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Utilization of Fishery Waste from The Morotai People's Market as Natural Flavoring

Andrha S. Pahana[1], Sandra Hi. Muhammad[2], M. Riska Seng[3], Alkadri M. Kasim[4], Moch. Nurcholis Hj Djafar[5], Rinto M. Nur[6]*

[1] *Fishery Product Technology Department, Universitas Pasifik Morotai, Indonesia, andrhapahana@gmail.com*
[2] *Marine Science Department, Universitas Pasifik Morotai, Indonesia, sandramuhammad12@gmail.com*
[3] *Fishery Product Technology Department, Universitas Pasifik Morotai, Indonesia, riskaseng13@gmail.com*
[4] *Fishery Product Technology Department, Universitas Pasifik Morotai, Indonesia, albape24@gmail.com*
[5] *Fishery Product Technology Department, Universitas Pasifik Morotai, Indonesia, nurchilishdjafar@gmail.com*
[6] *Fishery Product Technology Department, Universitas Pasifik Morotai, Indonesia, rintomnur777@gmail.com*

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ABSTRACT

Capture fisheries production in Morotai continues to increase from 2019-2021, with an average annual production of 17,102.3 tons. The increase in capture fisheries production is in line with the amount of fish waste produced. In Morotai, fish waste is produced from fisheries processing industries and fish sales places such as markets. This waste has not been utilized and is thrown into the environment. Even though these wastes still contain nutrients, especially protein, they can be used to make flavorings. The main flavoring ingredient is glutamate. This research aims to utilize fish waste from the market as raw material for making flavorings. This research used an experimental method by making four variations of flavorings. Before being processed into flavoring, fish waste will be treated by soaking it in a whiting solution, baking soda solution, or pineapple juice without soaking it. The powdered flavoring obtained was then analyzed for its hedonic organoleptic value using 30 panelists. Proximate tests were also conducted to determine the water, protein, fat, and ash content. The research results showed that, on average, the panelists liked the powdered flavoring from fish waste that had been soaked with lime, pineapple, and baking soda without soaking. The results of the proximate analysis showed that the flavoring water content ranged from 11.30—19.59%, the protein content ranged from 19.74—30.97%, the fat content ranged from 0.59—30.97, and the ash content ranged from 18.11—23.62%.

Keywords: Fisheries waste, Waste utilization, People's market, Flavoring, Natural flavouring

ABSTRAK

Produksi perikanan tangkap di Morotai terus mengalami peningkatan dari tahun 2019—2021 dengan rata-rata produksi setiap tahun sebesar 17.102,3 ton. Peningkatan jumlah produksi perikanan tangkap ini tentunya sejalan dengan jumlah limbah ikan yang dihasilkan. Di Morotai, limbah ikan tidak hanya dihasilkan dari industri-industri pengolahan perikanan, tetapi juga dihasilkan dari tempat penjualan ikan seperti pasar. Limbah-limbah tersebut belum dimanfaatkan dan dibuang ke lingkungan. Padahal limbah-limbah tersebut masih mengandung nutrisi terutama protein, sehingga dapat dijadikan sebagai bahan untuk pembuatan penyedap rasa. Hal ini karena kandungan utama bahan penyedap rasa adalah glutamate. Penelitian ini bertujuan untuk memanfaatkan limbah ikan dari pasar sebagai bahan baku pembuatan penyedap rasa. Penelitian ini menggunakan metode eksperimental dengan membuat 4 variasi penyedap rasa. Sebelum diolah menjadi penyedap rasa, limbah ikan akan diberikan perlakuan dengan perendaman pada larutan kapur sirih, larutan baking soda, sari nanas, dan tanpa perendaman. Penyedap rasa bubuk yang diperoleh kemudian dianalisis nilai organoleptik hedoniknya menggunakan 30 panelis.

Selain itu, juga dilakukan uji proksimat untuk mengetahui kadar air, protein, lemak, dan abu. Hasil penelitian menunjukkan bahwa rata-rata panelis menyukai penyedap rasa bubuk dari limbah ikan yang diberi perlakuan perendaman dengan kapur, nanas, baking soda, dan tanpa perendaman. Hasil analisis proksimat menunjukkan bahwa kadar air penyedap rasa berkisar antara 11,30 sampai 19,59%, kadar protein berkisar 19,74 sampai 30,97%, kadar lemak berkisar 0,59 sampai 30,97, dan kadar abu berkisar 18,11 sampai 23,62%.

Kata kunci: Limbah perikanan, Pemanfaatan limbah, Pasar rakyat, Penyedap rasa, Penyedap alami

INTRODUCTION

In 2022, the Central Statistics Agency reported that the value of capture fisheries production in Morotai Island Regency continued to increase from 2019 to 2021 (BPS, 2022). In 2019, capture fisheries production was 14,913 tons; in 2020, it was 16,033 tons; and in 2021, it was 20,361 tons. The increase in capture fisheries production is in line with the amount of fish waste produced (BPS, 2022).

Previous research results showed that fisheries waste produced from tuna loin processing at the Pacific Tuna Fishermen's Cooperative, Morotai Island, was around 50-60% of the total raw materials received each month. It has been reported that the waste generated from tuna loin production at PT Harta Samudra Morotai for four years (2019-2022) was 6.02 tons (Nur et al., 2023). Apart from the fishing industry, places selling fish, such as public markets, produce fishery waste. It is known that the waste generated from the remaining fish sales at the Morotai People's Market for 24 days was 165.70 kg, consisting of fish heads 37.95 kg (23%), bones and fins 37.90 kg (23%), and fish innards as much as 89.85 kg (54%). Specific industries or the surrounding community have not processed this waste. The waste is buried or thrown into landfills and the sea. It, of course, can pollute the environment.

This fishery waste still contains nutrients and can be processed into other products. Many studies have been carried out to utilize fishery waste into products such as fish skin into gelatin (Moranda et al., 2018; Karayannakidis et al., 2014; Siburian et al., 2020; Nurilmala et al., 2022), fertilizer (Mardhiah et al., 2020; Hikmah et al., 2023), collagen (María et al., 2017), and crackers (Pade et al., 2021). Red meat can be reprocessed into meatballs, nuggets, and sticks (Nur et al., 2023). Fish bones can be processed into calcium and phosphorus flour (Suarsa et al., 2020; Rozi & Ukhty, 2021; Pérez et al., 2024). Offal can be used as fish feed (Apu, 2021; Akerina et al., 2022) and fertilizer (Rahmawati & Setyawati, 2022). This waste still contains high levels of nutrients such as protein, fat, vitamins, and minerals, so it is still very suitable for use as a food product. Fish bones can also be processed into protein-rich flour (Boronat et al., 2023) and extract bioactive peptides that benefit health (Atma, 2016; Terzioğlu et al., 2018). The livers of sharks, sharks, and tuna are processed to obtain fish oil (squalene) containing omega-3 and omega-6 compounds (Sahubawa & Puspita, 2020). The main content of fishery waste is protein, which can be used as a raw material for flavorings. Several researchers have used fish waste to make flavoring powder, such as from shrimp shells (Atika & Handayani, 2019), fish skin, and bones (Tamaya et al., 2020).

Flavorings are ingredients that add flavor to food in powder or liquid form. In general, the flavoring agent often used is made from synthetic ingredients called MSG (Monosodium Glutamate), and people often add MSG to food, causing unfavorable effects on the body. MSG is an additional substance added to processed food to flavor or enhance taste. Excessive and continuous use of MSG can cause gastric disorders, sleep disorders, nausea, allergic reactions, trigger hypertension, asthma, cancer, diabetes, paralysis, decreased intelligence, and impaired

spermatogenesis due to the formation of free radicals and oxidative stress in the testicles. Therefore, looking for other alternatives, such as incredibly natural ingredients and flavorings, is necessary. The content of MSG can provide a more robust taste to food because it contains glutamate. Glutamate is one of the constituent parts of many amino acids in ingredients containing protein. One ingredient that contains much protein is fish.

Natural flavorings are flavorings that can be made from essential ingredients that contain protein. The ingredients used can be animal and vegetable protein. Using natural ingredients will be just as tasty as synthetic flavorings. Adding spices can affect the taste, color, and aroma of food. Natural spices such as garlic, shallots, and white pepper have a delicious aroma that can add to the natural flavor (Widyastuti et al., 2015). Therefore, it is necessary to research the manufacture of flavoring powder from waste left over from fish sales at the Morotai People's Market and analyze its quality.

The novelty of this research can be reviewed from several aspects including: 1) this research presents a new approach in managing traditional market waste in Morotai, namely not just being thrown away or processed into animal feed as usual, but being converted into natural flavoring ingredients, 2) local community-based research in the outermost regions of Indonesia and the archipelago is still relatively rare, especially in the context of processing waste into value-added products, 3) this research attempts to link waste utilization with the principle of zero waste and sustainable food production, which are global issues today. In another aspect, this research has opened up a new idea that fisheries waste can be a new source of economy for local communities.

METHODOLOGY

Time and Place

This research was carried out in June-August 2024. Fish waste samples were obtained from the Morotai People's Market Fish Sales Place. The preparation and organoleptic testing of powdered flavoring was carried out at the Laboratory of the Faculty of Fisheries and Marine Sciences, Univeritas Pacifik Morotai. Chemical tests were conducted at the Animal Food Chemistry Laboratory, Faculty of Animal Husbandry, Universitas Hasanuddin.

Tools and Materials

The tools used in this research are scales, measuring cups, knives, pans, stoves, blenders, sieves, baking sheets, cups, porcelain, ovens, desiccators, electric furnaces, test tubes, sintered glass, vacuum pumps, Khjedhal flasks, pipettes, flasks: distillation, distillation, and filter paper. Meanwhile, the materials used are fish waste in the form of offal, shallots, garlic, cornstarch, sugar, salt, pepper, pineapple, lime, baking soda, sulfuric acid, sodium hydroxide, water, boric acid, acetone, indicator solution, distilled water, and chloroform.

Experimental Design and Formula

Before making the flavoring, the fish waste is first given initial treatment, namely soaking it in whiting, baking soda, and pineapple juice. This research used a randomized block design using four treatments, namely: 1) treatment I: fish waste without initial soaking, 2) treatment II: fish waste is soaked with whiting first, 3) treatment III: fish waste is soaked with baking soda first, and 4) treatment IV: fish waste is soaked in pineapple juice first. table 1 shows the flavoring was made using the flavouring formula.

Table 1. Flavouring formula

Materials	**Volume**	**Units**
Fish waste	1000	g
Water	2000	ml
Shallots	30	g
Garlic	30	g
Pepper	30	g
Salt	30	g
Sugar	30	g
Maizena	@	

Research Procedures

1. Sample preparation; The raw material in the form of fish waste undergoes a meticulous process of washing and soaking with whiting, baking soda, and pineapple juice separately. This precise procedure, which includes a 4-hour soaking period and thorough rinsing, ensures the purity of the sample.
2. Making flavorings; The prepared fish waste is then boiled in a ratio of 1:2 (1 kg of fish waste uses 2 liters of water). After that, the boiled water is filtered to remove the fish waste broth. Continue heating using medium heat, then add the blended shallots, garlic, pepper, salt and sugar. Then, add the cornstarch slowly to avoid lumps. All mixed ingredients used in making flavorings are 3%. After the mixture is mixed well and thickens, the stove is turned off, and the mixture is put into a baking dish and spread thinly. We use parchment paper so the dough does not stick to the pan. After that, bake at 70°C until the dough becomes dry and crispy. Followed by grinding by blending the baked dough until smooth, then sifting it to produce a smoother flavoring (Meiyani et al., 2014).
3. Organoleptic testing; Organoleptic testing uses the hedonic method, including taste, color, appearance, and aroma/smell. Organoleptic testing uses 30 trained panelists. Table 2 shows the hedonic scale used has five levels.

Table 2. Scale hedonic indicators

Indicator	**Hedonic Scale**
like extremely	5
like slightly	4
Like	3
dislike slightly	2
dislike extremely	1

4. Chemical testing; The flavoring chemical content of fish waste will be analyzed using proximate analysis. Water, protein, fat, minerals, carbohydrates, and fiber are the chemical contents measured.

Data Analysis

Data on organoleptic test results and the chemical content of flavorings are displayed in the form of figures and tables and analyzed descriptively and qualitatively.

RESULTS AND DISCUSSION

The process of making flavorings consists of 9 (nine) stages, namely: 1) preparation of fish waste, 2) soaking with pineapple juice, 3) washing, 4) boiling fish waste, 5) wet smoothing, 6) mixing all ingredients (cooking), 7) drying, 8) dry smoothing, and 9) sieving. Figure 1a illustrates the first stage is the preparation of the fish waste used, where fish waste in the form of viscera and gills is first washed until clean. Figure 1b illustrates the second stage is after washing the fish waste and soaking it in pineapple juice for 2 hours. Soaking with pineapple juice aims to remove the smell and fishy taste of fish waste. The third stage is washing again to remove pineapple juice from the fish waste. The weigh the main ingredients (fish waste) according to the treatment, 100 grams. The next process is boiling. Figure 1c shows the boiling process (ratio 1:2) is 100 g of fish waste using 200 ml of water.

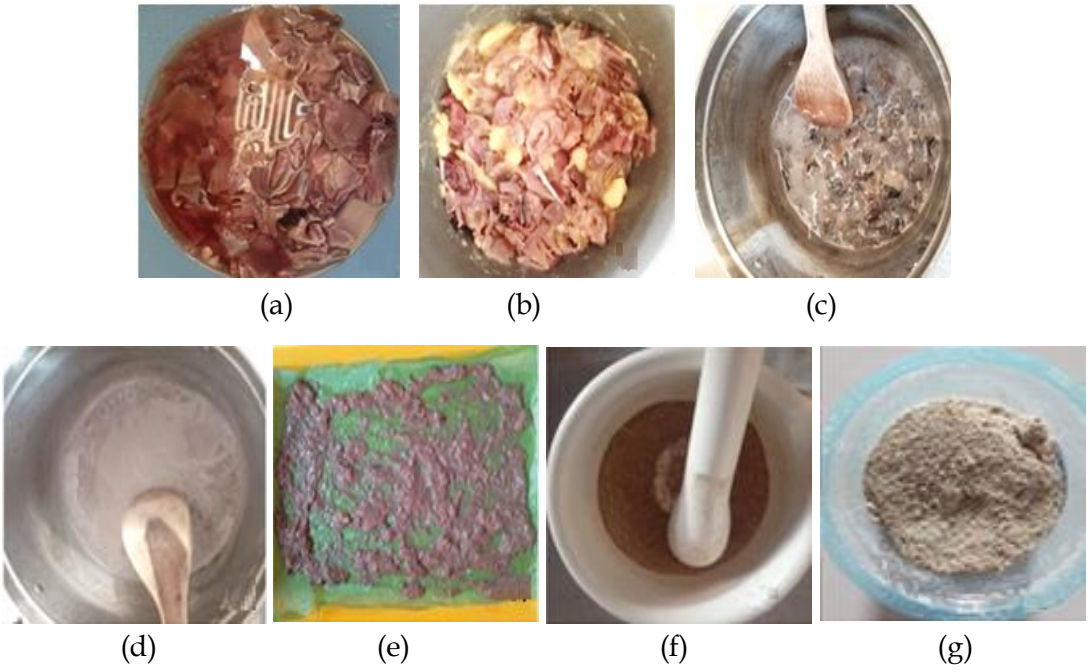

Figure 1. Process of making flavorings from fish waste. a) Fish waste is washed using clean water; Soaking using pineapple juice; c) Boiling fish waste; d) Thickening the boiled water by adding cornstarch; e) Drying; f) Dry smoothing; g) Powdered flavoring from fish waste.

The fifth stage is wet smoothing. Fish waste that has been boiled and allowed to cool is added with other ingredients (shallots, garlic, salt, pepper, sugar) and then blended until smooth. Figure 1d shows the cooking process. At this stage, all the ingredients that have been ground are cooked over low heat, and cornstarch is added little by little while stirring so that the cornstarch does not clump. This process continues until the mixture thickens and is smooth. Figure 1e shows the dough is spread out on a baking sheet lined with parchment paper. Cornstarch is used as a thickener; it can stabilize the flavoring mixture and be used as a substitute for maltodextrin. The cornstarch functions as a filler and binder to improve emulsion stability, reduce shrinkage due to cooking, provide a bright color, and increase product elasticity (Yunita & Silitonga, 2014).

The seventh stage is drying, a step that underscores the authenticity and traditional nature of this procedure. The dough is dried naturally in the sun and covered with cloth to prevent dust and insects from interfering. This natural drying process, lasting 3 days, ensures the dough is completely dry. The eighth stage is dry refining and Figure 1f shows the once the mixture is dry.

carefully crushed using a pestle and mortal, then sieved to produce a finer flavoring as shown in Figure 1g.

Hedonic Taste Test

Organoleptic analysis is a way of assessing using human senses (sensory). Organoleptic assessment is the method most often used to determine the panelists' level of preference for food (Bawinto, 2015). The hedonic organoleptic analysis can be carried out on a scale from 1 to 5, where 1 is the lowest value and 5 is the highest value (Setyaningsih et al., 2010). Thirty untrained consumers carried out the hedonic test assessment.

Figure 2 shows that the treatment of soaking fish waste with lime has the highest value for all hedonic indicators. The hedonic value of taste is 3.1 with the criteria of like, the hedonic value of color and aroma is 3.8 with the criteria of like slightly, and the appearance is 3.7 with the criteria of like slightly. The soaking treatment with pineapple had hedonic values of 2.9 (taste), 3.4 (color), 3.3 (appearance), and 3.1 (aroma) with the hedonic criteria of like. For the soaking treatment with baking soda, the average panelist scored 2.6 for all hedonic indicators (taste, color, appearance, and aroma), meaning the panelists liked the powder flavoring. Meanwhile, for the treatment without soaking, on average, the panelists gave a value of 2.1 for taste hedonics (dislike slightly), a value of 2.5 for color and appearance hedonics (like), and a value of 2.7 for aroma hedonics (like).

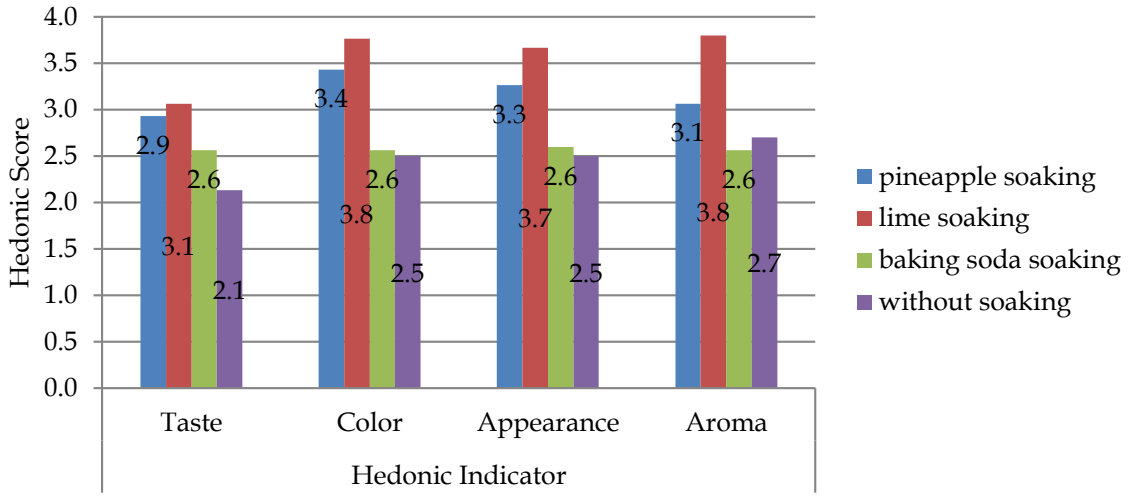

Figure 2. Hedonic test results for powdered flavorings from fish waste

One way that consumers accept a product is determined by the taste the product provides. The panelists most liked the taste of powdered flavoring with soaking treatment because it tasted savory and delicious, as expected from a flavoring that can provide a savory taste and add a delicious taste to food. The same is valid for synthetic flavorings that have been circulating in society. Natural flavorings are more profitable and preferred for consumption because they provide additional nutrition and do not hurt health (Sabri et al., 2006).

Color is one of the essential physical parameters of a food ingredient. The color of the food also determines consumers' preferences for food products. The color of a food ingredient is influenced by the light absorbed and reflected by the ingredient itself. It is also determined by dimensional factors, namely product color, brightness, and clarity of product color (Rahayu, 2011). Color is also a physical attribute that is assessed first in determining food quality and can sometimes be used to determine taste, texture, nutritional value, and microbiological properties.

The color test is one of the attributes or parameters of hedonic testing that is first seen by consumers when considering consumer judgment when buying or trying a product (Apandi et al., 2016). Attractive colors will increase product acceptance. Color may change during cooking. From the results of the hedonic test, on average, the panelists rated immensely liking the color of the powdered flavoring from fish waste. Figure 3 shows the flavoring is brown to dark brown. The brownish color comes from the raw materials (fisheries waste in the form of fish innards) and the processing process. Heating causes a browning reaction of sugar and amino acids, resulting in undesirable color and taste in food ingredients (Yeo & Shibamoto, 1991).

(a) (b) (c) (d)

Figure 3. Powdered flavoring. a) Powdered flavoring without soaking; b) Powdered flavoring with pineapple treatment; c) Powdered flavoring with baking soda treatment; d) Powdered flavoring with lime treatment.

On average, the panelists rated that they liked the aroma/smell of powdered flavoring from fish waste. The panelists liked the smell of the powdered flavoring because of its delicious aroma. The aroma of a food item influences the reaction level of liking because if a food contains glutamic acid, it will trick the brain into thinking that it has tasted something delicious. Natural flavoring from fish waste has an umami/savory taste and a distinctive aroma. It is caused by amino acids, which come from the high levels of protein contained in them. The aroma can influence a person's taste in food (Octaviyanti et al., 2017). If someone smells an unpleasant odor from a food, it can reduce their appetite. Treatment with fish will strengthen the aroma of the powdered stock, like the aroma of fish, thereby increasing appetite.

Appearance in hedonic assessment is included in the primary assessment because appearance can determine the characteristics of a product. The appearance of the flavoring powder can be seen from its color, cleanliness, shape, and size. From the results of the hedonic test, on average, the panelists gave a rating of liking to immensely liking the flavoring from fish waste with soaking treatment. This difference in appearance is because the boiling/cooking process can cause a browning reaction from the maltodextrin and amino acids contained in the flavoring formulation. The results of hedonic organoleptic testing showed that the taste and smell were preferred over the texture and appearance of the flavor of skipjack tuna waste (Djohar et al., 2018). It is due to the taste and smell of glutamic acid in the flavoring. The previous research reported that panelists gave favorable ratings to powdered flavorings from fish boil waste for all hedonic indicators such as the appearance, aroma, taste, and texture (Tamaya et al., 2020). Flavorings from snakehead fish waste were rated as liking the texture and somewhat liking the taste, aroma, and color (Nafsiyah et al., 2023).

The best treatment for the level of taste preference based on the results of the panelists' sensory test is treatment II (70% Malaja fish stock + 30% wheat flour) with an average value of 3.3 on the liking scale while the other two treatments have an average value of 2 and are on the dislike scale (Malichati & Adi, 2018). Meanwhile, treatment I (60% Malaja fish stock + 40% wheat flour) had an average value of 2.3, and treatment III (80% Malaja fish stock + 20% wheat flour) had an average value of 2.4. The distinctive savory taste of broth and spices produced in the best treatment is thought to be obtained when additional ingredients such as shallots, garlic, and

onions are added, as well as the addition of salt and sugar, which provide a delicious blend of flavors typical of powdered broth spices on the market.

Flavoring Chemical Test

Chemical tests were conducted to identify powdered flavorings' nutritional content from fish waste. These tests, carried out using the proximate method, focus on the protein, carbohydrates, fat, and fiber content in the food substance. The results of these tests, which include water content, ash content, protein content, carbohydrates, and fat content, can be seen in Table 3 (Suparjo, 2010).

Table 3. Results of analysis of the chemical content of powdered flavorings from fish waste

No.	Treatment	Komposisi (%)			
		Water	Protein	Fat	Ash
1	without soaking	19,49	30,97	5,87	18,11
2	pineapple soaking	19,42	27,79	3,27	18,24
3	lime soaking	11,30	19,74	0,59	23,62
4	baking soda soaking	19,59	23,87	3,19	19,51

Water Content

Water is used as the main component of food. The amount of water in a food affects its color, aroma, texture, and taste. The amount of water will also be directly related to the shelf life of a food item. The purpose of calculating water content is to determine the maximum range or limit of the water content in a sample or material (Novianti, 2020). The drying process greatly influences the water content of flavorings. Heat during the drying process can cause the water in the flavoring to diffuse to the surface and then by convection into the free air (Yonata et al., 2021).

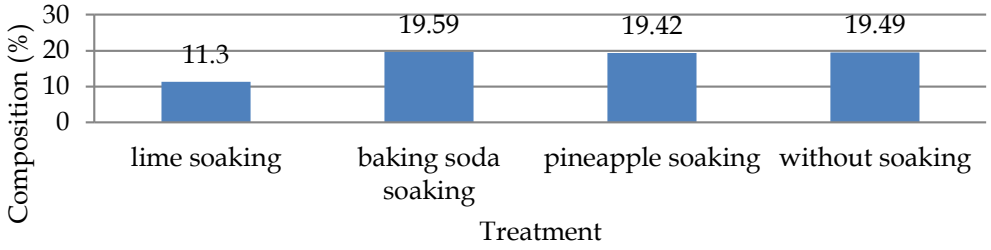

Figure 4. Comparison of the water content of powdered flavorings from fish waste.

Figure 4 show that the water content value ranges from 11.3% to 19.59%. These findings have practical implications for the production of powder flavoring. The highest water average was obtained for powder flavoring with baking soda soaking treatment, namely 19.59%, followed by powder flavoring with treatment without soaking, namely 19.49%, powder flavoring with pineapple soaking treatment, namely 19.42%, and the value. The lowest water content was in powdered flavoring with lime-soaking treatment, with 11.3%. It shows that differences in initial soaking treatment can produce varying water content of powder flavoring. A food product with a water content of less than 14% can be safe enough to prevent fungus or mold growth in food (Araminta et al., 2022). According to SNI-01-3709-1995, the maximum standard value for water content of flavorings is 12% (w/w). This statement indicates that only flavoring samples treated with lime soaking can still be said to meet SNI standards.

Crude Protein Content

Protein is a crucial food substance for the human body because it functions as fuel in the body and also as a building and regulating material. Protein in a fish's body is the compound with the highest content after water. Figure 5 show that the flavor protein content with the soaking treatment ranges from 19.74% to 30.97%.

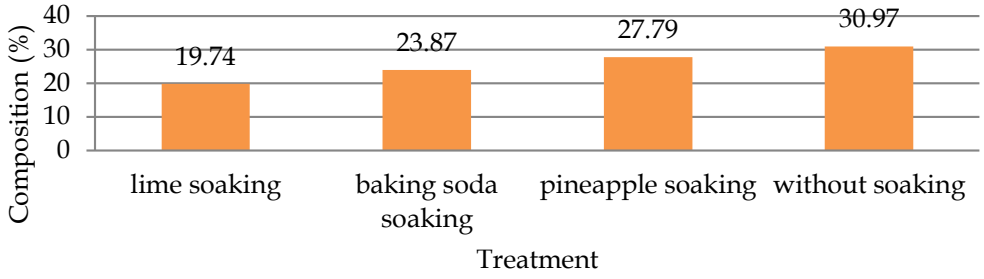

Figure 5. Comparison of protein levels of powdered flavorings from fish waste.

The protein content values of the powdered flavorings from fish waste are reassuring. The flavoring with the non-soaking treatment achieved the highest average protein content value at 30.97%, followed by the flavoring with the pineapple soaking treatment at 27.79%, the flavoring with the baking soda soaking treatment at 23.87%, and the flavoring with lime soaking treatment at 19.74%. Importantly, all these powdered flavorings meet and exceed the standard standards set according to SNI 01-4273-1996, with the minimum protein content in flavorings being 7%.

Crude Fat Content

Analysis and testing of the fat content in a food product has a critical role to play so that the calorie needs of the food can be calculated correctly. Fat content can also be used to estimate the level of oxidation related to the rancidity of a food ingredient (Pargiyanti, 2019; Fauzy et al., 2016). In the food sector, fat also has a function to help provide a savory taste to food ingredients (Hutomo et al., 2015). Figure 6 show that in this study, powdered flavorings had fat content values ranging from 0.59% to 5.87%.

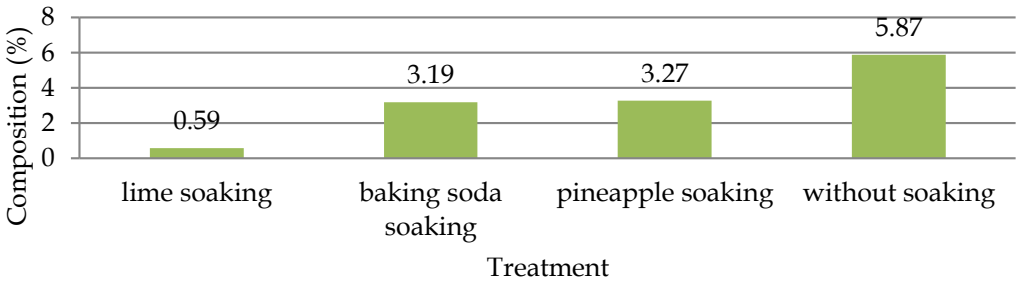

Figure 6. Comparison of the fat content of powdered flavorings from fish waste.

The highest average fat content value was achieved by the flavoring with the non-soaking treatment at 5.87%, followed by the flavoring with the pineapple soaking treatment, namely 3.27%, the flavoring with the baking soda soaking treatment, namely 3.19%, and the fat content value. The lowest was for flavoring with lime-soaking treatment at 1.39%. The initial soaking treatment can influence the fat content of the powdered flavoring. It is known that fish innards contain 1.63% fat (Riyanto et al., 2012). It means that lime-soaking treatment can reduce the fat content in fish innards. Meanwhile, the high-fat content of this flavoring is due to the addition

of additional ingredients such as shallots and garlic. However, the results of the fat content of the powdered flavoring are by the SIN-01-4218-1996 standard, where the quality of the fat content in the flavoring is a minimum of 0.3% so that the powdered flavoring from this research meets the SNI quality standards.

Ash Content

Ash content analysis is related to the inorganic mineral content of a food product. The higher the ash content of food, the higher the inorganic mineral content (Seftiono et al., 2019). In this study, powdered flavorings had ash content values ranging from 18.11% to 23.62%. A comparison of the ash content of powdered flavorings from fish waste treated with lime, baking soda, pineapple, and without soaking can be seen in Figure 7.

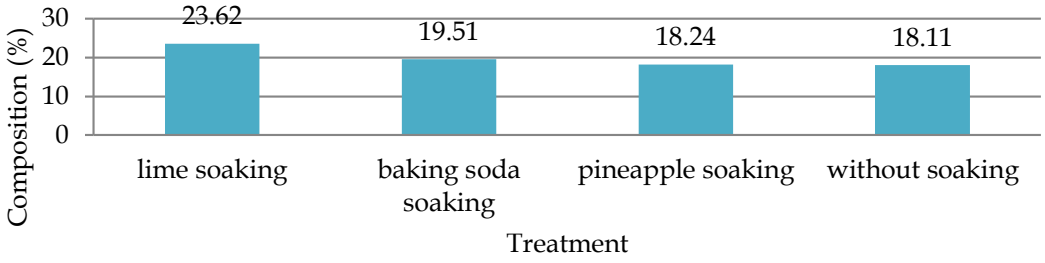

Figure 7. Comparison of the ash content of powdered flavorings from fish waste.

The highest average ash content value was achieved by the flavoring with lime soaking treatment at 23.62%, followed by the flavoring with baking soda soaking treatment, namely 19.51%, the flavoring with pineapple soaking treatment, namely 18.24%, and the fat content value. The lowest was for flavoring with treatment without soaking at 18.11%. A significant ash content indicates that many minerals are contained in the sample. However, excessive minerals are also not recommended in food ingredients. Therefore, a maximum limit has been set for the ash content. It's crucial for us, as professionals in the flavoring industry, to adhere to these standards. According to the Indonesian National Standard (SNI-01-3709-1995), the maximum quality standard for ash content in flavorings is 7% (w/w), so the powdered flavorings in this study do not meet SNI quality standards.

CONCLUSION

Natural flavoring from the utilization of fishery waste has been successfully carried out in this study. The panelists gave favorable ratings for the hedonic indicators of taste, color, appearance, and aroma of powdered flavoring from fish waste treated with pineapple and baking soda. For the powdered flavoring treated with lime soaking, the panelists gave a favorable rating for the hedonic indicator of taste. In contrast, the panelists rated favorably for the hedonic indicators of color, appearance, and aroma. On average, the panelists gave powdered flavoring from fish waste without prior soaking, giving a favorable to favorable rating. The results of the proximate analysis showed that the flavoring water content ranged from 11.30-19.59%, the protein content ranged from 19.74-30.97%, the fat content ranged from 0.59-30.97, and the ash content ranged from 18.11 —23.62%. These results indicate that for water and ash content, all flavorings do not meet the quality standards of the Indonesian National Standard.

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