Determination of Protein Content by Spectrophotometric Method and Fat Content by Soxhletation Method on Purple Kopek Eggplant and Green Kopek Eggplant

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ABSTRACT

The type of research is quantitative research which is concerned with determining how much certain substances are contained in a sample. The formulation of the problem in this study is how much protein and fat levels are contained in the green kopek and purple kopek eggplant. The study was conducted to determine how many grams of protein and fat content in purple kopek eggplant and green kopek eggplant samples. With a spectrophotometric method (Lowry) for the determination of protein content and one method of hot extraction is the soxhletation method for the determination of fat content. The results showed that the protein content in 50 g of eggplant purple kopek was 0.03 g and 50 g eggplant green kopek was 0.0375 g. The fat content in 10 grams of eggplant purple kopek is 0.1794% and 10 grams of eggplant green kopek is 0.1612%. Based on the results of the research that has been carried out, it was found that the protein content of eggplant kopek did not meet the DKBM standard, namely 1.4-2 g in a sample of 100 g. While the standard fat content obtained by DKBM is 1.1 g in a sample of 100 g.

INTRODUCTION

Protein, carbohydrates and water are the main ingredients in food. Protein is needed primarily for growth and repair of damaged body tissues. Carbohydrates and fats are a source of energy in the activities of the human body, while mineral salts and vitamins are also important factors for survival.

Oils and fats that are completely oxidized in the body provide 9.3 calories/g fat, while protein and carbohydrates provide 4.1 and 4.2 calories/g, respectively. Fats consist of mixed triglycerides, which are esters of glycerol and long chain fatty acids. Fats and oils can be obtained from animals or plants. Vegetable fats are found in fruits, nuts, seeds, plant roots and vegetables. Triglycerides can be solid or liquid, depending on the composition of the fatty acids that make them up. Most vegetable fats are liquid because they contain a number of unsaturated fatty acids, while...
animal fats are generally solid at room temperature because they contain a lot of saturated fatty acids.

Eggplant or eggplant (Java), torung (Batak), cuang, taung (Bali) or nasubi (Japan) is one of the most popular fruit vegetables in all corners of the country. Eggplant fruit which is the main crop, this plant has a delicious taste, nutritional value including A, B1, B2, C, P and Phosphorus. The most common type of eggplant in the community and easily accessible by the public in general is the koprk eggplant. Kopek eggplant consists of two kinds, namely purple kopek eggplant and green kopek eggplant.

Many factors affect human growth and development, including food. Food has a very important role in human growth and development. Through food, humans can get the nutrients their bodies need. These nutrients are in the form of carbohydrates, proteins, fats, vitamins, and mineral salts.

Based on the description above, it is necessary to conduct a study to determine the levels of fat and protein contained in purple kopek eggplant and green kopek eggplant.

RESEARCH METHOD

1. Research Types and Variables
   This research is a quantitative study conducted at the Makassar Health Laboratory Center (BBLK) which aims to determine the protein and fat levels in purple kopek eggplant and green kopek eggplant using spectrophotometry and soxhletation methods.

2. The scope of research
   The study was conducted from April 2010 to October 2010 at the Central Health Laboratory (BBLK) Makassar using samples of purple kopek eggplant and green kopek eggplant from Kaloling village, Gantarangkeke district, Bantaeng district.

3. Research Tools and Materials
   Tools: Protein analysis: UV-Vis Spectrophotometer; Analytical balance; Glassware; Fat Analysis Centrifuge: Soxlet; desiccator; Oven; Analytical balance; Electric Bath
   Research Materials: Protein Analysis: Eggplant Samples; Bovin Serum Albumin (BSA) Solution 250 g/mL; Lowry’s reagents A and B; Acetic Acid Buffer; Aquades. Fat Analysis: Eggplant Samples; Solvent n-Hexane; Aquades.

4. Research procedure
   Protein Content Analysis: Preparation of protein standard curves; Sample preparation for protein determination.

RESULTS AND DISCUSSIONS

1. Research result
   a. The results of the analysis of protein levels

   Based on the results of the measurement of the sample solution for determination of protein content in the purple kopek eggplant and green kopek eggplant growing in Kaloling Village, Gantarangkeke district, Bantaeng Regency using a UV-Vis spectrophotometer at a wavelength of 600 nm and analyzed at the Makassar Health Laboratory Center, the following data were obtained.

   Table 1. The results of the analysis of the sample solution on 50 g of eggplant kopek for determination of protein content.

   | Sample                  | Absorbance | Average absorbance | Concentration sample (ppm) | Protein content (g) |
   |-------------------------|------------|--------------------|----------------------------|---------------------|
   | Purple kopek eggplant   | 0.386      | 0.382              | 0.382                      | 40.403              | 0.0323               |
The sample solution for the determination of protein content contained in table 1 consists of two samples of kopek eggplant, namely purple kopek eggplant and green kopek eggplant with three repetitions or triple treatment.

b. Fat content analysis results

The results of the determination of fat content in 10 g of purple kopek eggplant and green kopek eggplant growing in Kaloling village, Gantarangkeke district, Bantaeng district using the soxhletation method analyzed at the Makassar Health Laboratory Center can be seen in table 2.

| Sample             | W1 (g) | W2 (g) | W3 (g) | Fat level (%) | Average fat content (%) |
|--------------------|--------|--------|--------|---------------|-------------------------|
| Eggplant Kopek     | 94.9304| 94.9306| 94.9304| 0.1794        | 0.1794                  |
| Purple             | 94.9304| 94.9306| 94.9304| 0.1794        | 0.1794                  |
| Eggplant Kopek     | 94.9040| 94.9042| 94.9040| 0.1794        | 0.1794                  |
| Green              | 94.9040| 94.9042| 94.9040| 0.1794        | 0.1794                  |

The sample for fat content determination in table 2 consists of two kopek eggplant samples. Namely, purple kopek eggplant and green kopek eggplant that grew in Kaloling village, Gantarangkeke district, Bantaeng district with three repetitions or triple treatment.

2. Discussion

a. Determination of protein content in purple and green kopek eggplant samples

In this study, the sample precipitates obtained from the centrifuge 40 mL of eggplant sample extract were used. The precipitate was then added with 10 mL of acetate buffer. The function of adding a buffer solution is as a buffer solution to maintain the pH of the sample solution so that it remains in an acidic atmosphere when analyzed. Then pipetted 4 mL of the solution and continued with the addition of 5.5 mL of Lowry’s reagent. After letting it sit for 10 minutes at room temperature, the sample solution was then added with 0.5 mL of Lowry’s reagent A. The color formed at the beginning of the addition was yellow as the color of Lowry’s reagent A. After being allowed to stand for 30 minutes at room temperature the color of the sample solution changed to blue.

This blue color is formed due to the reaction between Cu2+ with peptide bonds and the reduction of phosphomolybdic acid and phosphotungstic acid by tyrosine and tryptophan (a protein residue). Therefore, the color formed depends on the levels of tyrosine and tryptophan in the protein.

The protein content of each ingredient is different. Therefore, the measurement of the protein content of a material is very necessary. To be able to calculate the protein content, a spectrophotometer is needed by shooting the sample. In this study, the determination of protein levels was carried out on two samples of kopek eggplant, namely purple kopek eggplant and green kopek eggplant. Determination of protein content was carried out using a spectrophotometric (Lowry) method using a UV-Vis spectrophotometer at a wavelength of 600 nm.

Measurement of protein content using a UV-Vis Spectrophotometer basically uses the Lowry method. The curve showing the standard is the calibration curve of a series of standard solutions. The solution preferably has the same composition as the sample composition. A single solution is rarely used in the molar absorptivity literature. Proteins with phosphotungstate salts in alkaline
conditions will give a blue color whose intensity depends on the indicated protein concentration. Protein concentration is measured based on Optical Density (OD) or absorbance at a certain wavelength to determine the amount of protein in solution.

Based on the results of the analysis, the protein content of 50 g of purple kopek eggplant sample was 0.0323 g. And at 50 grams of green kopek eggplant sample the protein content obtained is 0.0375 gr. From the results obtained, it can be concluded that the protein content of green kopek eggplant is greater than that of purple kopek eggplant. This difference is caused by the condition of the green kopek eggplant which is still fresh compared to the purple kopek eggplant caused by the storage time factor. However, the difference in protein content in the two kopek eggplant samples was not significant. Because these two types of eggplant are still in one variety, namely eggplant kopek. Only the physical form, namely the color of this kopek eggplant variety, distinguishes the two.

b. Fat content in purple kopek eggplant and green kopek eggplant samples.

Fat is a group of organic compounds found in plants, animals or humans. Fat can be obtained from foods of animal or plant origin. Fat is rarely stored in leaves, stems and roots but is abundant in seeds and some fruits.

Animal fats are generally solid at room temperature, while plant fats are liquid. Fats that have a high melting point contain saturated fatty acids, while liquid fats or commonly called oils contain unsaturated fatty acids. For example, tristearin, which is a glycerol ester with three stearic acid molecules, has a melting point of 71°C, while triolein, a glycerol ester with three molecules of oleic acid, has a different fatty acid composition. Like lipids in general, short fatty acid glycerides or fats are soluble in water, while long fatty acid glycerides are insoluble. All glycerides are soluble in esters, chloroform or benzene. Hot alcohol is a good fat solvent.

Fatty acids are organic acids that exist as triglyceride esters or fats, whether of animal or plant origin. This acid is a carboxylic acid that has a long carbon chain with the general formula:

\[
\text{R} - \text{C} - \text{OH}
\]

where R is a saturated or unsaturated carbon chain and consists of 4 to 24 carbon atoms. Saturated carbon chains are carbon chains that do not contain double bonds, while those containing double bonds are called unsaturated carbon chains. In general, fatty acids have an even number of carbon atoms. Saturated fatty acids that have short carbon chains, namely butyric and caproic acids have low melting points. This means that both acids are liquids at room temperature. The longer the carbon chain, the higher the melting point. When compared to saturated fatty acids, unsaturated fatty acids have a lower melting point. In addition, the greater the number of double bonds, the lower the melting point. The solubility of fatty acids in water decreases with increasing carbon chain length. Generally, fatty acids are soluble in ether or hot alcohol. Fatty acids are weak acids. When dissolved in water, fatty acid molecules will partially ionize and release H+ ions.

Determination of fat content in the purple and green kopek eggplant samples used the soxhletation method using n-hexane as a solvent. In principle, the soxhletation method is a continuous filtration using a pure solvent. The selection of the filter fluid must consider many factors. Chemical substances and compounds are easily soluble in solvents of the same polarity as the solvent to be dissolved. Extractive substances are organic compounds that have undergone decomposition and are not a structural part of cell walls and include micromolecular components in plants. The nature of this extractive substance is easily soluble in neutral solvents or organic solvents. Solvent n-hexane is a class of neutral solvents like water and acetone.
In this study, 10 g of each sample of purple kopek eggplant and green kopek eggplant were weighed into a thimble which was inserted into a soxhlet apparatus and continued by flowing 150 ml of n-hexane solvent. From the results of the analysis, the fat content in the purple kopek eggplant sample was 0.1794% and the green kopek eggplant sample was 0.1612%. From the results obtained, it can be seen that the fat content of purple kopek eggplant is slightly higher than that of green kopek eggplant. This is because the purple kopek eggplant sample contained more seeds than the green kopek eggplant sample. According to the theory previously mentioned that fat in plants is stored more in the seeds and fruit.

The melting point and other properties of fats are determined by the type of fatty acids they contain. Fats derived from animal products generally contain large amounts of saturated fatty acids. In contrast, vegetable products, with the exception of coconut oil, contain large amounts of long-chain unsaturated fatty acids. To avoid high cholesterol levels, it is recommended to replace saturated fat sources with unsaturated fat sources by frequently consuming vegetables.

CONCLUSION

Based on the results of the research that has been carried out, it can be concluded that: (1) In 50 g of the purple kopek eggplant sample, it contains 0.0323 g of protein. And at 50 grams of green kopek eggplant samples contained 0.0375 grams of protein. (2) It can also be concluded that the fat content in 10 grams of purple kopek eggplant samples is 0.1794% or 1.794% in 100 grams and in 10 grams of green kopek eggplant samples has a fat content of 0.1612% or 1.612% in 100 grams. grams of sample. (3) Based on the results of the study, kopek eggplant is very good for consumption because it contains sufficient protein for growth and repair of damaged body tissues and fats that contain unsaturated fatty acids and are in accordance with the standards in the List of Nutritional Content of Food Ingredients (DKBM) concerning nutritional content of 100 g eggplant.

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To find out more about protein and fat levels in eggplant plants and as a comparison material, further research should be carried out using different eggplant varieties and with different treatments or methods.

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