

Fecundity and Gonadosomatic Index of *Alburnus chalcoides* (Guldenstaedt, 1772) Immigrant to Anzali Wetland, Guilan Province, Northern Iran

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Abstract: Fecundity is one of the important indicators of fish breeding biology. The present study was conducted in the spring (2008) on 66 *A. chalcoides* specimens caught from each of 2 and 3 years old, the Anzali wetland to investigate fecundity in this immigrant species. According to the results obtained the highest average fork length was (19.27 cm), average weight (82.79 g), ovary weight (9.64 g) and absolute fecundity (8301.21 eggs) belonged to 3 year old *A. chalcoides* specimens, while the lowest average fork length was (15.83 cm), average weight (42.30 g), ovary weight (5.54 g) and absolute fecundity (4447.84 eggs) belonged to 2 year old *A. chalcoides* specimens. On the basis of nonparametric Mann Whitney and T-test, significant differences were detected in the biometry parameters and fecundity of *A. chalcoides* specimens in different age groups.

Key words: Fecundity • Gonadosomatic Index • *Alburnus chalcoides* • Anzali Wetland

INTRODUCTION

Alburnus chalcoides is one of the economically valuable fishes in the Caspian Sea which belongs to the Cyprinidae family. This fish enters rivers and wetlands entering the Caspian Sea for spawning [1].

Anzali Wetland is one of 10 important wetlands worldwide. It located in southwest Coasts of Caspian Sea, Guilan Province, Iran. Anzali Wetland is Major reproducing location of most of Caspian Sea fishes such as Cyprinidae [2].

One of the important biological characteristics of fish is fecundity. Fecundity among egg-laying animals is the number of eggs being readied for the next spawning by a female [3, 4]. Knowledge about fecundity of a fish is essential for evaluating the commercial potentialities of its stock, life history, practical culture and actual management of the fishery [5, 6]. According to this fact that estimation of larvae numbers hatched from eggs and calculation of egg survival rate is impossible in natural ecosystem, determination of fecundity will identify

estimation of generation and its condition in future. Hence, in the spring of 2008, the fecundity of *A. chalcoides* an immigrant to the Anzali Wetland was studied.

MATERIALS AND METHODS

In this study, 66 specimens of *A. chalcoides* were captured during the spawning season in Anzali Wetland (from May until June 2008).

Fork length (FL) is measured to the nearest 1 mm and total weight to the nearest 0.1 g. The age of the *A. chalcoides* was determined from scale samples taken between the adipose fin and lateral line [7].

Fecundity was determined by gravimetric method [8] and egg size was determined by using a caliper (at 0.02 mm sensitivity). The relative fecundity was calculated by dividing the total egg number by the total body weight [7]. The gonadosomatic index was calculated using the formula of Dadzie and Wangila [9] and Gaikwad *et al.* [10].

Data collected were analyzed by using the software SPSS 10.0.13. For this purpose, given the lack of normal data (test Shapiro-Wilk) we used of Mann-Whitney and T-tests for data with a confidence of 95% ($P>0.05$).

RESULTS

In this study all the fish caught were belonged to the 2 and 3 years age group (each age class composed of 33 females).

Specific parameters of the studied population are given in Table 1. According to the T-test, there were significant differences between ages with fork length ($t = -7.657$, $P = 0.000$) and body weight ($t = -6.7$, $P = 0.000$).

T-test showed that ovary weight (Table 1) and absolute fecundity (Fig. 1) of *A. chalcoides* was significant difference between ages. Mann-Whitney test indicated that egg diameter of *A. chalcoides* wasn't significant difference between ages (Table 1).

Maximum average relative fecundity (109.89) and gonadosomatic index (GSI) (14.49%) were recorded in 2 year old *A. chalcoides* and minimum average relative fecundity (99.21) and gonadosomatic index (GSI) (13.61%) were recorded in 3 year old *A. chalcoides* (Table 1 & Fig. 2). But based on Mann-Whitney test there weren't significant differences between relative fecundity and gonadosomatic index with different ages.

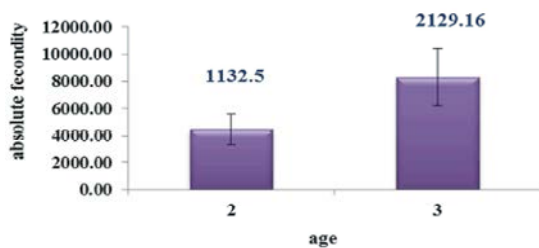


Fig. 1: Fecundity of *A. chalcoides* in the Anzali Wetland at reproduction season of 2008

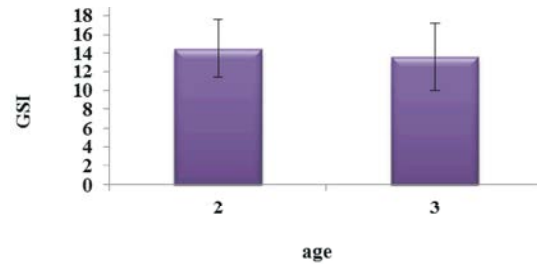


Fig. 2: Gonadosomatic index (GSI) of *A. chalcoides* in the Anzali Wetland at reproduction season of 2008

DISCUSSION

Efficient uses from water resources require knowing components of an ecosystem, that this information can't be possible except with investigation and study of biology characterization and fish ecology [11, 12].

The biological study of different fishes is due to keep and rebuild of their stocks in a water ecosystem and in this way, all of economic and noneconomic fishes have great importance and value due to their role in water ecosystems. Hence, improve of broodstock quality and reproduction control, can to help us for achieve to aquaculture growing and developing request in the world as most important reflections of modern biotechnology [13].

Absolute fecundity increases with increasing the fish length [1, 3, 11, 14, 15], but it has wide range in length groups. There are a linear graph for relationship between fecundity and weight of fish [16, 17] and fecundity has more dependence with weight than length [18]. However, weigh has less benefit than length [6]. Also, weight change with approach spawning season.

In present study 3 years old broodstock produced larger eggs than 2 years old fish and fecundity in older fish was greater. These results were similar to other fish species like *Rutilus frisii kutum* [19], *Oncorhynchus mykiss* [20, 21], *Salmo trutta macrostigma* [22], *Salmo trutta caspius* [23].

Table 1: Estimation of different parameters of *A. chalcoides* from the Anzali Wetland in 2008

Parameter					
Age	Fork length (cm) (Range)	Body weight (g) (Range)	Ovary weight (g) (Range)	Egg diameter (g) (Range)	Relative fecundity (Range)
2 year old	15.83 ± 1.20	42.30 ± 10.10	5.54 ± 1.81	1.17 ± 0.4	109.89 ± 21.06
	13.5-17.5	28-60	2.35-8.96	1.13-1.26	86-177
3 year old	19.27 ± 1.37	82.79 ± 20.56	9.64 ± 3.57	1.18 ± 0.34	99.21 ± 16.14
	16.3-21.5	55.8-132	6.35-11.49	1.13-1.27	75-133

When the egg size increases, the relative fecundity has been reported to decrease, either with female age [23,24], female size [7] or with female weight [25, 26]. In our experiment similar trends were observed in relative fecundity with weight and size.

In present study the mean of relative fecundity were 109.89 ± 21.06 in 2 years old female and 99.21 ± 16.14 in 3 years old female. Similar previous results in *A. chalcoides* were recorded 90-129 in southern water-bodies of Uzbekistan [27], 140 ± 6 in Anzali Wetland of Iran [28] and 116 ± 28 in Sefidrood River [29].

The results showed that maximum of Gonadosomatic index belonged to 3 years old *A. chalcoides* specimens and minimum of Gonadosomatic index belonged to 3 years old *A. chalcoides* in Anzali Wetland.

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