

**THE CHEMICAL CHARACTERISTIC OF SHRIMP WASTE-BASED
SHRIMP PASTE WITH THE ADDITION OF KALAKAI LEAVES
(*Stenochlaena palustris*)**

**Karakteristik Petis dari Limbah Udang dengan Penambahan Daun Kalakai
(*Stenochlaena palustris*)**

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ABSTRACT

The aim of this research was to find out the characteristics of shrimp waste-based shrimp paste with the addition of Kalakai leaves (*Stenochlaena palustris*) that was obtained in Palangka Raya. This research was using Completely Randomized Design (CRD) consisting of two treatments with three replications. The parameters observed were the water content test, protein content test, fat content test, and ash content test. Furthermore, the statistical test was using the ANOVA method and the BNT test with a 5% level, it showed a real difference, and with a 1% level, it showed a very real difference. It can be concluded that the chemical characteristics that was produced by shrimp paste from shrimp waste with the addition of Kalakai leaves contained 60.18% an average water content, 1.75% protein content, 0.64% fat content, 33.49% carbohydrate content, and 3.96% ash content.

Keywords: Shrimp waste, Shrimp paste, Kalakai Leaves

ABSTRAK

Penelitian ini bertujuan untuk mengetahui karakteristik petis berbahan dasar limbah udang dengan penambahan daun kalakai (*Stenochlaena palustris*) yang diambil dari kota Palangka Raya. Penelitian ini menggunakan Rancangan Acak Lengkap (RAL) yang terdiri dari 2 perlakuan dengan 3 ulangan. Parameter yang diamati adalah uji kadar air, uji kadar protein, uji kadar lemak dan uji kadar abu. Selanjutnya di uji statistik menggunakan metode ANOVA dan uji BNT dengan taraf 5% menunjukkan beda nyata dan dengan taraf 1% menunjukkan sangat beda nyata. Dapat disimpulkan bahwa karakteristik kimia yang dihasilkan oleh petis dari limbah udang dengan penambahan daun kalakai mengandung nilai rata-rata kadar air 60,18 %, protein 1,75%, kadar lemak 0,64%, karbohidrat 33,49% dan kadar abu 3,96%.

Kata Kunci: Limbah udang, Daun kalakai, Petis

INTRODUCTION

Shrimp waste, which is not optimally utilized, causes environmental pollution, particularly odor and poor aesthetics. In the home industry, this waste is only processed into shrimp paste or dried for poultry feed. To add value to shrimp waste, it is necessary to improve the quality of shrimp waste processing into products with high economic value and broad benefits. In comparison, in countries such as the United States, Japan, and Switzerland, shrimp waste has been processed in large-scale industries to produce commercial products. These products include cosmetics, pharmaceuticals, agricultural products, and food preservatives.

To date, shrimp shell waste in Indonesia has not been fully utilized, being used only as an ingredient in shrimp paste, shrimp crackers, and shrimp shell flour. Shrimp shells can be used to produce chitin, chitosan, and glucosamine, which are widely used in various fields and certainly have significantly higher added value.

In shrimp processing, in addition to processing the components that can be processed into products, the processing also produces waste as a byproduct (Nurasih, 2020). Shrimp waste is a byproduct of shrimp processing that is often discarded, negatively impacting the environment. In addition to these impacts, shrimp waste can also have a positive impact and benefit the community if it is recycled into various processed products.

Central Kalimantan is a peatland region, making ferns, especially Kalakai, easily grow in almost every area. Ferns like Kalakai are the most common, easily obtained and sold in traditional markets. Kalakai is generally only used as a vegetable or side dish. However, processed products made from kalakai are still lacking, even though the people of Central Kalimantan know that kalakai is rich in nutrients and acts as a blood tonic. The secondary metabolite content of the kalakai plant (*Stenochlaena palustris*), as measured by leaf and stem samples, showed water content of 8.56% and 7.28%, ash content of 10.37% and 9.19%, crude fiber content of 1.93% and 3.19%, protein content of 11.48% and 1.89%, and fat content of 2.63% and 1.37%. The results of the analysis of the mineral Ca were higher in the leaves than the stems, namely 182.07 mg per 100 g, as well as the highest Fe at 291.32 mg per 100 g. The results of the analysis of the highest vitamin C were found in the stems at 264 mg per 10 g and the highest vitamin A was found in the leaves at 26976.29 ppm. The highest phytochemical content of flavonoids, alkaloids and steroids was found in the stems at 3.010%, 3.817% and 2.583%, respectively. The most dominant bioactive compounds were alkaloids. Based on the analysis, Kalakai (*Stenochlaena palustris*) can be used as a functional food (Maharani *et al.*, 2006 in Tyas (2022).

Petis is a semi-moist, paste-like food product derived from meat, fish, or shrimp. Indonesians, especially those on the island of Java, recognize petis as a flavoring that imparts a distinctive flavor to traditional dishes. Shrimp, fish, or meat waste is generally used as the raw material for petis (Firdaus *et al.*, 2016).

Fertilizers are often added to speed up the thickening process. In this study, Kalakai leaves were used as an alternative coloring and filler in shrimp waste-based petis. This is an effort to increase the value of shrimp waste and enhance the utilization of Kalakai leaves.

RESEARCH METHODS

Tools and Materials

The tools used were a basin, spoon/stirrer, frying pan, pot, cutting board, strainer, scale, measuring cup, stove, and knife. The materials used in this study were water, shrimp waste (shrimp shells and heads), salt, brown sugar, and kalakai leaves.

Manufacturing Procedure

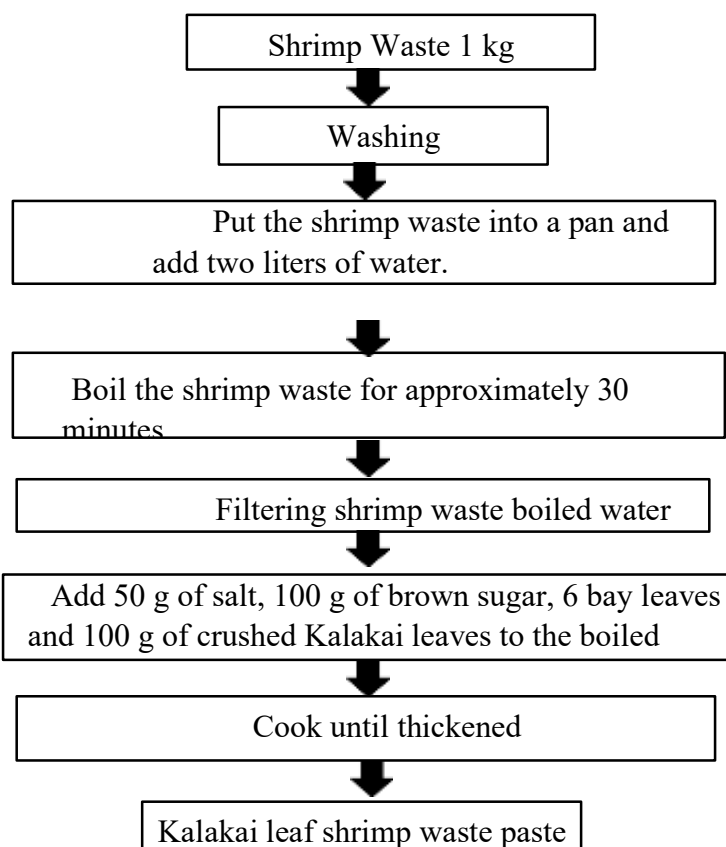


Figure 1. Flowchart of Shrimp Waste Processing with the Addition of Kalakai (*Stenochlaena palustris*) Leaves

Research Design

The design used in this study was a Completely Randomized Design with 2 treatments and 3 replications. Treatment A was shrimp waste petis, and treatment B was shrimp waste petis with kalakai leaves. Data were obtained by analyzing chemical test data (water content test, protein content test, fat content test, and ash content test).

RESULT

The chemical test results for shrimp waste paste with the addition of Kalakai leaves (*Stenochlaena palustris*) are as follows:

Table 3. Average Chemical Test Results for Shrimp Waste Paste

Treatment	Parameter			
	Water (%)	Protein (%)	Fat (%)	Ash (%)
A	52,16	1,22	1,85	4,36
B	60,18	1,74	0,64	3,95
SNI 1-2718-2013	30-50	Min. 15		Maks. 1
Suprapti 2011			0,1	

The following is a picture of a shrimp paste product made from shrimp waste with the addition of Kalakai leaves:



Figure 2. Shrimp Waste Petis with Kalakai Leaves (*Stenochlaena palustris*)

DISCUSSION

Petis produced in this study contains an average water content of 60.18%, protein 1.75%, fat content 0.64%, carbohydrate 33.49% and ash content 3.96%. Petis is a processed product that is usually made from pindang, mussels, or shrimp that are heated until they melt into a thick, dense sauce. Petis is a processed or preserved product that is included in the sauce group that resembles thick, sticky and elastic porridge, black or brown in color depending on the type of ingredients used and is a food product that has a semi-solid texture that is blackish brown in color and has a sweet taste (Isnaeni *et al.*, 2014) Petis is a traditional food in the form of a sauce which is a stimulant food ingredient that provides a distinctive additional aroma to food (Cahyarani, 2006). In general, the nutritional content of petis per 100 g of ingredients is shown in Table 2.6 Table 2. Nutritional Content of Petis Nutritional Elements Content Energy (g) 220 Water (g) 39 Protein (g) 15 Fat (g) 0.1 Carbohydrate (g) 40 Calcium (mg) 37 Phosphorus (mg) 36 Iron (mg) 2.8 Source: Suprapti (2011) Petis is generally made from boiled fish or shrimp heads. Of the various petis sold in the market, overall it can only be divided into two groups, namely petis made from shrimp extract during the processing of ebi, or it can also be fish extract (Adawyah, 2011). Broth is the main raw material of petis. Broth is obtained from the results of boiling raw materials, because in the boiling process there is a shrinkage of the fibers of the food ingredients which causes the liquid from the food ingredients to come out. The resulting liquid will carry extracts containing water, vitamins, water-soluble salts, and short-chain amino acid peptides (Winarso, 2003 in Malini, 2014). According to Rahmawati (2013), there are two types of petis: shrimp petis and fish petis. Shrimp petis is made from shrimp stock, not whole shrimp. The stock is cooked for a long time until it thickens, then brown sugar, salt, and other spices are added to taste. Fish petis is not much different from shrimp petis; the difference lies in the ingredients. Fish petis is made from fish stock that is cooked until thick. Usually, the stock used is stock from making fish pindang. Because of the high salt content in the cooking process, fish petis tastes saltier than shrimp petis (Prianto, 2008).

Shrimp waste petis with the addition of kalakai leaves (*Stenochlaena palustris*) produces a savory flavor from the shrimp and spices and a thicker texture compared to shrimp waste petis without the addition of kalakai leaves.

The flavor of petis comes from two main components: peptides and amino acids found in fish or shrimp extract, and the spices used. Petis available on the market varies in quality, depending on the raw materials used. Typically, fillers in petis production include starches such as wheat flour, tapioca flour, rice flour, or rice water. The addition of fillers is intended to add value in terms of quantity and sales value. Furthermore, the addition of starch can accelerate the thickening process of petis (Isnaeni *et al.*, 2014).

Chemical Test

a. Water content

The water content of shrimp waste petis (A) and shrimp waste petis with kalakai leaves (B) can be seen in Figure 3 below:

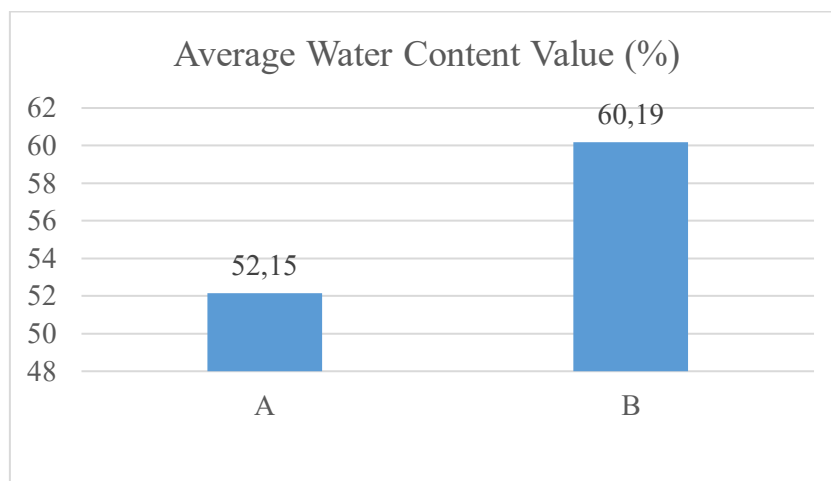


Figure 3. Average Water Content Test Results

The average water content of treatment A was 52.15% and treatment B was 60.19%. Water content in food can affect the food's resistance to microbial attack (Winarno 2004). In petis, water content is something that must be considered. This is because petis is categorized as a semi-wet food that has a water content of around 10-40%. The process of water evaporation (concentration) in raw materials causes a decrease in water content in the product. This process is a widely used and simple method to apply to liquid food ingredients considering the nature of water that easily evaporates when heated. Measurement of water content in petis is carried out using the gravimetric method, namely comparing the weight of the wet sample with the weight of the dried sample and is expressed in%. The quality requirements for water content in shrimp petis in SNI 01-2718-2013 are a minimum of 30% and a maximum of 50%.

b. Kadar Protein

The protein content of shrimp waste petis (A) and shrimp waste petis with kalakai leaves (B) can be seen in Figure 4 below:

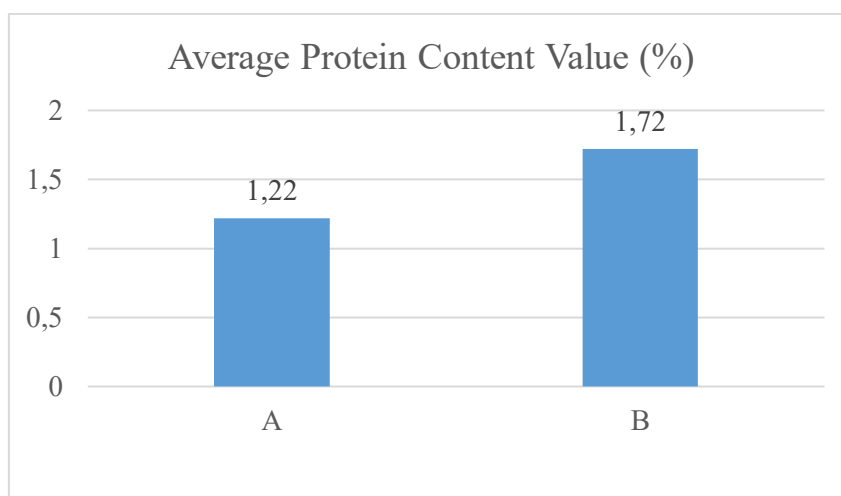


Figure 4. Average Results of Protein Content Test

The average protein content in treatment A was 1.22% and in treatment B 1.72%. Protein is one of the giant biomolecules, along with polysaccharides, lipids, and polynucleotides, which are the main components of living things. Most proteins are enzymes or enzyme subunits. Protein is a very important nutrient for the body because it functions as a source of energy in the body as well as a building and regulatory substance. Protein is a polymer of amino acids linked by peptide bonds. Protein molecules contain the elements C, H, O, N, P, S, and sometimes contain metal elements such as iron and copper (Winarno, 2004). The protein content in this study was determined using the Kjeldahl method. The working principle of the Kjeldahl method is that the protein and organic components in the sample are destroyed using sulfuric acid and a catalyst (Winarno, 2004). The protein content in shrimp paste is obtained from shrimp waste. The quality requirements for protein content in shrimp paste according to SNI 01-2718-2013 are a minimum of 15%.

c. Fat Content

The fat content of shrimp waste petis (A) and shrimp waste petis with kalakai leaves (B) can be seen in Figure 5 below:

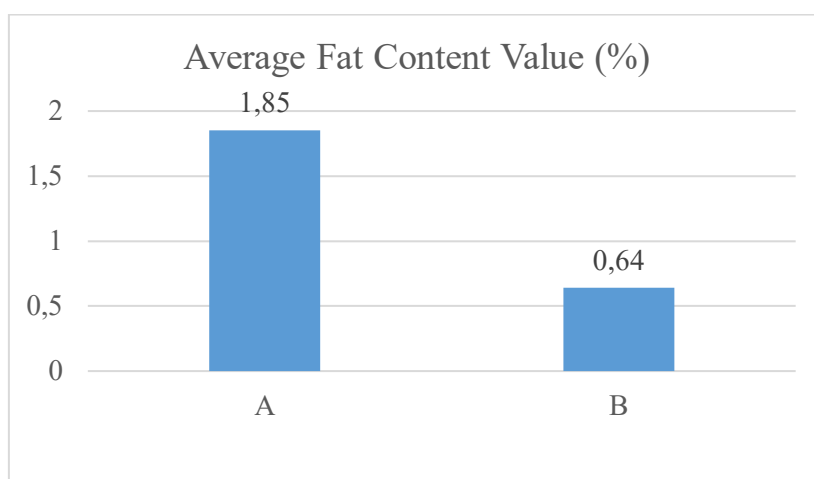


Figure 5. Average Fat Content Test Results

The average fat content of treatment A was 1.85% and treatment B was 0.64%. Fat is a part of lipids that contain solid saturated fatty acids. Fat is an organic compound found in nature and is insoluble in water but soluble in non-polar organic solvents such as diethyl ether, chloroform, benzene, hexane and other hydrocarbons. (Apriantono, 1988). Fat provides flavor and improves texture in food ingredients as well as being a source and solvent for vitamins A, D, E, and K. Fat is a biomolecular compound that is soluble in certain organic compounds and insoluble in water (Winarno, 2004). The fat content in petis is obtained from its constituent ingredients, especially from tapioca flour and shrimp waste. Determination of the fat content in shrimp waste petis is carried out using the Soxhlet method. In principle, this Soxhlet method uses a dry fat sample that is extracted continuously in a solvent with a constant amount. The quality requirements for fat content are not stipulated in SNI 01 – 2718-2013 concerning shrimp paste.

d. Ash Content

The ash content of shrimp waste petis (A) and shrimp waste petis with kalakai leaves (B) can be seen in Figure 6 below:

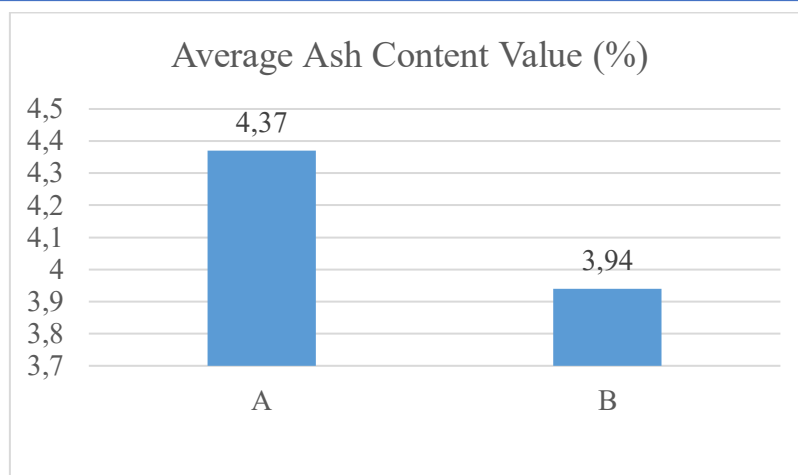


Figure 6. Average Ash Content Test Results

The average ash content of treatment A was 4.37% and treatment B was 3.94%. Ash content is the sum of the inorganic materials in the form of Ash content is the sum of the inorganic materials in the form of. The ash content of shrimp paste, especially from shrimp waste, is obtained when the water has been evaporated. The principle of determining the ash content is ashing at a temperature of 5250 - 5500C which has previously been heated until it is no longer smoking. Total ash content is part of the proximate analysis that aims to evaluate the nutritional value of a product/food ingredient, especially total minerals. The ash content of a material indicates the total minerals contained in the material. Food ingredients consist of 96% organic materials and water, while the remainder are 14 mineral elements, these elements are also known as organic substances (Apriyantono, 1988). The quality requirements for ash content in shrimp paste in SNI 01 - 2718-2013 are a maximum of 1%.

CONCLUSION

It can be concluded that the chemical characteristics produced by shrimp paste from shrimp waste with the addition of Kalakai leaves contain an average water content of 60.18%, protein 1.75%, fat content 0.64%, carbohydrate 33.49% and ash content 3.96%.

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