RUMPHIUS PATTIMURA BIOLOGICAL JOURNAL
2020, 2 (1): 19-24
E-ISSN : 2684-804X

NUTRITION OF LUMUT BANANA *(Musa Acuminate* Colla) AMBON PEEL AT SEVERAL LEVEL OF FRUIT MATURITY

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Received: 19 January 2020 Accepted: 21 March 2020 Published: 25 March 2020

ABSTRACT

Banana peel is a waste from processed ripe bananas such as making various types of cakes from banana flesh, while unripe banana peels are waste from unripe bananas whose flesh is made into chips and contains a lot of latex when compared to ripe and overripe banana peels. This may affect the nutritional content in the two banana peels, because the maturity level of the banana peel affects the nutrient content in the peel. Based on this, this research needs to be carried out with the aim of knowing the nutritional content of raw, ripe and overripe Ambon Moss banana peels (*Musa accuminata colla*) in Ambon City, Maluku Province. The method used in this study is descriptive quantitative, namely to determine the analysis of the nutritional value of carbohydrates, protein, fat, and calcium in raw and ripe Ambon Moss Banana (*Musa accuminata colla*) peels in Ambon City, Maluku Province. The results that have been obtained are that the raw Ambon banana peel has an average carbohydrate content of 4.02%, a fat content of 0.85% and a protein content of 0.31%. Ripe Ambon banana skin has an average carbohydrate content of 4.11%, fat content of 1.19% and protein content of 0.31%. Meanwhile, in the overripe Ambon banana peel, the average carbohydrate content was 3.96%, the fat content was 1.68% and the protein content was 0.64%.

Keywords: *nutrition, peel, banana, maturity*

To cite this article:
Maitimu, M., Wakano, D., Sahertian, D. 2020. Nutrition of lumut banana *(Musa acuminate* Colla) Ambon peel at several level of fruit maturity. *Rumphius Pattimura Biological Journal*. 2 (1): 19-24. DOI https://doi.org/10.30598/rumphiusv2i1p019-024

INTRODUCTION

Indonesia is the 4th banana producing country in the world (Wijaya, 2013). Banana production in Indonesia up to 2009 was 512.27 tons/ha (Purba, 2004). Particularly in Maluku, the production of bananas up to 2009 was 6.69 tonnes/ha (Maluku in Figures, 2009). Therefore it can be said that bananas are plants that are widely cultivated in Indonesia, including in Maluku. Generally, people want bananas that taste sweet and smell good, one of which is the Ambon banana (Astawan, 2008). Moss Ambon banana is an Ambon banana with the Latin name Musa accuminata cola with green fruit skin even though it is ripe, the flesh is whiter than other types of Ambon banana, tastes better and smells good (Kaleka, 2013). In addition to the fruit flesh that is consumed and contains high nutrition, it turns out that banana peels also contain nutrients and can be utilized. Banana peel is a waste material (banana fruit waste) which is quite a lot. In general, banana peels have not been put to real use, only thrown away as organic waste or used as fodder for livestock such as goats, cows and buffalo. A large

number of banana peels will have a profitable selling value if they can be used as food raw materials (Susanti, 2006).

Ripe banana peel is a waste product from processed ripe bananas such as making various types of cakes from banana flesh, while unripe banana peel is a waste product from unripe bananas whose flesh is made into chips, and contains a lot of sap when compared to ripe banana peels. This may also affect the nutritional content in the two banana peels. Tartrakoon et al. (1999) stated that the maturity level of the banana peel affects the nutrient content in the peel. Based on this description, this research needs to be carried out with the aim of knowing the nutritional content of raw and ripe ambon moss banana peels (Musa accuminata colla) in Ambon City, Maluku Province.

Figure 1. Ambon Lumut Bananas (*Musa accuminata colla*)

METHOD

This study used a completely randomized design (CRD) with three treatment levels of fruit maturity. Each treatment level was repeated three times. The first level of fruit maturity is for the category of unripe, ripe and overripe (Caussiol, 2001).

Sample preparation

The skin of the Ambon Lumut banana (Musa accuminata colla) in this study came from 3 locations, namely the Ambon mardika fruit market, the Passo transit fruit market, and the Batu Koneng Poka fruit market. The banana peel is taken 100 grams cut into small pieces, then dried using an oven at 60 0C for 6 hours. The procedure for analyzing banana peel protein is as follows (AOAC, 1999): A total of 0.51 gram sample of Ambon moss banana (Musa accuminata colla) in dry form was put into the Kjeldahl flask and added 2 g of a mixture of selenium and 25 ml of concentrated H_2SO_4. Destruct (heat) all the ingredients in the Kjeldahl flask over an electric heater or burner until it boils and the solution becomes clear greenish (about 2 hours). Diluted with 25 ml of distilled water and cooled to room temperature. 15 ml of the solution was put into the distiller and then added 15 ml of 30% NaOH and a few drops of phenolphthalein indicator. Distillation for about 10 minutes. The steam is collected in an Erlenmeyer containing 2% boric acid which has been mixed with indicator. The distillate obtained was titrated with 0.01 N HCl. The end point of the titration was marked by a change in color from blue to pink. Blank determination is also carried out.

$$Protein = \frac{(V1 - V2) \times N \times 0{,}014 \times fk \times fp}{W}$$

V1 = volume HCl 0,01 N (sample)
V2 = volume HCl (blanco)
N = normality HCl
fk friuts= 6,25
fp = factor dilution
W = snippet weight

Determination of fat content

Analysis of fat content using the Soxhlet method according to Sudarmadji et al., (1989). A total of 2 grams of sample was wrapped in filter paper, then covered with fat-free cotton wool, the sample was dried in an oven at a temperature of not more than 80oC for approximately one hour. Then the filter paper containing the sample is put into the Soxhlet extraction apparatus, then a condenser is installed above it and the fat flask containing dried boiling stones is below it. The hexane solvent is poured into the fat flask according to the size used. Further reflux is carried out for a minimum of 6 hours until the solvent that drops back into the fat flask is clear in color. The solvent in the fat flask is distilled and collected. The fat flask containing the extraction results was heated in an oven at 105°C then cooled in a desiccator and weighed until a constant weight was obtained.

$$\% \text{ fatty} = \frac{\text{Fatty extract} - \text{after extract}}{\text{Sample weight}}$$

Determination of carbohydrate levels

A total of 5 grams of banana peel sample tongkolangit (Musa troglodytarum L.) in dry form was dissolved in 200 ml of 3% HCl and then boiled for 3 hours. Then cooled and neutralized with 30% NaOH solution and added a little 3% CH_3COOH so that the atmosphere of the solution is slightly acidic. Everything was transferred to a 500 ml volumetric flask and 25 ml of Luff-Schoorl solution, a few boiling stones and 15 ml of distilled water were added. Then the mixture was heated for 10 minutes. After cooling, add 15 ml of 20% KI solution and 25 ml of 25% H2SO4 slowly. Titrate immediately with 0.1 N thiosulphate solution which is marked by a light yellow color change, then 3 drops of starch indicator are added and the titration is continued until the end point is marked by a color change from blue-black to colorless. This procedure also applies to blanks by replacing the sample with distilled water. The procedure for analyzing banana peel carbohydrates according to the International Starch Institute (2002) is as follows:

$$\text{glucose levels} = \frac{W1 \times fp}{W} \times 100\%$$

DISCUSSION RESULT

The results of nutrition ripe and overripe Ambon banana peels can be seen in Table 1.

Table 1. Results of testing the nutritional value of Ambon banana peels

Parameter	Nutrition (%)		
	Raw	**Ripe**	**over ripe**
Carbohydrate	4,02	4,11	3,96
Fat	0,85	1,19	1,68
Proteins	0,31	0,31	0,64

Results of nutritional value of Ambon banana peels at different maturity levels showed that the carbohydrate content in ripe Ambon banana peels was higher (4.11%) when compared to the carbohydrate content in raw Ambon banana peels (4.02%) and overripe (3.96%). Fat and protein levels in ripe Ambon banana peels were higher (1.68% and 0.64) when compared to raw (0.85% and 0.31%) and ripe (0.31% and 0.31%) Ambon banana peels. 0.31%). This shows that the level of maturity affects the nutritional content of Ambon moss banana peels, the more ripe the Ambon moss bananas, the nutritional value also changes. Changes will continue to occur during the cooking process. As according to Sumadi et al. (2004) that increased respiratory activity in climacteric fruit is a physiological activity that occurs during the ripening process of bananas. Further added by Morris et al., (2004), the nutrient content in plants is influenced by plant genetics, soil conditions where it grows, climate, fruit physiological conditions, harvesting process (method of packing, storage conditions and processing methods).

This research when compared with several previous studies there are differences. As Munadjim's research (1998), obtained 69.8% water, 18.5% carbohydrates, 2.11% fat, protein 0.32%, calcium 715 mg/100g, phosphorus 117 mg/100g, iron 1.6 mg/100g, vitamin B 0.12 mg/100g, vitamin C 17.5 mg/100g. Furthermore Gunawan research (2013), the nutritional content of Ambon banana peel is 0.90% protein, 1.70% crude lipid, 59% carbohydrates, and 31.70% crude fiber. According to Santoso (2011) that the starch content of banana peels depends on the variety of banana fruit. The resistant starch content of plantains was 30.66%, horn bananas 29.60%, ambon bananas 29.37%, yellow kepok bananas 27.70%, kepok manado bananas 27.21%. Bananas are a climacteric fruit so they experience their own maturity. According to Koni et al., (2013) climacteric is a critical phase in fruit life that causes many changes. Another opinion states that the climacteric is a unique period for certain fruits, where during this process a series of physiological processes occur which begin with the process of making ethylene. Climacteric is also defined as a state of autostimulation from within the fruit so that the fruit becomes ripe followed by an increase in the respiration process.

The ripeness of bananas can be seen in the change in skin color. Simultaneously with the color change that occurs, the physicochemical properties will also experience changes, either experiencing a decrease or increase. Changes in skin color during the ripening process can be associated with changes in the chemical and physical properties of bananas. The low content of carbohydrates, fats and proteins in this study was due to the skin of the Ambon banana which has a very thin skin texture when compared to the kepok banana which has a very thick skin (Pradhana at al, 2008), causing the content of carbohydrates, fats and proteins which is quite low. The low level of carbohydrates in ripe Ambon banana peels in this study was due to the fact that when ripe Ambon bananas carry out physiological activities, such as increased respiratory activity at the beginning that occurs in climacteric fruits. In addition, starch hydrolysis and cell wall degradation also occur which results in changes in texture in bananas. During the ripening process, bananas will experience an increase in fruit softening, but treatment using cold temperatures will be more inhibited by using room temperature (Sumadi et al, 2004). The carbohydrates contained in banana peels are starch. Starch or starch is a type of carbohydrate polysaccharide (complex carbohydrate). Starch (starch) does not dissolve in water, is a white powder, tasteless and odorless. Starch is the main ingredient produced by plants to store excess glucose (as a product of photosynthesis) in the long term. Animals and humans also make starch an important source of energy. Starch is the main source of energy for adults throughout the world's population, especially in developing countries because it is consumed as a staple food. Besides food ingredients rich in starch, they also contain protein, vitamins, fiber and several other important nutrients (Johari and Rahmawati, 2006).

Starch is composed of two kinds of carbohydrates, amylose and amylopectin in different compositions, namely 10-20% amylose and 80-90% amylopectin. Amylose is composed of α-glucose molecules with α-(1-4) glycosidic bonds forming a linear chain. Whereas amylopectin consists of amylose chains (α(1-4) bonds) which are linked to each other to form branches with α-(1-6) glycosidic bonds. Amylose gives hardness (pera) while amylopectin causes stickiness. Amylose gives a deep purple color in the iodine test while amylopectin does not react. The explanation for this phenomenon has never been fully explained. Amylopectin can have a number of glucose molecules ranging from hundreds to tens of thousands. While the average amylose consists of 1000 glucose molecules. The exact chemical structure of starch (starch) is not known, but it is suspected that the outer part of the starch granules is amylose while the inside granules are amylopectin (Supriyadi, 2008). The low protein value in Ambon banana peels in this study was influenced by several factors. According to Roiyana et al, (2012) the factors that influence the high protein content in bananas are pH, variety, age, type of management. Protein is a heterogeneous polymer of amino acid molecules (Winarno, 2004). The protein contained in banana peels is a globular protein. In globular proteins, the hydrophilic, polar side chains are on the outside and the hydrophobic, non-polar side chains are arranged on the inner surface (Kumalaningsih, 1993), so that these proteins have relatively high solubility in water or in salt solutions. dilute at a pH value below or above the isoelectric point (Mahardikasari, L.W. 2010). This protein, by the fungal proteinase enzymes R. oligosporus and R. oryzae is hydrolyzed into peptides, followed by hydrolysis of peptides by peptidases into amino acids. The fat content in the skin of Ambon bananas in this study was very low, ranging from 0.31 to 0.64%. This decrease is thought to be caused by the fiber content in banana peels. This is in accordance with the statement of Winarno (2004), namely fiber functions to reduce the fat content in foodstuffs.

CONCLUSION

Based on the results obtained, it can be concluded that the raw Ambon banana peel has an average carbohydrate content of 4.02%, a fat content of 0.85% and a protein content of 0.31%. On the skin of the Ambon banana, mengkal has an average carbohydrate content of 4.11%, a fat content of 1.19% and a protein content of 0.31%. Whereas in ripe Ambon banana peels, the average carbohydrate content was 3.96%, fat content was 1.68% and protein content was 0.64%.

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