

Variation of roasting temperature in making cookies with barlin banana flour base and skin (*Musa Acuminata AA*) on dietary fiber content and organoleptic test

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ABSTRACT : The purpose of this study was to use barlin banana peel waste (*Musa acuminata AA*) with flour made together as well as the banana fruit. Barlin banana flour with skin is made into a cake. The results of these cookies are tested in the laboratory to determine the content of dietary fiber. This type of research is experimental research. The production starts from fresh barlin banana into berlin banana flour. The process of making cookies using a roasting process at a different temperature of 170°C, 175°C, and 180°C for 10 minutes. Test the nutritional content of barlin banana flour mixed with the skin containing 3.96 dietary fiber. The content of dietary fiber in cakes is made from barlin banana flour mixed with the roasting process, the higher the heating temperature, the less the fiber content of the food reaches 3.89%. In the organoleptic test, cakes tested on 20 respondents resulted in 60% agree, for the texture of crispy cookies in 25% approve and 75% strongly agreed, for the aroma of fragrant cakes, stating 40% agreed, and 45% strongly agreed, to the taste of cookies that are crisp 40% approved and 50% strongly agreed.

Keywords : Cookies, Barlin Banana Flavour, Banana Skin, fiber, organoleptic test

1. Introduction

The more increasing year, the more increasing inhabitant, the need for food material as an energy source also keeps increasing. Due to the plenty of food material that is available in this country, there is also a great opportunity that can be obtained to make beautiful food creation to add the number of different crop yield that can be processed by using sufficient primary material and available around us. Due to the abundant banana in this country, therefore the inhabitant does not lack banana consumption. The age of a banana plant is approximately for a year then starting to bear fruit. After the bud coming out, the period of the fruit is about 80 to 100 days, and the fruit is ready to be harvested. The use of banana recently is still not optimal, and it is still as consumption fruit and traditional process. There are a lot of snack types from relatively popular such as banana cracker, sale, and others. The thing that should be anticipated is a surge in production during the harvest time at centers of banana producer whereas unbalanced

market uptake causes a lot of banana result that is sold relatively cheap. There is an opportunity that banana can be developed primarily as material. Barlin banana is a banana that has a relatively tiny tree from the other banana trees. However, although the size is small, this tree also has pretty thick fruit even though with tiny size too. Banana production in Indonesia is until 2009 as 512,27 ton/ha (Purba, 2004). To prolong the shelf life of banana and to increase the added value is to process it. One of the banana processed product is banana flour.

Cookies are widely consumed and generally, they are rich in carbohydrates, fats and calories, but low in fiber, vitamins and minerals. Currently, fortification of cookies has evolved to improve its nutritional and functional quality (Awolu et al., 2016). The banana is a fruit whose origin is from Southeast Asia, including North India, Burma, Cambodia and part of South China, as well as the major islands of Sumatra, Java, Borneo, the Philippines and Taiwan. Green banana is composed of the high amount of starch, around 70%

of the fruit, dry basis (Agama-Acevedo et al., 2015), banana flour contains 6% - 15.5% total fiber, 2.6% - 3.5% ash 2.5% - 3.3% protein and 0.3% - 0.8% lipids. The flour obtained has beneficial physiological effects, as it acts in the form of fiber, due to the high content of starch resistant to digestion and provides better glycemic and insulinemic responses (Hernández, 2006; Patzi, 2007). Processing semi-finished product is one of the preservation ways of harvest especially for the raw material that has high water content like tubers and fruits. Another benefit of semi-finished product as flexible semi-finished raw material for further processed industry, safe in distribution, save space and storage cost (Widowati and Darmadjati 2001). Besides being prepared to be banana flour can be made into cookies, biscuit and so on.

Banana skin is the waste that has not been used much as a food processing result. Banana flour that is made of banana together with its surface as an alternative in creating cookie creation. With the dietary fiber content of, the course will be beneficial for health. Banana flour that is mixed with its skin is alternative creation that is quite interesting that is quite attractive to be used as a primary material in making a cookie which is far more attractive compared with processed creation result of other materials. In a context of fiber food, the fiber foods can be obtained synthetically or can be isolated from food stuff or plant. The firer food that is from vegetable, nuts, and fruits as substantial that does improve not only intestinal flora through Lactobacillus bacterial growth but also brings positive effect on other health elements like degenerative disease prevention (for instance coronary heart disease, colon cancer, and diabetic). Based on that background, the researcher will donate by making research development like cookie product by using necessary material barlin banana that is mixed with its skin with the hope that the content of fiber food will be increased.

Table 1. Quality Requirement of Banana Flour (SNI 01-3841-1995)

No	Test Criteria	unit	requirements	
			A	B
1	Conditions	-	Normal	Normal
	Smell	-	Normal	Normal
	Taste	-	Normal	Normal
	Colour	-	Normal	Normal
2	foreign object	-	nothing	nothing
3	Insect (a part)	-	nothing	nothing
4	Other types of starch besides banana flour	-	nothing	nothing
5	Fineness passes the 60 mesh sieve	%w/w	Min 95	Min. 98
6	Water	%w/w	Max 5	Max 12
7	Additif	-	SNI 01-0222-1987	
8	Sulfite (SO ₂)	mg/kg	Negative	Max 1.0
9	Metal Contaminati on:			
	Pb	mg/kg	Max 1.0	Max 1,0
	Cu	mg/kg	Max 10.0	Max 10.0
	Zn	mg/kg	Max 40.0	Max 40.0
	Hg	mg/kg	Max 0.05	Max 0.05
10	Contaminati on of Arsenic (As)	mg/kg	Max 0.5	Max 0.5
11	Microbial Contaminati on			
	Total Plate Number	colony /g	Max 10 4	Max 10 4
	Coli-Forming Bacteria	APM/g	0	0
	Escherichia Coli	colony/ g	0	Max 10 2
	Mushrooms and Kamir	colony/ g	Max 10 2	Max 10 4
	Salmonella/2 5 gram	-	Negative	-
	Staphylococ cus aureus	colony/ g	Negative	-

Table 2. Quality Requirement of Cookies (SNI 01-2973-1992)

No	Test Criteria	Unit	Classification
1	Water	%	Max 5
2	Protein	%	Max 9
3	Fat	%	Max 9.5
4	Carbohydrate	%	Max 70
5	Ash	%	Max 1.6
6	hazardous metals		Negatif
7	Crude fiber	%	Max 0.5
8	Calories	Cal/100 grams	Max 400
9	smell and taste		Normal
10	Colour		Normal

2. Research Methods

The method in this research is experimental research. The test of nutritional content is held at Biochem Technology Surabaya. Independent variable in this research is the number of barlin banana flour with its skin. The dependent variable in this research is fiber food content of banana flour cookie with its surface that is roasted 170°C, 175°C, and 180°C. Control variable in this research is barlin banana type that is made of flour with its skin by using drying process treatment by sun drying for two days. The laboratory test is done to obtain data of nutritional content for fiber food content of banana flour and fiber food content from each cookie of barlin banana flour with its skin with different roasting temperature.

The utensils that are used is the knife, grater, cutter, chopping board, baking pan, basin, wooden spoon, scale, flour refiner, and plastic for packaging. The process of making barlin banana flour with its skin starting by the method, banana is cleaned from dirt, washed and rinsed three times. Then, it is grated. After being grated, later it is sundried directly for two days. It is drying for 6.5 hours. When drying process, stirring in reverse is done every one hour in the purpose that the drying process can be evenly distributed. After being dried, refinement process with 80 mesh size sieve to be barlin banana flour with its skin. The utensils that are used is a knife, grater, cutter, chopping board, baking pan, basin, wooden spoon, scale, flour refiner, and plastic for packaging. Making cookies from

banana flour and skin can follow the procedure in Figure 1.

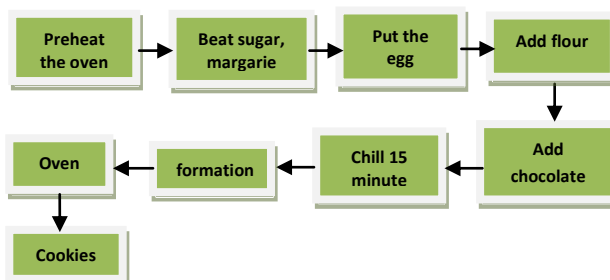


Figure 1. Making Cookie With Basic Material of Barlin Banana Flour together with Its Skin

Analysis of the content of dietary fiber using the AOAC 985.29 method (Gravimetric method). The material tested for dietary fibrous content is banana flour and skin as well as the processed cake products from fruit banana flour and banana skin.

3. Result and Discussion

3.1 Dietary fibre content

Dietary fiber content of barlin banana flour with its skin is 10.21% by using Gravimetric method. If the banana is converted in the form of banana flour, the dietary fibrous reaches 14.5% (Pragati et al, 2014). For cookies with primary material of barlin banana flour with its skin in which its roasting process uses 175°C for 10 minutes contain 4.87% food fibre by using Gravimetric method. For cookies with primary material of barlin banana flour with its skin in which its roasting process uses 175°C for 10 minutes contain 3.96% food fiber by using Gravimetric. For cookies with primary material of barlin banana flour uses 180°C for 10 minutes include 3.89% by using Gravimetric. It is known that banana fruit contains 1.7% dietary fiber (Dhingra et al, 2012). The crude fiber content that can be called dietary fiber in cookies increases, this is caused by the more significant amount of fiber provided by banana flour which in this case is green banana $22.91 \pm 0.11\%$ (Bezerra et al., 2013) so that the cake produced with 20% flour produces crude

fiber 1.01%. Crude fiber content of biscuits with the treatment of variations in banana flour, green bean flour and fish meal ranged from 3.67 to 5.72% (Nurhayati and Andayani, 2014)

3.2 Organoleptic Test

The assessment acceptance of 20 respondents towards cookies with primary material of barlin banana flour with its skin by roasting process use 170°C temperature in 10 minutes is 5% respondents state disagree with attractive brown color, 25% stateless agree that brown color is beautiful, 60% state agree with attractive brown color, and 10% respondents state strongly agree with attractive brown color in Table 3. Based on that data, the researchers conclude that the colour cookie appearance with primary material of barlin banana flour with its skin has beautiful color. Based on the organoleptic test result, from 20 respondents of each roasting process that choose agree is 60% and those who decide strongly agree is 10%. This is supported by the brown color indicating colors that are not too bright as in banana flour substitution can significantly reduce the intensity of the cake brightness at replacement from 50% to 90% when compared to cakes from 100% wheat flour. The change of banana flour can significantly reduce the color of the cake's brightness to substitution from 50% to 90% when compared to cakes from 100% wheat flour (Cahyana and Restiani, 2017).

Table 3. Respondent Acceptance towards Cookie Colour with Basic Material of Barlin Banana Flour with Brown Skin (Attractive)

No	Treatment (oC/10 minute)	Disagree (%)	Less Agree (%)	Agree (%)	Strongly Agree (%)
1	170	5	25	60	10
2	175	5	25	60	10
3	180	0	30	60	10

In Table 4, the assessment acceptance of 20 respondents towards cookies with primary material of barlin banana flour with its skin by roasting process use 170°C for 10 minutes is 10% stateless agree that the texture is crispy, 40% agree with a crispy texture, and 50% respondents state strongly

agree with a crispy texture. For roasting process by using 175°C for 10 minutes, the assessment of 20 respondents is 5% of respondents state less accept with a crispy texture, 35% state agree with a crispy texture, 60% state strongly agree with a crispy texture. Whereas for the roasting process by using 180°C for 10 minutes, the assessment of 20 respondents is 25% state agree with a crispy texture, 75% state strongly agree with a crispy texture. Based on that data, the researchers conclude that the cookie texture with primary material of barlin banana flour with its skin has crispy texture based on organoleptic test result from 20 respondents of three types roasting process by using 170°C, 175°C, 180°C who choose agree with crispy texture for 170°C is 40%, 175oC is 35%, 180°C is 25%, whereas those who strongly agree with crispy cookie texture 50%, 60%, and 75%. This thing is due to the primary material of these cookies that use barlin banana flour with its skin without any mixture from other types of flour. According (Suganda, 2006), the crispy cookies that are substituted with banana flour is due to the starch content in a banana that consists of amylose in banana flour to increase crispy level in the product.

Table 4. Respondent Acceptance towards Cookie Texture with Basic Material of Barlin Banana Flour with Its Skin (Crispy)

No	Treatment (°C/10 minute)	Disagree (%)	Less Agree (%)	Agree (%)	Strongly Agree (%)
1	170	0	10	40	50
2	175	0	5	35	60
3	180	0	0	25	75

The assessment acceptance of 20 respondents towards cookie aroma/smell with primary material of barlin banana flour with its skin by roasting process uses 170°C in 10 minutes is 5% state disagree with fragrant cookie aroma/smell, 25% stateless agree that the aroma/smell is fragrant, 60% state agree with fragrant aroma/smell, and 10% respondents state strongly agree with fragrant aroma/smell in Table 5. For roasting process by using 175°C in 10 minutes, the assessment for

aroma from 20 respondents is 15% respondents state less agree with fragrant aroma/smell, 40% state agree that aroma/smell is fragrant, 45% state strongly agree with fragrant cookie aroma/smell. Based on that data, the researchers conclude that cookie aroma/smell with primary material of barlin banana flour with its skin has fragrant aroma/smell from organoleptic test result on 20 respondents from three types of roasting process with 170°C, 175°C, 180°C who choose agree with fragrant aroma/smell is 60%, 40%, 40%, whereas 10%, 45%, and 45% state strongly agree with fragrant cookie aroma/smell. This aromatic aroma/smell results from essential material cookies, that is, barlin banana flour with its skin that is mixed with chocolate. This thing is due to the degraded starch content at the drying process of cookie dough that is substituted with banana flour (Yasinta et al, 2017). During degradation of starch content, there is extensive change with the elimination of water molecules and little sugar fragmentation in which occurs termination of carbon bond that will produce carbonyl compound and volatile compound. Therefore it arises typical aroma/smell from banana cookies.

Table 5. Respondent Acceptance towards Cookie Aroma/Smell with Basic Material of Barlin Banana Flour with Its Skin (Fragrant)

No	Treatment (°C/10 minute)	Disagree (%)	Less Agree (%)	Agree (%)	Strongly Agree (%)
1	170	5	25	60	10
2	175	0	15	40	45
3	180	0	15	40	45

The assessment acceptance of 20 respondents towards cookie taste with primary material of barlin banana flour with its skin by roasting process uses 170°C for 10 minutes is 5% state disagree with taste of crispy cookie, 20% stateless agree that the feeling of wafer is crispy, 55% state concur to the taste of crispy cookie, and 25% respondents state strongly agree with the taste of crispy cookie. For the roasting process of a wafer by using 175°C for 10 minutes, the assessment for the flavor from 20 respondents is 50% respondents state

agree with the taste of the crispy cookie, 50% state strongly agree that the feeling of the wafer is crispy. Whereas for a roasting process by using 180°C temperature in 10 minutes, the taste assessment from 20 respondents is 30% stateless agree with the taste of the crispy cookie, 40% state agree with the feeling of crispy cookie, 30% state strongly agree with the flavor of the crispy cookie. Based on the organoleptic test result from 20 respondents, from three types of roasting process by using 170°C, 175°C, 180°C who choose agree with the taste of crispy cookie as 55%, 40%, 40%, whereas 25%, 50%, and 30% state strongly agree with the taste of crispy cookie. The feeling of this crispy cookie is produced with its skin that is mixed with chocolate, egg, and sugar. According to Fajri (2012), banana flour has typical taste and unique, therefore can be used as mixture material in making various types of food.

Table 6. Respondent Acceptance towards Cookie Taste with Basic Material of Barlin Banana Flour with Its Skin (Crispy)

No	Treatment (°C/10 minute)	Disagree (%)	Less Agree (%)	Agree (%)	Strongly Agree (%)
1	170	5	25	60	10
2	175	0	15	40	45
3	180	0	15	40	45

4. Conclusion

Base on the research result, therefore it is obtained conclusion as follow that the effect of a laboratory test for food fiber in barlin banana flour with its skin is 4.87%. The cookie with primary material of barlin banana flour with its surface in which the roasting process uses for 10 minutes in 170°C contains food fiber as 4.87%, in 175°C contain food fiber as 3.96%, in 180°C contain food fiber as 3.89%. The organoleptic test results for the appearance of the color of the cake with the essential ingredients of barlin banana flour with the skin has an attractive color for the roasting process in all temperature variations with the survey results stating 60% agree and 10% strongly agree. The

crispy texture of the cake is very preferred at roasting temperatures of 185°C with 75% of correspondents strongly agree. The smell/smell of pie is preferably 175°C and 185°C where 40% of the correspondents agree, and 45% agree strongly. This fragrant aroma is produced from the essential ingredients of the cake, namely barlin banana flour with the skin mixed with chocolate. The taste of the cake at 175°C shows the choice agreed 50% and strongly agreed to 50% of the correspondent. The aroma of this fragrant cake is produced from a mixture of essential ingredients of the cake, namely barlin banana flour with skin mixed with chocolate, eggs, and sugar.

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