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SOME BIOLOGICAL PROPERTIES OF DATE MUSSELS, *LITHOPHAGA LITHOPHAGA* L., 1758 (MYTILIDAE) IN THE GULF OF ANTALYA

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Abstract

This research has been carried out to investigating of some biological aspects of date mussels, Lithophaga lithophaga distributing in Gulf of Antalya, in February 2015 – January 2016. The samples were used to determine length and live weight frequency distributions (nonlinear regression using the allometric function), size (length, breadth, thickness) – size relationship (linear regression). The length – live weight relationships of L. *lithophaga were determined by the general formula W = a x L^b, where "W" is the live weight in grams, "L" the sizes (length, breadth, thickness) in cm, and "a" and "b" are the constants to be calculated. Length – breadth and length-thickness relationship were determined by log W = log a +b log L. The statistical analysis of "r^2" and 95% confidence limits of the parameters "a" and "b" were calculated. Mean size and weight of samples was calculated 75.58 ± 17.65 cm, 6.56 ± 5.27 g, respectively. Positive allometry was found for the breadth (B) on length and length on live weight relationship was displayed negative growth. Negative relative growth was recorded in the breadth on length and thickness on length (P<0.001).*

Key words: *Biological properties, date mussels, Lithophaga lithophaga, gulf of Antalya.*

INTRODUCTION

The Mytilidae is a diverse group of bivalves adapting themselves to various shallow and deep-sea environments. All mytilid bivalves attach their antero-ventral shell margin to hard or soft substrata by a byssus composed of collagen. Three life modes are distinguishable. These are epifaunal, semi–infaunal, and rock boring. Rock-boring bivalves are an important component of rocky marine ecosystems (Guidetti and Boero, 2004; Devescovi et al., 2005).

Lithophaga lithophaga (Linnaeus, 1758) is a bivalve species belong to mytilidae family. Its shell grows up to 12 cm in length and 70 g in weight. This species is distributed throughout the Atlantic Ocean from Portugal down to Senegal and northern coast of Angola. Furthermore, it occurs throughout Mediterranean coasts (Fischer et al., 1987; Gonzalez et al., 2000). It can be found in coastal areas where it inhabits limestone rocks in which it bores holes 10-20 cm long (Gonzalez et al., 2000). The endolithic bivalve *Lithophaga lithophaga* (Linnaeus, 1758) is part of this community, digging into limestone by means of chemical secretions (Morton and Scott, 1980; Mojetta and Ghisotti, 1996; Owada, 2009). In their tunnels, individuals can live for 50 years or more (Katsanevakis et al., 2008). This gonochoristic bivalve is most abundant in the midlittoral and sublittoral zones (Galinou-Mitsoudi and Sinis, 1994).

The date mussel was subject of several studies dealing with its biology, population dynamics, fecundity and habitat (Simunovic´ et al., 1990; Galinou-Mitsoudi and Sinis, 1994, 1995, 1997; Jaafar Kefi et al., 2007; Devescovi, 2009). Some other studies focused on the impact of harvesting and overexploitation on marine ecosystem and Mediterranean rocky coasts (Fanelli et al., 1994; Parravicini et al., 2009).

Allometry is the relation between the size of an organism and the size of any of its parts. Allometric growth is differential growth of body parts (x and y) expressed by the equation "W = aL^b", where "*a*" and "*b*" are fitted constants. Allometric relations can be studied during the growth of a single organism or different organisms. Although, in bivalves allometric growths have been widely studied in many species and used as one parameter to describe the trophic conditions of bivalve species in different habitats (Saxby, 2002; Ross and Lima, 1994; Parky and Oh, 2002). There is no published information available concerning on biological aspects of *L. lithophaga* in the gulf of Antalya, Mediterranean Sea.

The aim of the present study was to investigate some biological properties of *L. lithophaga* were studied in the gulf of Antalya.

MATERIALS AND METHODS

The present work was carried out the Gulf of Antalya, from an anthropogenic ally contaminated area, in February 2015 – January 2016 (Figure 1). Individual of date mussels were collected (extracted) with traditional methods, hammers, chisels and pincers from depths of 0 - 10 m (36.883715°N, 30.679556°E).

Figure 1. Location of studied area in the Gulf of Antalya

A total of 86 various sizes of date mussels were collected by SCUBA diving equipment. After diving all specimens were immediately put inside marine water and kept alive until transferred research laboratory of Akdeniz University, Fisheries Faculty. All live individuals were weighed to the nearest 0.01 g and measured with digital calipers. Length, breadth and thickness of the *L. lithophaga* were measured by digital calliper (Figure 2).

Figure 2. Linear measurements used in *L. lithophaga* for this study. L: length; B: breadth; T: thickness

In order to describe relative growth, relationships were established between Length and breadth (L and B) and weight (W) variable by fitting power functions ($W = aL^b$) for the linear variables and logarithmic functions (log W = log a + b log L) for the volume-related variables, with ''a'' as the intercept and ''log b'' as the coefficient of allometry. To determine whether ''b'' was different from 1 (linear variables) and 3 (volume-related variables), respectively, t tests were performed following Mayrat (1959). In this way, the type of relative growth (negative allometry for b<1 or b<3; isometry for b = 1 or b= 3; and positive allometry for a>1 or a>3) was determined (King, 1995; Pauly, 1983).

RESULTS AND DISCUSSIONS

Length frequency distribution

In this study, a total of 86 specimens of *L. lithophaga* are analysed. Mean size of samples was calculated 75.58 ± 17.65 cm. Other dimensions (breadth and thickness) were used to determine the size of the study by calculating the frequency. However, during the evaluation process, according to the example of studies conducted, only length and live weight frequencies were calculated. The length frequency distribution diagram was given in Figure 3.

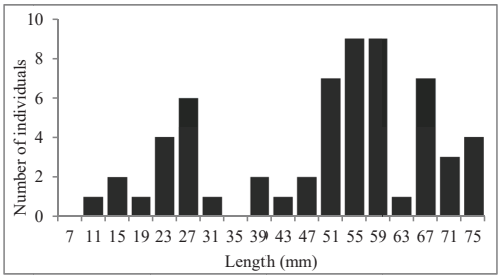

Figure 3. Length frequency distribution

Live weight frequency distribution

Mean weight of samples was calculated 6.56 ± 5.27 g. The live weight frequency distribution diagram was given in Figure 4.

Length – live weight relationship

The length – live weight and breadth – live weight relationships were calculated and shown in Figure 5, 6. From visual inspection, the relationship length on live weight relationship was displayed negative growth and it was

observed positive growth for the breadth on live weight relationship (P<0.001).

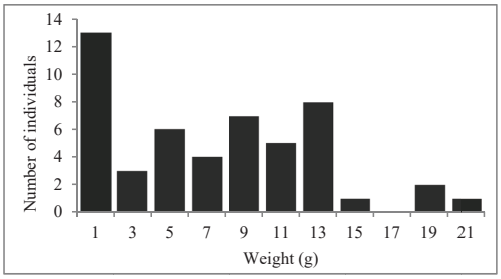

Figure 4. Live weight frequency distribution

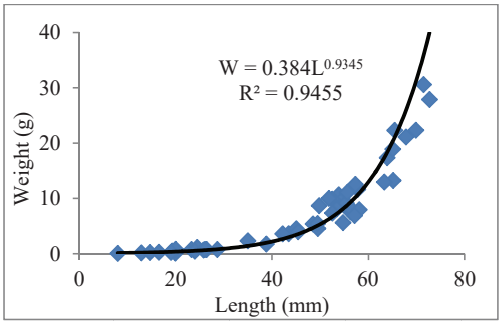

Figure 5. Length – live weight relationship

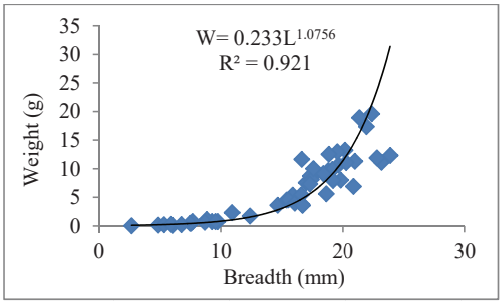

Figure 6. Breadth – live weight relationship

Breadth – length and thickness – length relationship

The regression of log breadth on log length and thickness on length were given a linear relationship expressed by log W = log a + b log L (Figure 7, 8). Concerning the relationships between linear and volume related variables, a negative relative growth was recorded in the breadth on length and thickness on length (P<0.001).

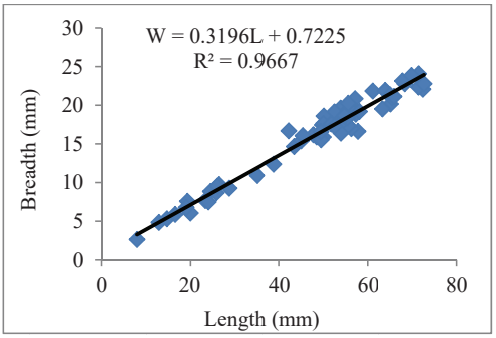

Figure 7. Breadth – length relationship

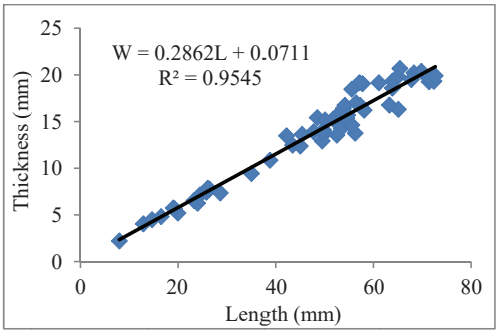

Figure 8. Thickness - length relationship

The present study of growth parameters of *L. lithophaga* collected from gulf of Antalya has demonstrated that a positive allometry was found for the breadth (B) on length and length on live weight relationship was displayed negative growth. Similar results were reported by Kefi et al. (2014) in Bizerte bay, northern Tunusia. According to literature data, *L. lithophaga* has the lowest growth rate of all studied species of the family Mytilidae (Galinou-Mitsoudi and Sinis 1995; Katsanevakis et al., 2008). This slow growth is probably related to the longevity of this species, which can live for more than 54 years (Galinou-Mitsoudi and Sinis, 1995). These authors also showed that individuals of 15–52 mm in length have an age of 6–25 or even up to 36 years.

Negative allometries were recorded in the breadth on length and thickness on length in present study (P<0.001). Although similar results were found in the Bizerte bay (Kefi et al., 2014), Wilbur and Owen (1964) were reported isometric relationships for both breadth and thickness on length. It is considered that these variations are likely

related to environmental and physiological conditions such as the gonad status.

CONCLUSIONS

It is well known, Data mussels*, L. lithophaga* is one of endangered species. It is illegally collected by fishermen and divers from natural habitats of Mediterranean subtidal ecosystem. Knowing biology and understanding their role in the ecosystem is very important. The information may be useful for proposing management measures to protect local wild stocks.

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