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Índices corporais da viola *Loricariichthys anus* em período pré-reprodutivo

Body indexes of viola Loricariichthys anus in pre-reproductive period

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RESUMO

Este estudo busca conhecer a variação dos índices corporais da viola, como indicativo do período reprodutivo para auxiliar na gestão e conservação deste importante recurso pesqueiro. Foram avaliados 50 indivíduos, sendo 25 machos e 25 fêmeas. Os dados mensurados foram: comprimento, peso, índice gonadosomático, índice hepatossomático, coeficiente de alometria e fator de condição alométrico. A viola não apresentou crescimento diferenciado entre machos e fêmeas no período que antecede a reprodução, entretanto a correlação entre o índice gonadosomático e o índice hepatossomático é um indicador da proximidade do período de desova.

Palavras-chave: Loricariidae; índice gonadosomático; índice hepatossomático; coeficiente de alometria.

ABSTRACT

This study was undertaken to understand the variation of corporal indexes of viola as an indicator of the pre-reproductive period, contributing to the management and conservation of this important regional fishery resource. Fifty individuals, 25 males and 25 females were evaluated. The data measured were: Length, weight, gonadosomatic and

hepatosomatic indexes, allometric coefficient and allometric condition factor. Viola showed no growth difference between males and females during the period before reproduction, however, the correlation between gonadosomatic and hepatosomatic indexes are indicators of the proximity of the spawning period.

Keywords: Loricariidae; gonadosomatic index; hepatosomatic index; allometric coefficient.

Lagoa Mangueira is located in the southern region of Rio Grande do Sul, Brazil, between the town of Santa Vitória do Palmar and the Atlantic Ocean, where according to SANTOS et al. (2011) viola (*Loricariichthys anus*) is the main species caught by local fishermen with indication of overfishing due to the reduced mesh size of the fishing gear and the catch of young fish.

The maintenance of fish stocks depends on the release of fishes that either did not reproduce or are in process of gonadal development. The increase in gonadosomatic index (GSI) indicates that the proportion of gonad weight increases relative to body weight and it is a good tool to indicate the beginning of the reproductive period (VAZZOLER, 1996). However the characterization of external body modifications (noninvasive) arising from gonadal development such as allometric growth coefficient and condition factor, may facilitate the identification of

individuals ready to reproduce, allowing them to be returned to aquatic environment (OLIVEIRA e NOVELLI, 2005).

Therefore, the goal of this study was to understand the variation of corporal indexes of viola as an indicator of the pre-reproductive period contributing to the management and conservation of this important regional fishery resource.

Fishes were acquired from local fishermen from Lagoa Mangueira (33°05'27" S, 52°46'03" W) in October 2010, before the beginning of the fishing restriction period (November to January), when there is the occurrence of spawn of viola, traíra (*Hoplias aff. malabaricus*) and jundiá (*Rhamdia quelen*) at this location.

Twenty-five male and 25 female of viola were evaluated to obtain biometric data, gonads and liver weight. From these data were calculated gonadosomatic index: $GSI=100(Wg/Wt)$ where Wg = gonad weight; Wt = fish total weight; and hepatosomatic index: $HSI=100(Wl/Wt)$ where Wl = liver weight (THOMÉ et al., 2005).

Body weight and total length data were utilized in allometric equation (KEYS, 1928):

$$Wt = aL^b$$

where L = total length; a = allometric condition factor constant given by regression; and b = allometric coefficient that indicates the shape of fish grows.

The average allometric condition factor (a) was estimated for males and females. Length, weight, GSI, HSI and allometric condition factor between males and females were submitted to ANOVA and compared by t Student Test (5%). The same analysis was applied to determine if the allometric coefficient (b) differs from 3.0 (that indicates isometric growth) and to compare the allometric coefficients. The correlation between GSI and HSI was determined by Pearson's correlation test ($P \leq 0.05$).

The average total length did not show difference between male and female ($P > 0.01$) (Table 1). According to MARQUES et al. (2007) the minimum size of the first spawning of viola is

estimated in 27.0 cm, which indicates that fishes in this study presented size for reproduction.

Despite that the total average weight between males and females showed no difference (Table 1), there was a significant difference between GSI of males (1.64 ± 0.5) and females (5.24 ± 2.3) resulting from higher gonadal development of females in this period.

The weight-length relationship equation for males was $Wt = 5.9 \times 10^{-3} Lt^{2.974}$ and for females was $Wt = 1.3 \times 10^{-3} Lt^{3.408}$. The allometric coefficient (b) was not influenced by sex.

There was no sexual dimorphism in relation to the growth of viola, in agreement with findings by BRUSCHI-JÚNIOR et al. (1997) when studying the same species in Lagoa Emboaba, Osório in the northern region of the state of Rio Grande do Sul. They found an allometric coefficient (b) for males and females of 3.335, similar to the 3.165 coefficient found in this work for animals from Lagoa Mangueira. In both cases the observed allometric coefficient did not differ from 3.0 ($P > 0.05$), which suggests that this species presents isometric growth in both environments.

There was no difference regarding HSI between sex, with 0.80 ± 0.2 for females and 0.72 ± 0.2 for males. However the correlation analyses showed significant effect ($P = 0.042$) between GSI and HSI for females and no effect for males ($P = 0.070$). The positive correlation between GSI and HSI in females supports the increase of energetic reserves by the females in the period pre-reproduction, proposed by QUEROL et al. (2002) for *L. platymetopon*.

The allometric condition factor (a) for males was higher than for females ($P < 0.01$), which demonstrates a bioenergetic state more active of females mobilizing energy for gamete production. BRAGA et al. (2009) reported a decrease of the allometric condition factor in females of *Pareiorhina rudolphi* (Loricariidae) during the reproductive period, also reported by LIMA-JÚNIOR & GOITEIN (2006) in *Pimelodus maculatus*, and GOMIERO et al. (2010) for *Oligossarcus hepsetus*.

Table1. Corporal indexes of *L. anus* caught in pre-reproductive period in Lagoa Mangueira, RS

Corporal indexes	Male	Female
Total length (cm)	34.48±1.939	35.34±1.934
Total weight (g)	223.4±41.88	239.8±45.35
Allometric coefficient (b)	2.974	3.408
Allometric condition factor (a)	0.0059±0.00045*	0.0013±0.00010*
Gonadosomatic index (GSI)	1.64±0.5*	5.24±2.3*
Hepatosomatic index (HSI)	0.72±0.2	0.80±0.2

* Statistic difference ($P<0.01$) by *t* Student Test.

There was no difference in growth of *viola* between males and females in the period pre-reproduction however the correlation between GSI and HSI, as well as the allometric condition factor of females are indicators of proximity of the spawning period.

The use of the allometric condition factor is useful to establish the fishing restriction period in several environments. It is also very important to prepare animals for reproductive studies and aquaculture, and it can be done quickly and easily calculated with live fish.

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