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PROXIMATE COMPOSITION OF FRESH AND PROCESSED MANGROVE SNAIL *Telescopium telescopium*

Kandungan Proksimat Keong Bakau *Telescopium telescopium* Segar dan Olahan

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ABSTRACT

The mangrove snail *Telescopium telescopium* has long been utilized by communities in Olong Village, Central Maluku, as a food source. However, scientific information regarding the nutritional composition of fresh and processed *Telescopium telescopium* is still limited. This study aimed to determine the proximate composition of fresh and processed mangrove snail *Telescopium telescopium*, including crispy fried, pepes, and satay products. This research employed an experimental method. The treatments consisted of fresh *Telescopium telescopium* (A_0), crispy fried (A_1), pepes (A_2), and satay (A_3). The parameters analyzed included moisture, ash, fat, protein, and carbohydrate contents. The results showed that the proximate composition of fresh mangrove snail consisted of 72.52% moisture, 1.02% ash, 0.70% fat, 23.88% protein, and 1.88% carbohydrates. After processing, changes in proximate composition were observed. The crispy fried contained 28.59% moisture, 4.75% ash, 11.75% fat, 33.03% protein, and 21.88% carbohydrates. The pepes product contained 65.29% moisture, 2.78% ash, 4.76% fat, 24.36% protein, and 2.81% carbohydrates. Meanwhile, the satay product contained 49.10% moisture, 3.22% ash, 8.22% fat, 27.34% protein, and 12.20% carbohydrates. Therefore, processing methods affect the proximate composition of mangrove snail meat *Telescopium telescopium*.

Keywords: Fresh, Processed Products, Proximate Composition, *Telescopium telescopium*

ABSTRAK

Keong bakau *Telescopium telescopium* telah lama dimanfaatkan oleh masyarakat di Desa Olong, Maluku Tengah sebagai bahan makanan. Hingga saat ini informasi ilmiah tentang kandungan gizi segar maupun olahan dari *Telescopium telescopium* belum diperoleh. Penelitian ini bertujuan untuk mengetahui kandungan proksimat dari keong bakau *Telescopium telescopium* segar dan olahan seperti: goreng tepung, pepes dan sate. Penelitian ini menggunakan metode eksperimen. Perlakuan yang digunakan pada penelitian ini meliputi *Telescopium telescopium* segar (A_0); goreng tepung (A_1) pepes (A_2) dan sate (A_3). Parameter yang dianalisa berupa kadar air, abu, lemak, protein dan karbohidrat. Hasil penelitian menunjukkan bahwa kadar air yang dihasilkan pada keong bakau segar, sebesar 72,52%, abu 1,02%, lemak 0,7%, protein 23,88%, dan karbohidrat 1,88%. Setelah melewati proses pengolahan, terjadi perubahan kandungan proksimat. Kadar air pada produk goreng tepung sebesar 28,59%, abu 4,75%, lemak 11,75%, protein 33,03%, dan karbohidrat 21,88%. Kadar air pada produk pepes sebesar 65,29%, abu 2,78%, lemak 4,76%, protein 24,36%, dan karbohidrat 2,81%. Sementara itu, produk sate memiliki kadar air 49,1%, abu 3,22%, lemak 8,22%, protein 27,34%, dan karbohidrat 12,2%. Dengan demikian metode pengolahan mempengaruhi kandungan proksimat daging keong bakau *Telescopium telescopium*.

Kata Kunci: Olahan, Proksimat, Segar, *Telescopium telescopium*

INTRODUCTION

Telescopium telescopium is a type of Gastropod that lives in brackish water or mangrove forests of the *Rhizophora* sp. type. This animal is known by different names. Some call it mangrove snail, burungan, and others. Animals are known by the people of Olong Village, North Seram District, Central Maluku Regency by the name bia poli. *Telescopium telescopium* is widely used by the people of Olong Village as a food ingredient because the meat tastes good, is easy to find and has a fairly good nutritional content for the body such as protein, fat, vitamins and minerals as well as a number of fatty acids and amino acids. *Telescopium telescopium* is also used as a health food because it is believed to have properties as an asthma medicine. Hafiluddin (2012) explains that fresh *Telescopium telescopium* contains 12.16% protein, 0.38% fat, 5.42% ash, 7.86% carbohydrates, 78.14% water. Contains 17 types of amino acids, 7 types of fatty acids, and several minerals such as Ca, Mg, K, Fe, Zn, Cu, and Mn. *Telescopium telescopium* also contains compounds such as alkaloids, steroids, flavonoids, benidict, and ninhindrin, which play an important role in physiological activities in human health.

The nutritional content of *Telescopium telescopium* is known to be quite good, but its composition varies. Ramadani (2020) stated that *Telescopium telescopium* contains 16.8 g of protein, 1.2 g of fat, 8.5 g of carbohydrates, 66.9 g of water, 802 g of calcium, 464 kJ of energy, amino acids and essential fatty acids, vitamins B_6, B_{12}, choline, and niacin, as well as the minerals calcium, phosphorus, iron, zinc, selenium, and magnesium. Marjuki et al. (2012) stated that *Telescopium telescopium* from Sepulu Waters contains 12.43% protein, 4.12% fat, 2.77% ash, 77.08% water, and 3.60% carbohydrate, while from Socah Waters contains 12.26% protein, 4.60% fat, 2.50% ash, 77.66% water and 2.98% carbohydrate. *Telescopium telescopium* from Negeri Luhu Waters, Huamual District, West Seram Regency and Waai Village Waters, Central Maluku Regency contain fat content of 4.5448% and 3.3649%. Sukina et al. (2020) stated that fresh *Telescopium telescopium* from Kendari waters contains 13.5% protein, 0.77% fat, 4.29% ash, 74.95% water, 6.49% carbohydrate, 7.9 ppm Fe and 8.6 ppm Zn and contains 10 types of fatty acids including: myristic acid, pentadecanoic, palmitic, palmitoleic, heptadecanoic, cis-10 heptadecanoic acid, stearic, oleic, linolelaidic, and linoleic acid. While fresh dried *Telescopium telescopium* produces protein content of 53.91%, fat 3.06%, ash 17.13%, crude fiber 0.06%, carbohydrate 25.84%, minerals Fe 31.5 ppm and Zn 34.1 ppm.

Several regions in Indonesia, such as West Halmahera, Southeast Sulawesi, and Maluku, have utilized *Telescopium telescopium* as a food ingredient and even as a source of income. The people of Todowongi and Tuada Villages, Jailolo District, West Halmahera, utilize *Telescopium telescopium* as a food ingredient by boiling and stir-frying it (Haerullah, 2017). The people of Olong Village and surrounding villages in North Seram District, Central Maluku utilize *Telescopium telescopium* as a side dish by stir-frying it with rica, grilling it, skewering it, or boiling it and eating it with rice, papeda (rice cake), bananas, tubers such as kasbi and taro, or with other side dishes (Rieuwpassa et al., 2023). *Telescopium telescopium* has also been sold in dried, smoked form at a price of 15,000/kg.

To date, scientific information on the nutritional content of fresh and processed *Telescopium telescopium* from Olong Village has not been obtained, only limited to making cookies (Rieuwpassa et al., 2023). Meanwhile, scientific studies on the proximate content between fresh mangrove snails and processed ones based on traditional cooking methods such as pepes and satay, or semi-modern ones such as fried flour are still unknown. In fact, this information is very important in the development of fishery products based on local resources as an effort to support food diversification and increase added value. Scientific information on the mangrove snail *Telescopium telescopium* has so far been limited to studies on biology, ecology, and nutritional content of fresh meat, while processed diversification is limited to making sauces (Lutpia, 2017) and shredded meat (Ramadani, 2020). According to Dewi et al. (2019), the processing process can produce different results for the resulting product. This study aims to determine the proximate content of fresh and processed mangrove snails *Telescopium telescopium* such as: fried in flour, steamed in pepes and satay so that it can provide an overview of the nutritional content of several processing processes.

RESEARCH METHODS

This research took place in September 2025. Sampling was carried out in the coastal waters of Olong, North Seram District, Central Maluku Regency. Proximate analysis was carried out at the Fisheries Product Technology Laboratory, Faculty of Fisheries and Marine Sciences, Pattimura University. The materials used in this study included fresh *Telescopium telescopium* meat from Olong Waters, spices, ice cubes, plastic, label paper, distilled water, a number of materials for analytical purposes. The spices used included: shallots, garlic, ginger, turmeric, coriander, lemongrass, basil leaves, tomatoes, red chilies, curly chilies, spring onions, candlenuts, sweet soy sauce, eggs, seasoned flour, flavoring, sugar, salt, coconut oil, water, and a number of other materials used in the analysis process. The tools used included: Styrofoam, analytical scales, calipers, thermometers, knives, scissors, blenders, drying equipment, stoves, frying pans, spoons, plastic sieves, plastic containers, a set of glassware, a digestion flask, a fume hood, and several other tools used in the analysis process.

The method used in this study was an experimental method. To determine the size of the individuals obtained, morphometric measurements were taken, including shell length, width, and weight. This study was conducted in two stages: the first stage was a proximate analysis of fresh mangrove snails and the second stage was a proximate analysis of the mangrove snail meat after it had been processed into several processed products, including fried mangrove snails, steamed rice cakes (pepes), and satay. First, the mangrove snails were collected and washed thoroughly. After cleaning, the mangrove snails were soaked again in water for 12 hours to remove any remaining dirt. Afterward, they were drained. The mangrove snail meat was then extracted by breaking the shells. The meat collected was the black and greenish-white, chewy flesh, while the guts were discarded. The meat was thoroughly washed and placed in polyethylene plastic bags and then packed in Styrofoam filled with crushed ice for laboratory analysis. The mangrove snail meat was divided into four parts. The first part was for fresh analysis (A_0), the second part was for fried flour (A_1), the third part was for steamed fish (A_2), and the fourth part was for satay (A_3). The composition of the ingredients used for the processed products can be seen in Table 1.

Table 1. Composition of Ingredients Used

Raw Material (g)	Type of Processing		
	Fried Flour	Pepes	Satay
Mangrove snail meat	50	50	50

Raw Material (g)	Type of Processing		
	Fried Flour	Pepes	Satay
Red onion	5.6	5.6	1.6
Garlic	1.6	1.6	5.6
Candles	-	2.5	-
Turmeric	-	3.3	-
Ginger	2.1	2.1	2.1
Red chilies	-	0.8	0.8
Curly chilies	-	1.3	-
Tomatoes	-	5.8	5.8
Basil	-	0.5	-
Lemongrass	-	0.5	-
Ground coriander	0.5	0.5	0.5
Masako	1	1	1
Salt	0.3	0.3	0.3
1 chicken egg	25	-	-
Crispy seasoned flour	30	-	-
Coconut oil (ml)	-	6	6
Satay seasoning	-	-	50
Soy sauce (ml)	-	-	6
Water (ml)	-	25	-

Fried flour is made by soaking 50 grams of mangrove snail meat (*Telescopium telescopium*) in a mixture of spices such as shallots, crushed garlic, coriander, salt and flavoring for 10 minutes. Next, the marinade is coated with egg yolk and crispy seasoned flour. Let stand for a while until the crispy seasoned flour is absorbed and then fried. Frying is done using the deep-frying method for 2 minutes with oil at a temperature of 120ºC (Silaban et al., 2024) which is modified. Pepes is made by: shallots, garlic, ginger, turmeric, coriander, lemongrass, basil leaves, tomatoes, red chilies, curly chilies, spring onions and candlenuts are ground first, then sauté all the spices until fragrant, add water, flavoring and salt, then cook for 1 minute then remove and set aside. Mix the mangrove snail meat with the sautéed spices and let it sit for 30 minutes to allow the spices to penetrate. Then, wrap it in banana leaves and steam it. Steaming is done using a modified stainless-steel steamer in boiling water for 20 minutes at 95°C (Silaban, 2024). Satay is made by marinating it for 20 minutes in a ground spice mixture of shallots, garlic, red chilies, ginger, ground coriander, sweet soy sauce, cooking oil, salt, and flavoring. It is then placed on skewers and grilled. Grilling is done over a charcoal grill at 50°C for 10 minutes, followed by drizzled with a modified peanut sauce (Silaban et al., 2024).

These four treatments were repeated three times, and then analyzed for moisture, ash, fat, and protein content using the method (AOAC, 2005). Carbohydrates were calculated by difference. The data obtained was processed using Microsoft Excel, presented in table form and then compared with literature studies.

RESULT

Morphometric Characteristics and Yield of the Mangrove Snail (*Telescopium telescopium*)

Based on the results of morphometric measurements (Table 2) of 40 individual mangrove snails (*Telescopium telescopium*) from the waters of Olong, North Seram District, Central Maluku, the average body weight of the mangrove snails (*Telescopium telescopium*) reached 59.57 g, the meat weight was 10.37 g, the shell diameter was 3.54 cm, and the shell height was 7.89 cm. Based on the total length size classes of the mangrove snails (*Telescopium*

telescopium) categorized by Sibua et al. (2021), where small ranges from 4.7 to 6.53 cm; medium ranges from 6.54 to 8.96 cm; and large ranges from 8.97 to 10.10 cm, the mangrove snails (*Telescopium telescopium*) from this study fall into the medium-sized category. The yield of the mangrove snail Telescopium telescopium obtained in this study was 17.4%. This indicates that the yield of edible parts of the mangrove snail is relatively small due to the relatively low percentage of meat produced by weight.

Table 2. Morphometric Measurements of *Telescopium telescopium*

Parameter	Body Size (n = 40)
Whole weight (g)	59.57 ± 7.69
Meat weight (g)	10.37 ± 0.24
Shell diameter (cm)	3.54 ± 0.23
Shell height (cm)	8.89 ± 0.5

These results show that the proportion of shell is more dominant than the usable meat portion. The greater body weight compared to the weight of the meat indicates that the majority of the mangrove snail biomass is composed of shell. This aligns with the characteristics of *Telescopium telescopium*, which generally has a thick shell as an adaptation to extreme environmental conditions in muddy areas. The yield of the mangrove snail *Telescopium telescopium* obtained in this study is higher than the yield of mangrove snails *Telescopium telescopium* from Sepuluh and Socah waters, Bankalan, Madura, which were obtained in a study (Hafiluddin, 2012), which were 10.16% and 9.14%, respectively. According to (Silaban, 2025), factors such as natural food availability, habitat quality, substrate type, and gonad maturity can also influence this composition. Considering the relatively low yield, utilization of *Telescopium telescopium* mangrove snails should not only focus on meat but also consider the utilization of shell waste, thereby increasing economic value and supporting sustainable fisheries resource utilization.

Proximate Content of Fresh and Processed *Telescopium telescopium* Mangrove Snails

The results of the proximate analysis (Table 3) show that fresh *Telescopium telescopium* mangrove snails have a water content of 72.52%, protein 23.88%, ash 1.02%, fat 0.7%, and carbohydrate 1.87%. These results indicate that fresh *Telescopium telescopium* mangrove snails have relatively high water and protein contents (72.52% and 23.88%, respectively), while having a relatively low-fat content (0.7%).

Table 3. Proximate Composition of Fresh, Fried Flour, Pepes, and Satay Mangrove Snail *Telescopium telescopium*

Proximate Composition	Fresh	Fried Flour	Pepes	Satay
Water (%)	72.52 ± 0.99	28.59 ± 0.37	65.29 ± 0.47	49.10 ± 0.31
Protein (%)	23.88 ± 0.09	33.03 ± 0.15	24.36 ± 0.35	27.34 ± 0.25
Ash (%)	1,02 ± 0.01	4,75 ± 0.09	2.78 ± 0.03	3.22 ± 0.04
Fat (%)	0.7 ± 0.08	11.75 ± 0.35	4.76 ± 0.06	8.32 ± 0.08
Carbohydrate (%)	1.87 ± 0.83	21.87 ± 0.68	2.8 ± 0.02	12.01 ± 0.70

After undergoing various processing stages, including frying, steaming, and satay, the proximate composition showed varying values. The proximate analysis results (Table 3) show that the proximate composition of *Telescopium telescopium* meat processed into steamed, fried, and satay varieties changed from its fresh state. The highest protein content was found in the fried product with flour at 33.03%, followed by satay at 27.34%, and pepes at 24.36%. The highest ash content was found in the fried product with flour at 4.75%, followed by satay at 3.22%, and pepes at 2.78%. The highest fat content was found in the fried product with flour at 11.75%, followed by satay at 8.22%, and pepes at 4.76%. The highest carbohydrate content is found in fried flour products at 21.88%, followed by satay at 12.02% and pepes at 2.81%. The lowest water content is found in fried flour products at 28.59%, followed by satay at 49.1% and pepes at 65.29%. Protein, fat, carbohydrate, and ash content will increase after processing, while water content tends to decrease. The highest protein, ash, fat, and carbohydrate content is found in fried flour products, while the lowest is in pepes products.

DISCUSSION

The fresh mangrove snails (*Telescopium telescopium*) found in this study have the potential to be a good source of animal protein for coastal communities. These results align with several studies (Table 4), which state that mangrove snails generally have a high-water content of 70–80% and a relatively high protein content (12–25%). They also have a fat content of less than 2%, making them a low-fat food.

Table 4. Comparison of the Proximate Composition of Fresh Mangrove Snails (*Telescopium telescopium*) with Several Research Results

Source	Proximate (%)				
	Water	Ash	Fat	Protein	Carbohydrate
Research Result	72.52	1.02	0.7	23.88	1.88
Hafiluddin (2012)	78.14	5.42	0.38	12.06	7.86
Ananda (2017)	72.42	3.41	0.25	13.87	10.06
Sukina (2020)	74.95	4.29	0.77	13.5	6.49

Processing methods can influence the chemical composition of a food ingredient (Sundari et al., 2015; Nurjanah et al., 2020). The high-water content in pepes products is due to the steaming process, which uses steam heating, resulting in relatively minimal water loss from the ingredients. The low water content in fried flour products is caused by the frying process and the use of flour as a coating. During this process, water evaporates from the mangrove snail meat tissue because the heat from the oil causes the water in the material to turn into steam and escape from the tissue. The empty space is then filled by oil, significantly increasing the fat content. During the frying process, the evaporation of water from the mangrove snail meat tissue causes an increase in the concentration of solid components, including protein, resulting in a higher protein percentage. In addition, the addition of coating materials such as flour can also contribute to increasing protein content, although in relatively small amounts. During the frying process, flour will undergo gelatinization and form a layer that adheres to the surface of the material, thereby increasing the overall carbohydrate content. Silaban (2023) and Silaban et al. (2024) reported that in some fishery products, reducing the water content of a food ingredient can increase the percentage of solid components such as protein, fat, ash, and carbohydrates. Processing processes such as frying, steaming, baking, or drying can affect the nutritional content of food ingredients due to changes in water content, oil absorption, and the addition of other ingredients during processing. The difference in proximate composition between fresh ingredients and processed products in this study also showed the same tendency as the studies of Silaban (2024) and Silaban et al. (2024).

CONCLUSION

Based on the research results, it can be concluded that the processing method can affect the proximate content of mangrove snail meat *Telescopium telescopium*. In fresh mangrove snails, the resulting water content is 72.52%, ash 1.02%, fat 0.7%, protein 23.88%, and carbohydrate 1.88%. After going through the processing process, there is a change in the proximate content of mangrove snails. Fried flour products have a water content of 28.59%, ash 4.75%, fat 11.75%, protein 33.03%, and carbohydrate 21.88%. Pepes products have a water content of 65.29%, ash 2.78%, fat 4.76%, protein 24.36%, and carbohydrate 2.81%. Meanwhile, satay products have a water content of 49.1%, ash 3.22%, fat 8.22%, protein 27.34%, and carbohydrate 12.2%. The fresh *Telescopium Telescopium* mangrove snails resulting from this study have high protein content and low ash content, so they have the potential to be a source of animal protein.

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