29.60%, Ambon banana 29.37%, kepok kuning banana 27.70%, Kepok Manado banana 27.21%. In this study, using the basic ingredients of banana peel, apart from the second-highest starch content after plantains, also because no research has been done on making banana peel flour from banana peels.

2. RESEARCH METHOD AND MATERIALS

2.1. Research Instruments and Materials

The research instruments are basins, knives, oven, pans, sieves, cutting boards, scales, thermometers, and blenders. The research materials are banana peels originating from Air Molek Market or Markets in Indragiri Hulu, Riau and Singaparna Markets or Markets in Tasikmalaya, West Java, and H_2O.

2.2. Research Methods

The research was started by sorting the banana peel to get the best banana peel. Peel the outside of the banana peel and wash it thoroughly. Cut banana peels into small pieces and weigh 200 g (W) of banana peels. Dry banana peels in the oven for 5, 7, and 9 hours at a temperature of 100, 110, and 120 ℃. Weighing the final weight or weight after ovening (W1). Blend banana peels until smooth. Sift the banana peel flour to get a fine and uniform flour size. Analyzing banana peel flour according to SNI.

3. RESULT AND DISCUSSION

3.1. Physical Characteristics of Banana Peel Flour

The characteristic of banana peel flour is the physical appearance of banana peel flour which can be observed using the five senses. The data in Table 1 shows that in general the form of banana peel flour is powder, the aroma of banana peel flour is the aroma of banana (which can be categorized as normal), the taste of banana peel flour is bitter and slightly sweet, and the color of the banana peel flour is brown.

Powder form is the general form of flour so that each flour raw material is processed in such a way as to produce a powder form. According to PKKP BKP (2011), the manufacture of banana peel flour begins by cutting banana peels into small pieces approximately 1 cm x 0.2 cm in size with a knife or with a ruler. Then soak the banana peel in sodium thiosulfate and salt for 1 hour, after which it is drained. The process of processing the fruit peel flour starts from drying the skin using an oven at 60 ℃ until the skin is completely dry so that the final result is dry flour. After drying or the moisture content has decreased by 14 percent, the banana peel pieces can be grinded / crushed using a kammer mill or ground. The milling results are then sieved. The fruit skin flour that escapes the

sieve is packed in a plastic bag.

Table 1. Characteristics of Banana Peel Flour

Parameter	Temperature (℃)	Banana Skin Flour Test Results		
		5 hour	7 hour	9 hour
Shape	100	Powder	Powder	Powder
	110	Powder	Powder	Powder
	120	Powder	Powder	Powder
Flavor	100	A little banana scent	A little banana scent	A little banana scent
	110	Flavor of banana	Flavor of banana	Flavor of banana
	120	Flavor of banana	Flavor of banana	Flavor of banana
Taste	100	Tasteless	Tasteless	Tasteless
	110	A little bit bitter and sweet	A little bit bitter and sweet	A little bit bitter and sweet
	120	Bitter and sweet	Bitter and sweet	Bitter
Color	100	Light brown	Light brown	Light brown
	110	Brown	Brown	Dark brown
	120	Dark brown	Dark brown	Blackish brown
Moisture content	100	6.40%	5.17%	5.39%
	110	5.99%	4.57%	4.15%
	120	4.98%	4.36%	3.94%

Making banana peel flour as described above, which is an ideal condition used in the production process. However, considering that this research was conducted in conditions and situations that were not possible and supportive, so that some modifications were made to the work steps and the tools used, namely tools and materials that could be found or easily obtained in the vicinity of the researchers' homes.

Then for the aroma character of banana peel flour is normal. The normal is the normal aroma typical of bananas (Aryani, 2018). This means that the normal aroma obtained in making banana peel flour is not like the normal aroma of wheat flour. This is because the characteristic aroma of skin flour is the identity of flour. In addition, the process of processing banana peel flour is able to save the distinctive aroma of bananas, resulting in a banana aroma in the resulting banana peel flour.

The taste character of banana peel flour obtained from the source of Aryani's research (2018) states that the character of the taste of banana peel flour is slightly bitter. This may be caused by phytochemicals such as saponins found in banana peels. According to Sirait (2007), saponin taste is bitter or bitter. Saponin when shaken will foam which will reduce the surface tension caused by saponin molecules consisting of hydrophor and hydrophil. Most of the saponins react neutrally (dissolve in water), some are acidic (difficult to dissolve in water), a small proportion react with alkalis. Saponins can be compounds that have one sugar chain or two mostly branched sugar chains.

The color character of banana peel flour in all research results showed that the banana peel flour was brown. The brown color produced from the banana peel flour is the effect of the browning reaction. This is due to oxidation with air so that a browning reaction is formed by the influence of the enzymes present from these foodstuffs (browning enzymatic). Enzyme browning is a reaction between oxygen and a phenol compound catalyzed by polyphenol oxidase. The formation of brown in banana peels is triggered by an oxidation reaction catalyzed by the enzymes phenol oxidase or polyphenol oxidase. This enzyme can catalyze the oxidation of phenolic compounds into quinones and then

polymerized into brown melaniadin pigments (Mardiah, 1996).

Water content is related to the quality and stability of materials, because water content is very influential in testing every food ingredient in daily life (Hombing, 2016). The longer the drying time, the optimal drying process will be because the water content that evaporates will be greater so that the resulting yield is less. This is in accordance with research which states that the difference in height and low yields in a food material is strongly influenced by the water content of a food (Martunis, 2012).

Based on the results of the research we have done with 9 variations that the water content is best for a temperature of 120 ℃ and a time of 9 hours because it is the lowest water content. According to the quality standard of wheat flour according to SNI 3150: 2009, the maximum permissible moisture content is 14.5%. The results of our research showed that the moisture content of all banana peel flour samples met the Indonesian National Standard (SNI).

3.2. Comparison of Physical Characteristics and Nutritional Content of Banana Peel Flour to Quality Requirements for Wheat Flour

The Indonesian National Standard (SNI) is the only standard that applies nationally in Indonesia. SNI is formulated by the Technical Committee and stipulated by the National Standardization Agency (BSN). The National Standardization Agency determines 105 products that are required to meet the Indonesian National Standard (SNI) to protect public interests, State security, national economic development and the preservation of environmental functions. A product that has fulfilled the SNI will be given an SNI mark on the product. If a certain product has been obliged with SNI but does not have the SNI mark, then the product may not be circulated or traded in the territory of Indonesia (Sari, 2015). Wheat flour is one of the 105 products that is obliged to SNI. Comparison of the physical characteristics of various types of banana peel flour to the quality requirements of wheat flour in the SNI for Wheat Flour as food (SNI 3751: 2009) is shown in Table 2.

Table 2. Comparison of Physical Characteristics and Nutritional Content of Different Types of Banana Peel Flour

Wheat Flour Quality Requirements		Table column header				
Test Type	Requirements	Kepok	Uli	Raja[a]	Raja[b]	Raja[c]
Shape	Powder	Powder	Powder	Powder	Powder	Powder
Flavor	Normal	Normal	Normal	Normal	Normal	-
Color	White	Brown	Brown	Brown	Brown	-
Moisture content	Max. 14.5	2.05%	1.96%	3.93%	6.92%	13.63%

Based on Table 2, the comparison of the physical characteristics and water content of various types of banana peel flour to the quality requirements of the wheat flour showed that the average banana peel flour met the requirements for shape, flavor, taste, and moisture content. The quality requirement for wheat flour that is not fulfilled is the color of the banana peel flour.

4. CONCLUSIONS

Based on the research that has been done regarding the effect of temperature and time on the quality of banana peel flour with temperature variations 100, 110, and 120 ℃ and time 5, 7, and 9 hours, it can be concluded that the flour produced is the best quality at temperature 110 ℃. 5 hours drying time which has a brown color. In terms of aroma, color and taste and surface there is no difference. As for the water content that is close to the

quality standard of wheat flour, it is at a temperature of 120 ℃ and a time of 9 hours. From this research, it can be concluded that the banana peel is suitable as a flour substituent with relatively good characteristics when used as a substitute for wheat flour.

BIBLIOGRAPHY

Akili, M. S, Ahmad. U, and Suyatma N.A. (2012). *Karakteristik Edible film dari Pektin Hasil Ekstraksi Kulit Pisang*. Jurnal Teknik Pertanian. Vol. 26, No. 1.

Aryani, T. and Mu'awanah, I. A. U. (2018). *Efektivitas Pengolahan Limbah Kulit Pisang Menjadi Donat Ditinjau dari Analisis Fitokimia, Proksimat dan Organoleptik*. Laporan Penelitian Hibah Penelitian Dosen Pemula DIKTI 2018, Yogyakarta: Universitas Aisyiyah Yogyakarta.

Astawan, Made. (2008). *Sehat Dengan Hidangan Hewani*. Jakarta: Penebar Swadaya.

BAPPENAS. (2000). *Pisang (Musa spp)*. Editor: Kemal Prihatman. Sistem Informasi Manajemen Pembangunan di Pedesaan, Surabaya.

Djunaedi, E. (2006). *Pemanfaatan Limbah Kulit Pisang Sebagai Sumber Pangan Alternatif dalam Pembuatan Cookies*. Bogor: Universitas Pakuan.

Emaga, T.H. Andrianaivo, R.H. Wathelet, B. Tchango, J.T. and Paquot, M. (2007). *Effects of the stage of Maturation and Varieties on the Chemical Composition of Banana and Plantain Peels*. Food Chemistry, 103, 590- 600.

Gunawan, I. (2013). *Metode Penelitian Kualitatif :Teori dan Pratilik*. Jakarta: Bumi Aksara.

Mardiah E. (1996). *Penentuan Aktivitas dan Inhibisi Enzim Polifenol Oksidase dari Apel (Pyrus malus Linn.)*. Jurnal Kimia Andalas. Vol. 2, No. 2.

Martunis. (2012). *Pengaruh Suhu dan Lama Pengeringan Terhadap Kuantitas dan Kualitas Pati Kentang Varietas Granola*. Banda Aceh: Universitas Syiah Kuala.

Munadjim. (1983). *Teknologi Pengolahan Pisang*. Jakarta: PT. Gramedia Pustaka Utama.

Musita, N. (2009). *Kajian Kandungan dan Karakteristik Pati Resisten dari Beberapa Varietas Pisang*. Jurnal Teknologi Industri dan Hasil Pertanian, Vol. 14, No. 1.

Prabawati, S., Suyanti, and Setyabudi, D.A. (2009). *Teknologi Pasca Panen dan Pengolahan Buah Pisang*. Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor.

Santoso, A. (2011). *Serat Pangan (Dietary Fiber) Dan Manfaatnya Bagi Kesehatan*. Jurusan Teknologi Hasil Pertanian, Fakultas Teknologi Pertanian, Unwidha Klaten.

Sukriyadi, L. (2010). *Kajian Sifat Kimia dan Sifat Organoleptik Pada Tepung Kulit Pisang Dari Beberapa Varietas Pisang*. Skripsi, Ternate: Universitas Khairun Ternate.

Syahruddin, A.N., Ibrahim, I. A., and Nurdiyanah. (2015). *Identifikasi Zat Gizi dan Kualitas Tepung Kulit Pisang Raja (Musa Sapientum) dengan Metode Pengeringan Sinar Matahari dan Oven*. Media Pangan Indonesia, 19(1), 116-121.

Sirait, M. (2007). *Penuntun Fitokimia dalam Farmasi*. Bandung: Penerbit ITB.

Widyaningsih, S., Kartika, D., and Nurhayati, Y. T. (2012). *Pengaruh Penambahan Sorbitol Dan Kalsium Karbonat Terhadap Karakteristik Dan Sifat Biodegradasi Film Dari Pati Kulit Pisang*. Purwokerto: Universitas Jendral Soedirman.