



Some Observations on Relationships of the Liver, Ovary and Body Weights for Pipefish Species at the Lake Bafa Coasts (Muğla)

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ARTICLE INFO	ABSTRACT
<p><i>Research Article</i></p> <p>Received : 15/01/2019 Accepted : 15/02/2019</p> <p>Keywords: Pipefish <i>Syngnathus abaster</i> <i>Syngnathus acus</i> Hepatosomatic index Lake Bafa Turkey</p>	<p>This study aims to determine various relationships between liver, gonad and body weights of the two pipefish species caught in two breeding seasons from the Bafa Lake (Muğla) coasts between 2014 -2016. Using beach seine-net in the lake, a total of 208 pipefish specimens (79 <i>Syngnathus abaster</i> and 129 <i>Syngnathus acus</i>) were sampled. L-W relationship and Fulton condition factor were $W = 2E - 0.9^{4.01}$, 0.035 ± 0.009 in <i>S.abaster</i> specimens. Also LW relationships and condition factor were $W = 8E - 0.9^{3.83}$, 0.033 ± 0.01 in <i>S. acus</i>. On the other hand mean \pm SD of HSI and GSI values were 2.18 ± 1.65 and 7.69 ± 7.12 respectively. In <i>S.acus</i> values 3.22 ± 3.13 and 5.49 ± 5.12 as well. The decrease in HIS and K values, provides sufficient information to claim that species in the lake spend all energy requirement obtained with proper feeding to growth and gonad development.</p>

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Introduction

Syngnathus abaster and *Syngnathus acus* (Fam: Syngnathidae) are distributed along eastern Atlantic coasts and also Mediterranean and Black sea (Dawson, 1986). These species are abundant in sea, brackish waters and fresh waters (Movčan, 1988). Although they have not economic importance, have attracted attention due to their reversed sex roles (Berglund et al., 1986) and few reproductive seasons (Franzoi et al., 1993; Campbell and Able, 1998) to different researchers from the world.

The condition factor, defined as good nutrition index, shows changes in the amount of stored nutrients in the fish muscle. The condition factor, which reveal a feeding activity of a species, is used to determine whether they utilize the nutritional sources in best way. Fish condition is affected by gonad weight and body weight of fish (Mahboob and Sheri, 2002). In bony fish, gonad weight depends, in part, on body weight (Mahboob and Sheri, 1997). According to Mahboob and Sheri (2002), gonadosomatic index (GSI) is defined as the ratio of

gonadal development to gonadal activity. Gonadal regeneration in female fish contains protein deposition and lipid absorption of developing oocytes and the source of these depositions can be the liver in many species depending on oocyte development (Mahboob et al., 2002). Hepatosomatic Index (HSI) is defined as the ratio of liver weight to total body weight and used as a measure of the energy reserves of an animal, especially in fish. The relationship between liver weight and body weight is given by seasonal variation (Mahboob et al., 2002). Analyses of CF, HSI and GSI of fish species may reveal information on the general health condition of the organisms.

Hepatosomatic Index (HSI), Fulton condition factor (CF) and gonadosomatic index (GSI) knowledges of *S. abaster* and *S.acus* are virtually undocumented from lake environmental. The aim of this study is to determine the relationships of gonad, liver and body weights between the two pipefish species from the lake environment in Turkey.

Material and Method

Using beach seine-net at the lake coasts, a total of 208 pipefish specimens (79 *S.abaster* and 129 *S.acus*) were sampled during the fall and spring seasons between the years of 2014 and 2016 .The specimens caught were transported to the laboratory in plastic containers containing 70% alcohol. TL of the specimens were measured in centimeters using a measuring board and the each fish was weighted (W) with a digital scale.

Length –weight relationship was determined for the samples according to the formula $W=aL^b$. For the changes of gonadosomatic index (GSI), the equation,

$$GSI = [W_g \times (W - W_g)^{-1}] \times 100 \text{ (Ricker 1975)}$$

was used and Fulton condition factor was calculated according to the formula,

$$K=W/L^3 \times 100$$

Analysis of variance (ANOVA) and t-test were performed with the STATISTICA package program.

Results and Discussion

The results obtained for *S. abaster* specimens are as follows; $W=2E-09L^{4.1}$ ($R^2=0.86$) For *S.acus*; $W=8E-09L^{3.83}$ ($R^2=0.83$). According to L-W relationship results found in this study, the two pipefish species have an allometric growth. (Figure 1a and b). The values of b in *S. abaster* and *S.acus* are compared with other studies.

According to these comparisons, b value of *S. abaster* in this study is found to be higher than b values obtained from other studies (Gurkan and Innal, 2018; Cakić et al., 2002; Khrystenko et al., 2015; Taylan et al., 2018) and similarly b value *S.acus* is lower than those given by Gurkan Taşkavak (2007) and Yildiz (2015).

Average condition value was calculated as 0.035 ± 0.009 for *S. abaster* specimens. This result is consistent with the study conducted in the Danube river (Cakić et al., 2002). On the other hand, it is seen that this value obtained here is lower than this given for Aegean Sea (Taylan et al.,2018).

In *S. abaster*, the mean HSI was 2.18 ± 1.65 while mean GSI value was 7.60 ± 7.12 , the (Figure 2a and b).

Our results of GSI are higher than those given by Taylan et al. (2018).

In *S. acus*, the mean values of GSI, HSI and K were calculated as 5.49 ± 5.12 , 3.22 ± 3.13 and 0.032 ± 0.01 , respectively. (Figure 3a and 3b)

Our GSI results are higher than those computed by Gurkan et al. (2009). On the other hand, the condition factor values are lower than those of Gurkan and Taskavak (2011). It is reported that the relationship between liver weight and body weight changes seasonally (Mahboob et al., 2002). According to this, it is understood that the HSI and GSI values were low due to the reproductive period of the *S. acus* in the region. According to those computed here

for the K and HSI values, it was determined that there was statistical difference between two species (t-test $p:0.010$ $P<0.05$). On the other hand, it is seen that the K and HSI values, which are inversely correlated to allometric growth, show a decrease for both species.

Consequently, this decrease in HIS and K values provides sufficient information to claim that species in the lake spend all energy requirement obtained with proper feeding to growth and gonad development.

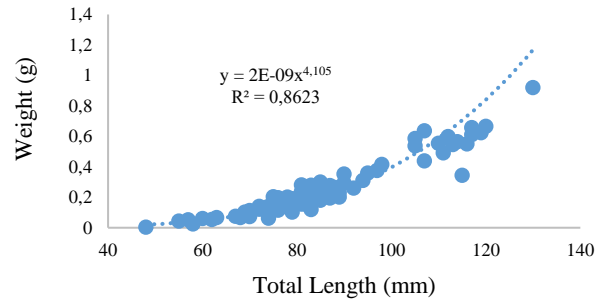


Figure 1a LW relationships in *S.abaster*

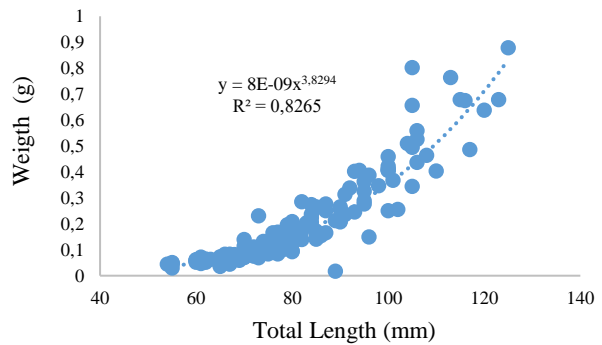


Figure 1b LW relationships in *S.acus*

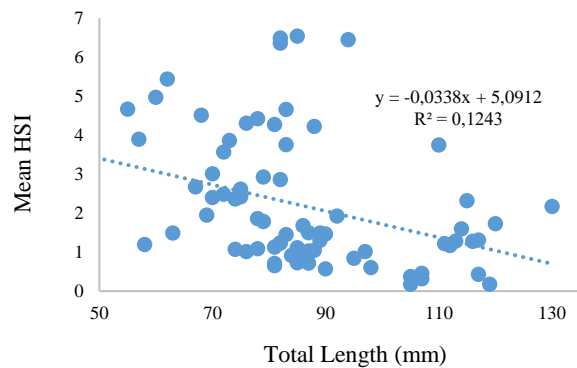


Figure 2a HSI and Length relationships in *S.abaster*

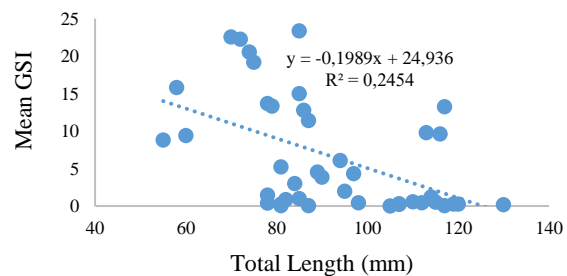


Figure 2b GSI and Length relationships in *S.abaster*

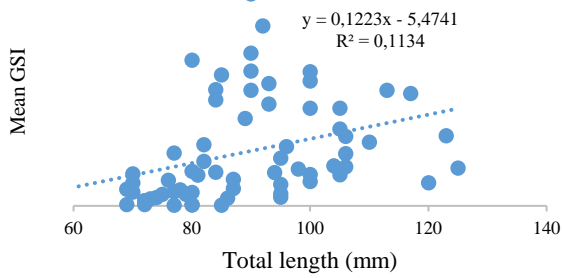


Figure 3a GSI-Total length relationships in *S.acus*

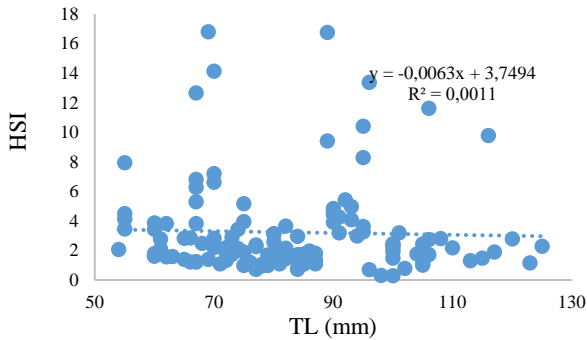


Figure 3b. HSI - Total length relationships in *S.acus*

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