Density and nutrient content of *Terebralia pallustris* mangrove snails in mangrove ecosystems in Pannikiang Island, Barru Regency, South Sulawesi

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**ABSTRACT**

*Mangrove snail, Terebralia palustris Linnaeus 1967, was also found on Pannikiang Island, Barru Regency, South Sulawesi. This study aims to describe the fluctuation of *T. palustris* density in a year of observation. This research was conducted for ten months from August 2018 to July 2019. There were two research stations. Each station has a large plot measuring 10m x 10m and in it, five small plots are measuring 1m x 1m. Measurements of environmental parameters such as temperature, salinity, and pH were carried out in situ. This snail meat as much as 100gr also analyzed proximate. The proximate analysis of the snail shows that crude protein content is 18.73% so that the snail is very suitable to be used as a source of protein. The highest density is in July 2019 and the lowest density is in August 2018.*

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**Introduction**

The mangrove ecosystem located on Pannikiang Island, Barru Regency, is in good condition and is very dense with dense canopy cover. The area of mangrove cover on Pannikiang Island reaches 89.01 hectares or reaches 87.45% of the island's land area (Irmayansari, 2016).

*Terebralia palustris* mangrove snails are snails that live in mangrove ecosystems, especially on Pannikiang Island, Barru Regency, South Sulawesi (Samsi, 2017). This species has the largest size among members of the Potamididae family. The maximum length of *T. palustris* shell is 19 cm and most are 12 cm (Carpenter & Niem, 1998). The size of *T. palustris* shells is three to four times the size of *T. sulcata* and about twice the size of *T. semistrata* (Houbrick, 1991). Amounts are abundant and conspicuous in muddy mangroves and generally live in brackish water. The shell is large, elongated, and thick. The color of the shell is dark brown to bluish-black. The aperture is shiny and blackish-brown with a light brown columella (Carpenter & Niem, 1998). The density of these snails in each place must be different and depends on environmental factors that influence it. This is the aim of this study.

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Materials and Methods
1. Research design

This research was conducted in the mangrove ecosystem on Pannikiang Island, Barru Regency, South Sulawesi from August 2018 to July 2019. Sampling was not conducted in December 2018 and January 2019 due to weather constraints. The coordinate points at station A are 4˚20'23" S and 119˚36'11" E while at station B are 4˚21'37" S and 119˚35'42" E.

In this study, two research stations were used. Station A is located in the northern part of the island and Station B is located in the southern part of the island. At each station, a plot of 10 m x 10 m was used and in this plot, there were small plots of 1 m x 1 m in a total of 5 units (Samsi, 2017).

2. Population and samples

The sample of this research is the *T. palustris* mangrove snail associated with mangroves.

3. Sample collection techniques and instrumental development

Samples found for each plot are then put into the plastic. Observations and sample counts were carried out at the Laboratory of Fisheries Biology, Faculty of Fisheries and Maritime Affairs, Hasanuddin University. Proximate analysis was carried out at the Laboratory of Animal Food Chemistry, Faculty of Animal Science, Hasanuddin University.

Measurement of environmental parameters (temperature, salinity, and pH of seawater) is done in-situ before sampling. Salinity is measured directly in the field using a hand-refractometer that has been previously rinsed with distilled water.

4. Data analysis techniques

The density of *T. palustris* is calculated using the following formula (Brower, Zar, & Von Ende, 1990):

$$D_e = \frac{n_i}{A}$$

Note $D_e =$ density (ind m$^{-2}$), $n_i =$ total number of individuals, $A =$ total area of the sampling area, that is, the plot area (1 m x 1 m) multiplied by the number of replications (m$^2$).

Results and Discussion

a. Densities of *Terebralia palustris*

Samsi (2014) found the average density of *T. palustris* in 2014 on Pannikiang Island at 24.6 ind m$^{-2}$. Different results from 2018 to 2019 are an average density of 11.48 ind m$^{-2}$. The highest average density was obtained in July 2019 and the lowest in August 2018 (Figure 1).

Figure 1. Average density of *T. palustris* every month

Density is measured to find out how many individuals are in a certain area. Fratini, Vannini, Vigiani, & Cannicci (2004) found 10.5 ind m$^{-2}$ *T. palustris* in Kenya's mangrove areas. Plaziat (1984) found *T. palustris* density of 150 ind m$^{-2}$ while Slim et al. (1997) obtained a *T. palustris* density of 33 ind m$^{-2}$ in the mangrove bay of Gazy Bay, Kenya. Patria & Putri (2017) found *T. palustris* density of 25 ind m$^{-2}$ on Pulau Panjang, Banten.

Figure 2. The average density of *T. palustris* every month at stations A and B

The density of *T. palustris* each month at stations A and B is different. The density of *T. palustris* at station A is higher than at station B (Figure 2). This is caused by several factors, namely the temperature of seawater, salinity of seawater, acidity of seawater, sediments and dominant plant species.
The results of measurements of temperature and salinity of seawater at stations A and B show results that are not much different (Figures 3 and 4). However, slightly different results are shown in seawater acidity measurements at stations A and B (Figure 5). This striking difference can be seen from September 2018 to March 2019.

b. The content of snails

This snail is consumed by local residents as a source of protein. These snails are also consumed in Merauke (Pasaribu, Buyang, & Monika, 2019). Proximate analysis results show that in every 100 grams of mangrove snails it contains 67.84% water, crude protein 18.73%, crude fat 0.39%, crude fiber 0.16%, the ash content of 4.16 %, and Extraction Material without Nitrogen of 8.72%. Pasaribu et al. (2019) showed slightly different results, namely an average water content of 78.66%, an average protein of 28.68%, an average fat of 3.31%, and an average ash content of 28.13 %. The difference in the nutritional content of T. palustris snails is influenced by several factors, namely body weight, feed, length and shape of the shell (Ademolu et al., 2004; Emelue & Dododawa, 2017; Zhang et al., 2014).

Some snails can be consumed and contain high nutrition. Engmann, Afoakwah, Darko, & Sefah (2013) found that Achatina achatina snails contained 82.96% protein, total carbohydrate 3.26%, and fat 3.98%. Babalola & Akinsoyinu (2009) found a crude protein content of 84.91% in Limicolaria sp., 79.28% in Achatina fulica, and 75.28% in Achatina achatina, and 73.67% in Archachatina marginata.

References


