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Length-Weight relationships and condition factors of *Telescopium telescopium* (Gastropoda: Potamididae) in banggi coast of central Java, Java Island, Indonesia

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Wardiatno**

Abstract

Length-Weight relationship (LWR) of *Telescopium telescopium* were analyzed from coast of Banggi, Rembang, Central Java, Indonesia. This study was found 644 specimens during September 2016 – July 2017 at low tide and took systematic measurements (length and weight) to quantify shell size. The parameter a and b relationship used the formula $W = aL^b$ and the value of the b slope in the length-weight relationship was 1.14 and the intercept was 0.05486. The length – weight relationship in *Telescopium telescopium* expressed an allometric growth. The condition factor 'K' of all experimental fish was below 1.0 (0.78 ± 0.13) indicating poor or extrem condition of experimented gastropod.

Keywords: allometric, condition factor, banggi coast

1. Introduction

Telescopium telescopium, a mangrove epifauna, prefers to inhabit the muddy substratum of midlittoral mudflats both within and outside the mangrove forests. *Telescopium telescopium* is characteristically found in soft muds in the Rhizophora forest, on the surface of the mud in shallow pools and on the muddy banks of creeks [1]. Growth patterns such as shell morphology and size at maturity can also be different between the sexes, especially in animals that mature at a small size and then approach a larger asymptotic size. Body and shell growth rates are the result of several physiological constraints and ecological factors. Gastropods are able to live in diverse habitats, and the morphology of their shells is considered as a trait that is adapted to each habitat [2].

The length-weight relationship (LWR) and its accompanying parameters are inevitable tools in the practical assessment of stocks of aquatic species (fin and shell fishes). Estimation of the length-weight relationships of organisms are essential among other reasons; for assessing the relative wellbeing condition [3]. The condition factor expresses the relationship between weight and length [4]. This factor reflects changes in the animal's physiology and has also been broadly used to estimate mean weight from a known length and to calculate the index of physical condition of populations [5]. This study is to know the Length- Weight relationship (LWR) of the *Telescopium telescopium* from Banggi Coast of Central Java, Java Island.

2. Materials and Methods

The study was conducted at Banggi Coast of Central Java, Java Island. The mangrove forest is flushed by daily tides and grows on fine mud. The location of research was 6°42'5" S 111°23'16" E. *Telescopium telescopium* were collected from Coast of Banggi Rembang Central Java for a period of one year (September 2016 – July 2017). The length (L) was measured using a caliper (0.1 mm accuracy) and the values expressed in mm. The weight (W) was determined using a weighing balance and the values expressed in grams. The relationship between length and weight is described in two forms, the isometric and allometric. Length-weight relationship: The length-weight (log-transformed) relationships were determined by linear regression analysis and scatter diagrams of length and weight were plotted. The length-weight relationship of the experimented gastropod is worked out as per cube law given by following formula [6].

$$W = aL^b$$

Where, W=Weight of gastropod (g), L is observed total length (mm), 'a' is the regression intercept and 'b' is the regression slope. The logarithmic transformation of the above formula is

$$\text{Log } W = \text{Log } a + b \text{ Log } L$$

Fulton's condition factor (K): Fulton's condition factor (K) was calculated according to [7] equation as per formula given below:

$$K = W \times 100 \frac{W \times 100}{L^3}$$

W=Weight of gastropod (g), L is observed total length (mm),

3. Results

The sample of gastropods were found 644 specimens in coastal Banggi, Central Java Rembang, Indonesia during September 2016 – July 2017. The total length collected 33.92 mm – 96.97 mm and total weight collected 12 g – 69.91 g. The frequency distribution was noted the most gastropoda between 80.98 – 88.97 mm (196 specimens) (Fig 1). The minimum of frequency distribution was 57.95 -64.95 mm (20 specimens).

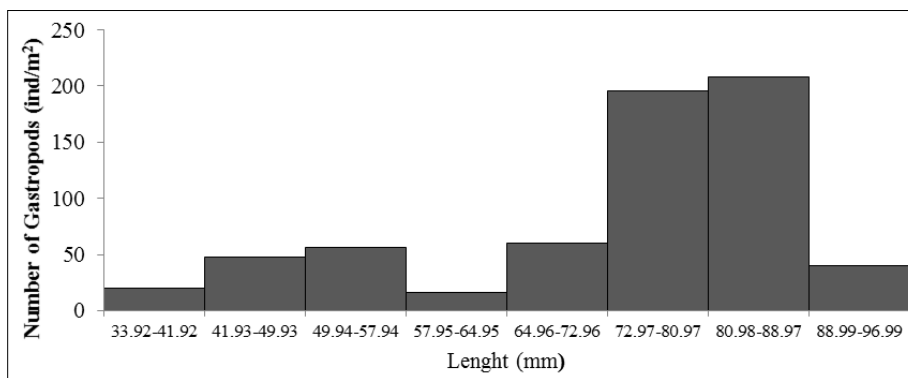


Fig 1: Frequency of the total shell length of *Telescopium telescopium* in Coast Banggi Rembang, Central Java, Indonesia

Fig 2: shows the regression analysis of linier relationship between length and weight of *Telescopium telescopium*. The value b was

1.14. The value of exponent b was found to less than 3

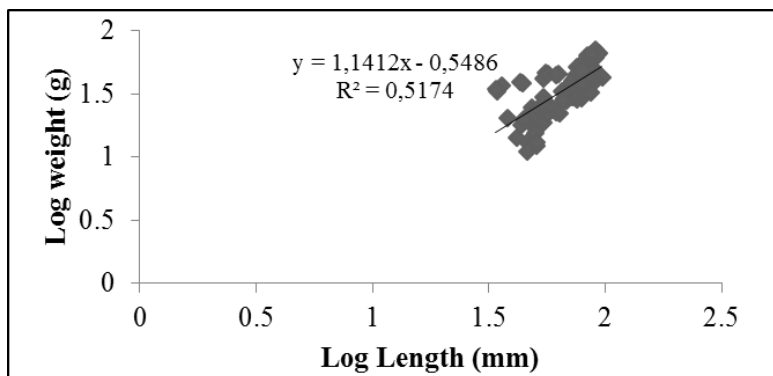


Fig 3: Scatter diagram showing Length – Weight relationship in *Telescopium telescopium* in Coast of Banggi Rembang Central Java

Figure 4 shows K value. Site I had a K value (0.34±0.31), site II (0.59±0.46), site III (0.96±0.03), and site IV (0.99±0.01). All of the sites had k value (0.78±0.13). All sites showed the value difference of K. Site I and III had a stability of K value

during Sep 2016 – July 2017. Meanwhile, site I and II had fluctuative value of K. The difference of K value indicated that *T. telescopium* had a life cycle that was affected by climate, feeding density in area, and others conditions.

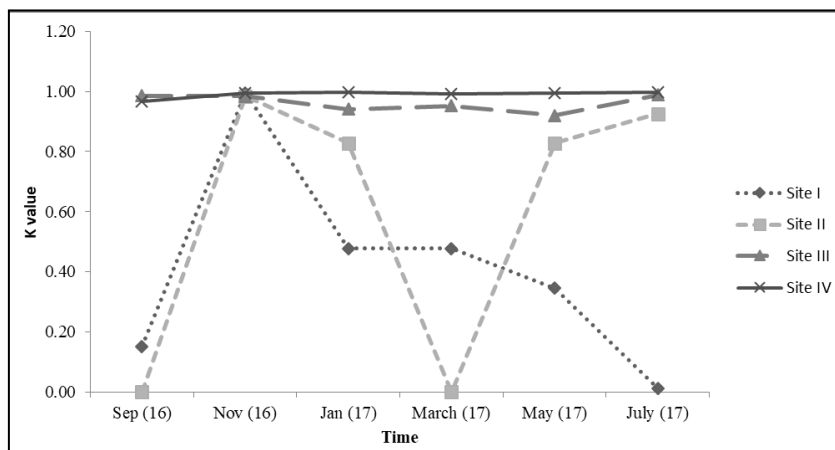


Fig 4: K value in *Telescopium telescopium* in Coast of Banggi Rembang Central Java

4. Discussion

The value b was 1.14. Depending on the value of the allometric coefficient, the growth was considered isometric ($b = 3$), positive allometric ($b > 3$) or negative allometric ($b < 3$)^[8]. This study showed length - weight relationship in *T. telescopium* in different months. The gastropods demonstrated that growth strongly depends on seasonal changes and food sources in the mangrove ecosystem. Changes in the value of b could be related to environmental factors such as the competition for food, food availability, season, temperature, salinity, season, and sex^[9, 10]. Morphological differences can be caused by water temperature and predator abundance^[11]. A number of factors could affect the ratio between shell weight and length and food availability^[12]. Many various foods that were consumed by organism increasing a gonad size and a body size^[13].

Condition factor of K could be used to predict the conditions of gastropods in an ecosystem. The K value obtained in the present study ranged (0.78 ± 0.13). Based on the categories values less than 1 are considered very poor. If the K value for the gastropods is greater than one, the gastropods are above average condition and receive adequate natural food for their growth^[14]. Gastropods' condition factors were also strongly influenced by the conditions of the biotic and abiotic environment and could be used as an index to assess the ecosystem status. The condition factor could also differ due to age, sex, season, habitat, maturity phase, intestinal fullness, types of food, and feeding activities^[15]. Condition factors (K) are used to compare conditions, health or wellbeing and for monitoring feeding intensity, age, and growth rate^[16, 17]. Condition factor a is a constant which can provide an indication of the "well being" of a given species, therefore it can be regarded as an indicator of the food abundance for the given species in a given area or time. Variations in the condition factors over different years may be synonymous with fluctuations and changes in food availability^[13]. All of specimens showed the Length- Weight relationship (LWR) showed allometric growth.

5. Acknowledgement

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