The utilization of lady fingers banana flour into cake as creative product to empower the local ingredients

L Masdarini¹, R P Ariani¹ and I A P H Ekayani¹
¹Faculty of Engineering and Vocational, Ganesha University of Education

E-mail: ¹masdarini@undiksha.ac.id, ²risa.panti@undiksha.ac.id, ³hemy.ekayani@undiksha.ac.id

Abstract. This research aimed at creating good quality cake made of lady fingers banana flour as a way to support the empowerment of local ingredients as well as the food shelf life. The target of this research was to gain a variation of cake made of lady fingers banana with good quality standard formula. Meanwhile, the specific targets were: (1) gaining an accurate formula of lady fingers banana cake, (2) gaining the quality of lady fingers banana cake seen from its volume, pore, aroma, texture, and taste through organoleptic test, (3) gaining feedback about the society’s taste towards the lady fingers banana cake. The data were obtained by observation using quality test observation sheet (organoleptic test) to 5 expert panelists and the taste test observation sheet to 15 people in the society. Then, the data were analyzed descriptively. The result shows that (1) the formulation of 75 % lady fingers banana flour was the best formulation for standard recipe of making lady fingers banana cake, (2) the variation of lady fingers banana cake had organoleptic quality in the rate of good in the aspect of volume, pore, aroma, texture, and taste, (3) the society liked the product of lady fingers banana flour from the aspect of volume, pore, texture and taste. Meanwhile, society shows that they quite liked the aroma of lady fingers banana cake.

1. Introduction
Food variation is one of the main requirements of the food consumption standard quality and nutrition. The effort of making variation of the food for society is not a new thing and it is very common. The society starts to be disinterested with the local ingredients such as corn, nuts, roots, and fruits especially banana. Meanwhile, the global ingredients such as noodle and bread are getting more famous. There are some factors which obstruct the consumption diversification of local ingredients, one of them is the use of wheat flour because it tastes better and is easier to be made in various way.

Indonesia is a country which has abundant of local ingredients [1]. Now a days, those local ingredients are replaced by the non-local ingredients (global ingredients) in the market. One of them is the tendency of people to have flour which is made of wheat. As it is known that the wheat flour is imported from abroad. This tendency makes Indonesian difficult to utilize the local ingredients maximally in order to make the local ingredients become more nutritious and valuable to be sold.

Indonesia is the third country which has mega diversity on its natural resources [2]. It makes Indonesia has big support on its continuity of food production, water, and other energy source. An importing activity, such as importing rice, wheat, fruits and even vegetables actually means the lack of efficiency in processing the natural resources in Indonesia. According to this situation, Indonesia local ingredients will be definitely decreasing and become extinct if they are not sustained by the society.
Among Indonesian tropical fruits, banana is a fruit which is widely consumed both fresh and processed. This is because banana contains high starch and has various nutrition as the source of calories, vitamins, and minerals as well as fibers which are good for digestions. Moreover, banana has a widemarketing distributions and is easy to be found anytime along the year. Unfortunately, banana belongs to ingredients which is easily rotten and has short shelf life. Thus, an invention of appropriate technology to process this fruit into a product which giving higher value and shelf life is needed.

As what is stated previously, in Indonesia, especially in Bali, there are many local ingredients that can be found such as banana. This horticultural plant is easily rotten because of its own physiology process. In order to increase the shelf life of the fruit, a diversification process is needed. One of them is by turning this fruit into flour. This diversification can also decrease the needs of wheat flour as well as the products which use rice as the main ingredients. Banana flour is one of the ways to preserve banana into processed food. The way to process it is also easy and can be applied by the society (citizens or villagers).

The benefits of processing banana into flour is it can make its shelf life longer and easier to be brought to other places as well as stored[3]. The utilization of banana flour in the food industry is various, such as it is used as the substitution of wheat flour in the baby’s food and cookies. This is because the banana flour contains good nutrition and is easily digested by digestion system. The widely used of banana flour makes this flour as one of the local ingredients which has high potential to be processed as innovative product. The types of the banana planted in Indonesia are the green banana, Saba banana, lady fingers banana, and many more. They are favorites among of the society.

One of them is lady finger banana. This banana grows up throughout the year. The characteristics of lady finger banana can be distinguished from its sweet and fragrant aroma. Besides lady fingers banana has many benefits for health, such as provides high minerals and vitamins. This kind of banana is easy to be found in both traditional and modern market. Another characteristic of this banana is its thin skin. This thin skin makes the fruit gets easily rotten and has a very short shelf life. To solve this problem, there should be a way to keep it longer by turning the fruit into flour. There is a need of making lady fingers banana into flour[4]. So that, there will be real action in creating innovation of finding alternative way to utilize the flour into product, such as banana cake.

2. Method
This research is an experimental research aiming at gaining innovative products with a certain quality of lady fingers banana flour cake. The steps of the research are: (a) doing experiment of making pound cake and sponge cake from lady fingers banana flour, (b) testing the quality of the lady fingers banana flour pound cake and lady fingers banana flour sponge cake, (c) testing the taste of the lady fingers banana flour pound cake and lady fingers banana flour sponge cake.

The first test of cake formula is 100% lady fingers banana flour, which referred to the standard of wheat flour used in making cake. The formula used was: 200 gr of wheat flour, 200 gr of sugar, 200 gr of butter, 4 eggs, 10 gr SP (cake emulsifier). If the cake in the first try did not meet the standard of good cake criteria in quality test, then the second test was conducted. On the second test, the formula of the lady fingers banana flour used was 75% of the standard used flour. Then the obtained data would be analyzed descriptively. If the second formula still did not meet the standard, then the third formula made was 50% of the lady fingers banana flour. At last, if the third formula did not meet the standard criteria of good cake, then the lady fingers banana flour was not worth to be used to make cakes.

The method used to obtain the data were observation method with quality test sheet (organoleptic test) and taste test sheet. The quality test sheet (organoleptic test) was used to obtain the data about the quality of each cake (pound cake and sponge cake) seen from its volume, pore, aroma, texture, and taste. Meanwhile, the taste test sheet was used to gain feedback or response from the society about lady fingers banana cake. The instruments are shown below.
Table 1. Quality Test Sheet of Lady Fingers Banana Cake.

| Quality Aspects | Score   |
|-----------------|---------|
|                 | 3       |
|                 | 2       |
|                 | 1       |
| Volume          | Expand maximally | Less expand | Doesn’t expand at all |
| Pore            | Tight   | Less tight | Hollow               |
| Aroma           | Typical lady fingers banana flour | Less typical lady fingers banana flour | Doesn’t has any typical lady fingers banana flour |
| Texture         | Soft    | Less soft | Hard                 |
| Taste           | Sweet   | Less sweet | not sweet at all     |

Note: 3 = good, 2 = less good, 1 = bad.

Table 2. Taste Test Sheet of Lady Fingers Banana Cake.

| Quality Aspects | Pound Cake Score | Sponge Cake Score |
|-----------------|------------------|-------------------|
|                 | 1    | 2    | 3    | 1    | 2    | 3    |
| Volume          |      |      |      |      |      |      |
| Pore            |      |      |      |      |      |      |
| Aroma           |      |      |      |      |      |      |
| Texture         |      |      |      |      |      |      |
| Taste           |      |      |      |      |      |      |

Note: 3 = like, 2 = quite like, 1 = dislike

Then, the quality of the lady fingers banana flour pound cake and sponge cake were analyzed from the volume, pore, texture, aroma, and taste aspects. After that, the taste test of the product was conducted by 15 people taken from the society. The obtained data was further analyzed using the formula below.

\[ \bar{X} = \frac{\sum X}{N} \]

Note:

\[ \bar{X} \]  = Mean

\[ \sum X \]  = total obtained score

\[ N \]  = total sample

3. Findings and Discussion

3.1. The Exact Formulation of Lady Fingers Banana Flour Cake

The first experiment using 100% lady fingers banana flour (as the general standard of making cake in the recipe) was done to make 2 types of cake. Those were pound cake and sponge cake. The result showed that this first experiment was not able to produce both pound cake and sponge cake that suits the good criteria of cake. Then it was followed by the second experiment with composition of 75% lady fingers banana flour to make pound cake and sponge cake. Fortunately, the third experiment with 50% composition of lady fingers banana flour was not done because the second experiment with 75% composition of lady fingers banana flour, and it met the requirement of good cake criteria.

Here are the exact formula of lady fingers banana flour pound cake and lady fingers banana flour sponge cake which can be used as the standard recipe of each cake type.

1. Standard recipe of pound cake:
a. Ingredients:
   150 gr lady fingers banana flour
   200 gr sugar
   200 gr butter
   4 eggs
   5 gr SP (cake emulsifier)
   50 gr almond

b. Steps:
   1) Preparing the ingredients
   2) Preparing the equipment
   3) Mixing the butter and sugar for about 20 minutes until it turns white
   4) Add the eggs one by one and SP into the butter-sugar dough while the dough is continuously mixed for about 30 minutes until it expands and turns into white
   5) Add the sieved lady fingers banana flour little by little into the dough, mix it until well-mixed
   6) Put the dough into the baking sheet which is already smeared by butter
   7) Bake the dough for about 30 minutes (or until it is well-done)

2. Standard recipe of sponge cake:
   a. Ingredients
      150 gr lady fingers banana flour
      200 gr sugar
      200 gr butter
      4 eggs
      5 gr SP (cake emulsifier)
   b. Steps:
      1) Preparing the ingredients
      2) Preparing the equipment
      3) Mixing the eggs and sugar for about 20 minutes until it turns white
      4) Add the sieved lady fingers banana flour little by little into the dough, mix it until well-mixed
      5) Add the butter (which is already melted) into the dough
      6) Put the dough into the baking sheet which is already smeared by butter
      7) Bake the dough for about 30 minutes (or until it is well-done)

3.2. The Quality Test (Organoleptic Test) Lady Fingers Banana Flour
This quality test involved some expert panelists from UNDIKSHA culinary lecturers and the researcher team who is also lecturers of the same field. The panelists were asked to do quality test of the lady fingers banana flour pound cake and lady fingers banana flour sponge cake from each experiment (100% lady fingers banana flour and 75% lady fingers banana flour) by filling the given quality test sheet. The scoring system was according to the rubric of quality test. The test was about the volume, pore, aroma, texture, and taste of each lady fingers banana flour cake.

3.3. The Quality Test (Organoleptic Test) Lady Fingers Banana Flour (100%)
Based on the description of quality test that has been explained, it can be stated that the two products of lady fingers banana flour cake (pound cake and sponge cake) seen from its volume, had quality with the mean score 1.1 which is described as having bad volume which was not expanded well. The next was seen from the pore aspect. The mean score was 2 for both of the lady fingers banana flour pound cake and lady fingers banana flour sponge cake which means that the cakes had less tight pore which was not good enough for a cake. The next was seen from the aroma aspect. From this aspect the mean score was
3 which means that both cakes have a typical lady fingers banana flour aroma. About the texture aspect, both cakes had quality score in 1.3 which was hard and not so good for both types of cake. Lastly, from the taste of both cakes, the mean score was 3, described the two cakes had sweet taste.

![Figure 1. Lady fingers banana flour pound cake (100%).](image1)

![Figure 2. Lady fingers banana flour sponge cake (100%).](image2)

### 3.4. The Quality Test (Organoleptic Test) Lady Fingers Banana Flour (75%)

Based on the recapitulation of quality test result, both pound cake and sponge cake with 75% lady fingers banana flour had a great score in the quality of volume which was 3, and can be described as having good volume that the dough expanded well. Both cakes also showed good quality of pore by having 2.9 as the mean score of the pore aspect. From the aroma aspects, the mean score was 3 which means both of lady fingers banana flour cakes had typical lady fingers banana aroma. Seen from texture aspect, lady fingers banana flour pound cake and lady fingers banana flour sponge cake were shown to have tight texture as it is the criteria of good texture of each type of cake. The texture mean score was 2.9. Lastly about the taste aspect, as the same as the first experimental cakes, the mean score of taste aspect was 3, which means that the taste of both cakes were sweet.

Based on the quality test of the two cakes which was done descriptively, it can be stated that the formulation of 75% lady fingers banana flour can make a good quality of cake. It can be seen from the result of the volume, pore, aroma, texture, and taste which belong to good category of cake.

![Figure 3. Lady fingers banana flour pound cake (75%).](image3)

![Figure 4. Lady fingers banana flour sponge cake (75%).](image4)

A good cake volume can be seen from the maximum or perfect expansion of the dough. The volume can be used as the parameter of the organoleptic test observed by using the sight sense (Triyono, 2010). The empirical result showed that the cakes with 75% lady fingers banana flour had better expansion rather than those which made of 100% lady fingers banana flour. It is because based on the nutrition analysis, lady fingers banana flour has higher starch containment than the wheat flour [5]. It makes the lady fingers banana flour has heavier characteristic of flour rather than the wheat flour so that the dough would harder to expand.

About the pore, a tight pore is the best pore of good quality cake [3]. There should be a cut in the
middle of the cake to see the pore accurately. The empirical result showed that the cake made of 75% composition of lady fingers banana flour produced better pore than the one with 100% composition, which had some whole in some parts of the cake.

The other aspect of the quality is aroma. Aroma is one of the parameters used in organoleptic test which can be observed by using sense of smell. Aroma is also the component of food flavor which can be observed if there is specific smell of the food. The smell comes from the food which is evaporated to the air. In the food industry, aroma testing is important to be done in order to examine a product whether the product is worth it or not in a short way. In the case of examining with sense, aroma is more complex rather than taste. Besides, aroma can be an indicator of a decreasing in food’s quality. In this research, the aroma of both cakes shows that the use of lady fingers banana flour in making cake produced a very typical aroma of lady fingers banana flour. This aroma gave different sensation of enjoying cake. However, the cake’s aroma of 100% composition of lady fingers banana flour was stronger than 75% composition of lady fingers banana flour cake. This was because the more lady fingers banana flour used in the dough, the stronger aroma produced by the cake.

The next aspect is about cake’s texture. Texture is one of the parameters of organoleptic test which is observed by the sense of touch. In this research, the empirical result of texture aspect showed that the cake with 100% composition of lady fingers banana flour had harder texture than the one with 75% composition of lady fingers banana flour. It was because the characteristic of lady fingers banana flour is heavier than the wheat flour. Thus, the more lady fingers banana flour used in making the cake, the harder texture of the cake would be.

The last aspect analyzed in this research deals with the taste of the cake. Taste is still the part of the parameters in examining the quality of cake. This is the sense’s response of the nerve stimulation such as sweet, bitter, sour, salty and savory as well as the response of the food temperature (cool or hot). The result showed that both cakes with 100% and 75% lady fingers banana flour formulation produced good taste of each types of cake which belongs to good cake criteria.

3.5 Society Responses toward The Product (Pound Cake and Sponge Cake)
After the quality test of both lady fingers banana flour pound cake and lady fingers banana flour sponge cake, the next step of the research was to do the taste test from the society. This test was done to see the feedback and response toward the pound cake and sponge cake which were made using the standard recipe of 75% composition of lady fingers banana flour. The result of the test showed that the society like the two products made of lady fingers banana flour seen from the volume, pore, texture and taste. On the other hand, the society did not really like the aroma of both cakes because the cakes smelled a little sour.

According to the description of the taste test from both cakes, it can be concluded that the society like the product made of lady fingers banana flour based on the volume, pore, texture, and taste.

4. Conclusion
Based on the findings and discussion, it can be concluded that:

1) The result of the lady fingers banana flour cakes’ quality test showed that the use of 75% flour composition creates good quality cakes (pound cake and sponge cake). Thus, it can be used as a standard recipe of lady fingers banana flour cake with formulation: 150 gr lady fingers banana flour, 200 gr sugar, 200 gr butter, 4 eggs, and 5 gr SP (cake emulsifier).

2) From the result of lady fingers banana flour cakes’ quality test, it can be stated that the volume aspect mean score was 3 which belongs to good category by having good quality of dough expansion. From the pore aspect, the mean score was 2.9 which belongs to good category by having tight pore. From the aroma aspect, the mean score was 3 which belongs to good category by having typical lady fingers banana flour aroma. The next is from texture aspect. The mean score was 2.9 which also belongs to good category of texture by having soft texture. The last aspect, taste aspect gained maximum in the mean score (3.0) by having sweet taste which is very good for the certain types of cake.
3) The result of taste test for the society showed that majority of the society liked the products made of the lady fingers banana flour seen from the volume, pore, texture, and taste. Yet, from the aroma aspect, the society did not really like the cake which has a little sour aroma.

The cake with 75% lady fingers banana flour composition is preferred by the society based on its volume, pore, texture, and taste aspects. Yet, the society seems to have less interest on its aroma. The society did not really like the sour aroma produced by the lady fingers banana flour cakes. Thus, it can be suggested to make the lady fingers banana flour using good quality of banana with perfect ripeness level (not the young banana). Besides, other researches to investigate the shelf life of the cake can be done in the future to increase the shelf life of the product.

5. References
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