# Proximate and Antioxidant Analysis of Steamed Cake Made from Flour of Green Bean Sprout (Vigna radiata) and Ambon Banana Peel (Musa paradisiaca var. sapientum (L.) Kunt.) as Main Ingredients

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# Proximate and Antioxidant Analysis of Steamed Cake Made from Flour of Green Bean Sprout (*Vigna radiata*) and Ambon Banana Peel (*Musa paradisiaca* var. sapientum (L.) Kunt.) as Main Ingredients.

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**Abstract:** Steamed cake is a type of cake that is enjoyed by all ages, both children and adults. This cake is usually made from wheat flour. Wheat flour causes dough to rise due to the gluten content. The use of excessive flour can be harmful to health. One alternative effort to replace wheat flour is to combine green bean sprout flour and Ambon banana peel flour. This study aims to determine the antioxidant level in green bean sprout flour and banana peel flour, to determine the protein, fat, water, ash, and carbohydrate levels in steamed cakes made from green bean sprout flour and Ambon banana peel flour. This type of research is experimental. Antioxidants were analyzed using the DPPH method, protein was analyzed using the Kjeldahl method, and fat was analyzed using the Soxhlet method. The research results showed that the antioxidant activity in green bean sprout flour was 360.30 ppm which was classified as very weak, banana peel flour was 165.58 ppm which was classified as weak. The highest protein content was in sample T0 at 7.01%, the highest fat content was in sample T0 at 0.77%, the highest water content was in sample T2 at 43.95%, the highest ash content was in sample T3 at 1.15%, and the highest carbohydrate content was in sample T0 at 53.44%.

**Keywords: Ambon Banana Peel, Antioxidant, Flour, Green Bean Sprout, Proximate, Steamed Cake**

**Abstrak:** Bolu kukus adalah salah satu jenis kue yang disukai semua kalangan baik anak-anak maupun orang dewasa. Bolu ini umumnya berbahan dasar dari tepung terigu. Tepung terigu menyebabkan adonan mengembang yang disebabkan kandungan gluten. Penggunaan tepung berlebihan dapat mengganggu kesehatan. Salah satu upaya alternatif pengganti tepung terigu yang dapat digunakan yaitu mengombinasikan tepung kecambah kacang hijau dan tepung kulit pisang ambon. Penelitian ini bertujuan mengetahui uji kadar antioksidan pada tepung kecambah kacang hijau dan tepung kulit pisang, mengetahui kadar protein, kadar lemak, kadar air, kadar abu, dan karbohidrat pada bolu kukus dari tepung kecambah kacang hijau dan tepung kulit pisang ambon. Jenis penelitian ini adalah eksperimental. Antioksidan dianalisis dengan metode DPPH, protein dianalisis dengan metode kjeldhal, lemak dianalisis dengan metode soxhlet. Hasil penelitian menunjukkan aktivitas antioksidan pada tepung kecambah kacang hijau yaitu 360,30 ppm tergolong sangat lemah, tepung kulit pisang ambon yaitu 165,58 ppm tergolong lemah. Kandungan protein paling tinggi ada di sampel T0 sebesar 7,01%, kandungan lemak paling tinggi ada di sampel T0 yaitu 0,77%, kandungan air paling tinggi ada di sampel T2 yaitu 43,95%, kandungan abu paling tinggi ada di sampel T3 1,15%, dan karbohidrat paling tinggi ada di sampel T0 yaitu 53,44%.

**Kata kunci:** Antioksidan, Bolu Kukus, Proksimat, Tepung, Kecambah Kacang Hijau, Kulit Pisang Ambon

## INTRODUCTION

Steamed cake is a type of cake that is enjoyed by all ages, both children and adults (Sari and Eka., 2019). This cake is usually made from wheat flour. Wheat flour causes dough to rise due to the gluten content. The use of excessive flour can be harmful to health. The high glycemic content increases blood sugar levels (Yanti et al., 2019).

Efforts to improve the quality of steamed cake can be seen from the quality of flour as the main ingredient, including antioxidant content. Antioxidants function to prevent oxidation or release oxidized compounds, by contributing hydrogen atoms or electrons (Sinaga, 2016). Natural materials that are expected to be antioxidant sources are green bean sprouts and Ambon banana peels.

Green bean sprouts contain vitamin C, vitamin A, vitamin E, vitamin K, riboflavin, niacin, thiamin, pantothenic acid, vitamin B6, folate, choline, β-carotene. Essential amino acids found in green bean sprouts include tryptophan, methionine, threonine, leucine, isoleucine, phenylalanine, lysine, and valine. The mineral content includes calcium (Ca), iron (Fe), phosphorus (P), magnesium (Mg), sodium (Na), copper (Cu), potassium (K), manganese (Mn), selenium (Se) and zinc (Zn) (Fanzurna and Taufik 2020).

The banana peel has high nutritional value, particularly vitamins and minerals, so it can be used as a flour ingredient. The content of Ambon banana peel is fiber and antioxidant. Antioxidant compounds in Ambon banana peel are catechins, gallocatechins, and epicatechins and are classified as flavonoids. Based on previous research, it is known that Ambon banana peel has a relatively high antioxidant activity compared to the fruit flesh. The antioxidant activity of Ambon banana peel reaches 92.25% at a concentration of 125.00 mg/ml while in the fruit flesh only 70.00% at a concentration of 50.00 mg/ml (Cahyani at al., 2019).

The purpose of this study is to determine the antioxidant level test on flour of green bean sprouts and flour of banana peel, determine the protein level, fat level, water level, ash level and carbohydrate level in steamed cake from flour of green bean sprouts and flour of Ambon banana peel.

## METHOD

This research was conducted in July at the Laboratory of Biology II, Department of Biology, Faculty of Mathematics and Natural Sciences (MIPA), University of Lampung. The type of research is experimental. This research uses a Completely Randomized Design (CRD) with 4 different treatment variations, namely:

Table 1 Formulation for Making Steamed Cake

| Bahan | Quantity Concentration | | | |
|---|---|---|---|---|
| | 100% | 80% | 60% | 40% |
| Wheat Flour (g) | 250 | 200 | 150 | 100 |
| Green Bean Sprout Flour (g) | 0 | 25 | 50 | 75 |
| Ambon Banana Skin Flour (g) | 0 | 25 | 50 | 75 |

| | | | | |
|---|---|---|---|---|
| Granulated Sugar (g) | 220 | 220 | 220 | 220 |
| Chicken Egg (pieces) | 2 | 2 | 2 | 2 |
| SP (tsp) | 1 | 1 | 1 | 1 |
| Powdered Milk (mL) | 150 | 150 | 150 | 150 |

**The Making of Green Bean Sprout Flour**

500 grams of green beans are soaked in 500 ml of water for 12 hours. Then they are drained and rinsed again with clean water, and then spread out in a container with holes lined with cotton or cloth and covered with a damp cloth. The green beans are sprayed with water using a hand sprayer every 6 hours. The sprouts that are produced are drained first and then sun-dried for 5 days, and then dried in an oven at a temperature of ±40°C until a certain degree of dryness is achieved. The dried sprouts are then peeled, ground and sieved into flour (Dirga, 2018).

**The Making of Banana Peel Flour**

Wash the Ambon bananas. After washing the fruit, steam it and remove the banana peel. Before drying, the banana peels are sun-dried for a week to reduce the moisture content and prevent sticking to the grinder. Then, drying is done for 1.5 hours at a temperature of ±40°C. After drying, it is ground using a grinder and sieved into flour (Cahyani at al., 2019).

**Making Steamed Cake**

The procedure for making steamed cake is to heat the steamer with medium heat. Add 220 g of granulated sugar, 2 eggs, and 1 tsp of baking powder into the mixer, then mix at high speed until it becomes white and thick. Reduce the mixer speed, add wheat flour, sprouted green bean flour, and Ambon banana peel flour according to the concentration, then add 150 ml of milk powder. After that, mix at high speed until the dough is evenly mixed. Pour the dough into a steamed cake mold that has been lined with paper cups until it is full. Steam at 100°C for 20 minutes.

**Extracting Flour**

330 g of sprouted green bean flour is macerated with 96% ethanol solvent. Then, the crude is divided into three sample parts, 110 g each. Next, the crude is dissolved in ethanol in the Erlenmayer tube. Then, the mixture is stirred until it is evenly mixed and closed tightly and wrapped in black plastic, then left for 72 hours. Every 24 hours, stirring is done at a speed of 50 rpm for 15 minutes. After 72 hours, the mixture is filtered. Then, it is immersed again for 24 hours, filtered again and then concentrated with rotary vacuum evaporator at 50°C. And evaporated using waterbath until a thick extract is obtained (Maulida, 2017). Then, the same steps are taken to make the extraction of Ambon banana peel flour.

**Anti-Oxidant Test**

2 mL of test flour solution of kecambah with concentrations (25, 50, 75, 100 and 125 mg/L) were added with 1 mL of 1,1-diphenyl-2-picrylhydrazyl (DPPH) solution and 0.8 mL of tris HCl buffer, and vortexed for 2 minutes. Then, the absorbance was measured during the last 5 minutes out of 30 minutes incubation using a spectrophotometer with a wavelength of 517 nm (Wulan et al., 2019). The anti-oxidant level was determined using the following equation:

Inhibition(%)=(Abs. Control-Abs. Sample)/(Abs. Control) x 100%

The parameter used is $IC_{50}$. $IC_{50}$ is the concentration needed to reduce DPPH by 50%, and it is calculated using linear regression equation. Sample concentration as the x-axis and % inhibition as the y-axis. The smaller the $IC_{50}$, the stronger the anti-oxidant level (Wulan et al., 2019). Using the equation y = a + bx, $IC_{50}$ is calculated using the formula: (Rahman et al., 2016)

$$y = a + bx$$
$$50 = a + bx$$
$$(x)\ IC_{50} = \frac{50-a}{b}$$

**Uji Proximate on Steamed Cake**

**Protein Content Test**

*Destruction Stage*

Weigh 2 g of steamed cake and grind it. The fine sample is put into a Kjeldahl flask, and a boiling stone is added. Then add 5 g $K_2SO_4$, 200 mg $CuSO_4$ and 30 ml of concentrated $H_2SO_4$ to the flask. All the materials in the flask are heated in an acid cabinet, first with a small fire, and after the smoke disappears, the fire is heated. The heating is ended until a clear green liquid is obtained. Then cooled, and then add aquades to a total volume of 150 ml. Then add 50% NaOH slowly until the liquid is basic (Purnama et al., 2019).

*Distillation Stage*

Immediately attach the Kjeldahl flask to the distillation apparatus. Then perform the distillation quickly until the ammonia is completely evaporated. The distillate is collected in an Erlenmeyer flask that has been added with 50 ml of 0.1 N HCl and 3 drops of phenolphthalein indicator 1%. Make sure the glass pipe of the distillator enters into the 0.1 N HCl solution. The distillate is ended with a drop of distillate that does not react to base (Purnama et al., 2019).

*Titration Stage*

The distillate obtained is titrated with a standard NaOH (0.1 N). The end of titration is marked by a change in color of the solution to light red (Muthe, 2016).

*Calculation*

Determining protein content is calculated using the following formula: (Sumantri., 2018)

$$\frac{\text{v NaOH blanko} - \text{VNaOHsampel}}{\text{berat sampel}} \text{ x N NaOH x 14,008 x 100\% x fk}$$

% protein = % N x Faktor Konversi.

**The Test for Lipid Content Using The Soxhlet Method:**

Weigh 1 g of steamed cake, put it into a paper thimble that has been lined with cotton. Then stuff the paper thimble containing the sample with cotton, dry it in an oven at a temperature of ± 80°C for 1 hour. After that, put it into a Soxhlet apparatus that has been connected to a flask containing dried boiling stones and known weight. Extract with hexane solvent for 6 hours. Then the solvent is distilled. Dry the lipid extract in an oven at a temperature of 105°C. Then cool it in a desiccator and weigh (Angelia, 2016).

Lipid content (%)= $\frac{W - W1}{W2}$ x 100%

W = Sample weight (g)

W1 = Lipid weight before extraction (g)

W2 = Lipid weight after extraction (g)

**The Test for Water Content**

Porcelain cups are dried in an oven at a temperature of ±105°C for 15 minutes. Then cooled in a desiccator for 15 minutes and weighed. 5 g of steamed cake sample is put into a porcelain cup then dried in an oven at a temperature of ±105°C for 6 hours. Then put it into a desiccator for 30 minutes and then weighed (Sakul et al., 2019). Water content calculation:

Water content = = $\frac{\textit{Berat Awal Sampel} - \textit{Berat Akhir Sampel}}{\textit{Berat Awal Sampel}}$ x 100%

**The Ash Content Test**

A clean porcelain dish is heated in a furnace at a temperature of ± 400°C for 1 hour, then cooled in a desicator for 1 hour and weighed. 5 g of the cake sample is placed in a porcelain dish and then placed in a furnace at a temperature of ±550°C for 1 hour. After that, it is cooled in a desicator and weighed (Angelia, 2016).

Calculation of Ash Content:

Ash Content (%) = = $\frac{Berat\ Abu}{Berat\ Sampel}$ x 100%

**Test for Carbohydrate Content**

The carbohydrate content is calculated by determining the difference between the amounts of water, protein, fat, and ash content (Sakul et al., 2019). The formula is as follows: % Carbohydrates = 100% - % (Protein + fat + ash + water)

## RESULTS AND DISCUSSION

**Antioxidant in Flour**

The antioxidant test in this research used the DPPH method with UV-Vis spectrophotometry at a wavelength of 517 nm. The results of the antioxidant test can be seen in the table as follows.

**Table 2 Results of Antioxidant Testing**

| The sample | Consentration (ppm) | Average Absorbance | %Inhibition | Linear Equation | $IC_{50}$ Value |
|---|---|---|---|---|---|
| Ethanol extracts of green bean sprout flour | 25 | 0,254 | 53,82 | y = -0,0091x +53,286 $R^2$ = 0,0207 | 360,30 ppm |
| | 50 | 0,255 | 53,64 | | |
| | 75 | 0,282 | 48,55 | | |
| | 100 | 0,247 | 55 | | |
| | 125 | 0,264 | 52 | | |
| Ethanol extracts of ambon banana peel flour | 25 | 0,242 | 56 | y = -0,0255x +54,219 $R^2$ = 0,0221 | 165,58 ppm |
| | 50 | 0,298 | 45,82 | | |
| | 75 | 0,213 | 61,27 | | |
| | 100 | 0,300 | 45,45 | | |
| | 125 | 0,258 | 53 | | |

Table 2 shows that the green bean sprout flour sample obtained and $IC_{50}$ value of 360.30 ppm and the Ambon banana skin flour obtained an $IC_{50}$ value of 165.58 ppm. The calculation results of the $IC_{50}$ value of green bean sprout flour are categorized as Very Weak because it obtained a value of 360.30 ppm. The Ambon banana skin flour obtained a value of 165.58 and is categorized as a weak antioxidant. The higher the% inhibition value of a material, the stronger the inhibitory ability of the material against free radicals but inversely proportional to the $IC_{50}$ value.

The weakness of antioxidants in flour may be influenced by the drying and sun-drying time of green bean sprouts which is too long. In Ambon banana skin, it is influenced by the thickness during the process of taking the inner skin and heating during the boiling process. During boiling, tissue integration occurs in food materials causing direct substrate contact, leading to the extraction of antioxidant activity and oxidation reactions (Cahyani at al., 2019).

**Proximate Analysis**

Proximate analysis of steamed cake includes: protein, fat, moisture content, ash content, and carbohydrates. The results of the analysis can be seen in the following table.

**Table 3** The results of the proximate analysis of steamed cake

| Parameter | Test Results | | | | SNI Requirements |
|---|---|---|---|---|---|
| | TO | T1 | T2 | T3 | |
| Protein (%) | 7,01 | 6,40 | 6,26 | 6,98 | Minimum 9% |
| Fat (%) | 0,77 | 0,27 | 0,21 | 0,45 | Minimum 9,5 % |
| Water Content (%) | 38,27 | 42,96 | 43,95 | 41,10 | Maximum 5% |
| Ash Content (%) | 0,51 | 0,85 | 0,99 | 1,15 | Maximum l 1,5% |
| Carbohydratea (%) | 53,44 | 49,52 | 48,59 | 50,32 | Minimum 70% |

Table 3 presents proximate analysis data. The table shows the test results of various parameters of the product against the SNI (Indonesian National Standard) requirements. Each column represents the results of each formula (TO, T1, T2, T3). It can be seen that the protein content is below the minimum requirements of 9%, the fat content is below the minimum of 9.5%, the water content is above the maximum of 5%, the ash content is above the maximum of 1.5%, and the carbohydrate content is below the minimum of 70%.

The protein content in formula T0 is 7.01%, while T1 is 6.40%. In T2, the protein content is 6.26% and T3 is 6.98%. The lowest protein content is in formula T3. The protein content in green bean sprout flour (per 100g) is 28.50%. Germination for 48 hours is able to increase protein content in flour. Germination for 48 hours has the most optimal germination time, giving the production of phenolic compounds and tocopherols (Dirga, 2018). In banana skin flour itself, it causes a decrease in protein content. This is because banana skin flour has a low protein content, banana skin flour has a protein content of 4.40% (Lestari, 2018).

Fat content in this study uses the Soxhlet method. The lowest fat content is in formula T2 at 0.21%. The fat content is in the control formula at 0.77%. In formulas T1 and T3, fat content is obtained at 0.27% and 0.45%. The fat content in green bean sprout flour is 11.33%. This decrease in fat content is caused by the germination process, fat is a food reserve used as an energy source. Ambon banana skin flour has a fat content of 1.38% lower than green bean sprout flour (Rachim, 2020).

The highest moisture content is in formula T3 and the lowest is in the control formula T0. Ambon bananas contain high moisture, so Ambon banana skin also has high moisture content. In steamed cakes with Ambon banana skin, it has a rough texture. Coarse fibers have strong water absorption capabilities because they have large polymer sizes and hydroxyl groups that can bind large amounts of water. The water absorbed by coarse fibers is a type of bound water, but the water evaporated from the fermentation process is free water (Paramita et al., 2020).

The ash content in this study does not exceed 4% of the total weight of food. Ash content indicates the mineral content in a food. The ash content of a material is influenced

by technical factors during planting, such as the intensity of fertilization, soil type and climate. Fertile soil contains many minerals, which increases the mineral content of Ambon banana skin. The greater the ash content of a material, the greater the mineral content in a food (Proverawati et al., 2019).

The highest carbohydrate content is in formula T0 as a control. The carbohydrate content in Ambon banana skin flour is 25.09%. The main function of carbohydrates itself is as one of the main sources of body energy. While in Ambon banana skin flour has a carbohydrate content of 46.41%. The carbohydrate content of legumes is usually between 24%-68%. The decrease in carbohydrate content is possibly caused by carbohydrates used as an energy source during germination (Rachim, 2020).

## CONCLUSION

The antioxidant activity in green bean sprout flour is 360.30 ppm, which is considered very weak. The antioxidant activity in Ambon banana skin flour is 165.58 ppm, which is considered weak. The highest protein content is in sample T0, at 7.01%. The highest fat content is in sample T0, at 0.77%. The highest water content is in sample T2, at 43.95%. The highest ash content is in sample T3, at 1.15%. The highest carbohydrate content is in sample T0, at 53.44%.

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