

Determination of Biometry and Gonadosomatic Index in Male Khramulia (*Capoeta capoeta gracilis*, Keyserling 1861) in the Sefidroud River

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Abstract: Khramulia (*Capoeta capoeta gracilis*) is one of the semi economically valuable fishes in the Rivers. This fish is a potamodromous and spawning in rivers. The study of biometry and Gonadosomatic index is the important indicators of reproduction biology in fishes. The present study was conducted in spring of 2010 on 36 Khramulia specimens caught from each of 1, 2 and 3 years fishes, in the Sefidroud River to investigate Gonadosomatic index and biometry in this male species. According to the results obtained the highest mean of total length (186.67 mm), mean of fork length (173.67 mm), mean of standard length (160.5 mm), mean of weight (66.45 g) and ovary weight (1.902 g) belonged to 3-year specimens, while the lowest mean of total length (121.25 mm), mean of fork length (111.75 mm), mean of standard length (102.63 mm), mean of weight (21.81 g) and ovary weight (0.546 g) belonged to 1-year specimens. Among different age groups of fish were significant differences in mean of total length, fork length, standard length, weight and gonad weight ($p \leq 0.05$). While there was no significant differences in Gonadosomatic index among these male broodstocks ($P > 0.05$).

Key words: Sefidroud River • Capoeta Capoeta Gracilis • Male Broods • Biometry • Gonadosomatic Index

INTRODUCTION

Today, the need to protein materials and food materials shortages matter to society and be an important part of the economic, human research and technological ability spend to review, study and implementation of projects in this field. Among suitable production of natural resources has important role and it is effective for continuation of this process.

Rivers are part of water ecosystems and site of many freshwater fish that they permanently live in it or marine fish temporarily survive period of life, due to sexual physiological changes and returned back into the sea after spawning. Generally, study of environment and lifestyle of fish in rivers can be utilized to create the necessary conditions for increase of stocks and also provide reproduction and culture of them with biotechnological reviews.

Review of fish in ecosystems is important, due to of evolutionary, ecological, behavioral biology, protection of their, management of water resource and exploitation of fish resources [1, 2].

With growing pressures due to growth of population on current limited resources, it is felt an urgent need to better understand the characteristics of the aquatics and their environment. Also it is important to correct management of understanding the biology and have of adequate information about the aquatics [3].

Descriptions of reproductive strategies and the assessment of fecundity are fundamental topics in the study of the biology and population dynamics of fish species and also for evaluation of the reproductive potential of individual fish species. Of course this will increase our knowledge about the state of a stock and improves standard assessments of many commercially valuable fish species [4, 5]. Moreover, the availability of

data based on reproductive parameters and environmental variation leads to a better understanding of observed fluctuations in reproductive output and enhances our ability to estimate recruitment [6].

Estimation and recognition of fish physiological situation and determination of amount and size is necessary for estimation and keep of economical fishes stocks for artificial reproduction and development of growth condition [7].

Several factors including season, temperature, social circumstance, age, genetics [8], physiology and biochemical status of fish [9] and other variables related to reproductive capacity and opportunity. Environmental factors also influencing developing of gonad and reproduction behavior [10]. Also, dietary including some material such as 17 β -estradiol affect on serum sex hormones, gamete quality and gonadal sex differentiation. Serum levels of estradiol and 17-hydroxyprogesterone were high in 17 β -estradiol-treated fish compared to the control group in *Carassius auratus* [11]. 17 β -estradiol is capable to induce a complete masculinization of genetic females at a low dosage level in *Astatotilapia latifasciata* [12].

The genus *Capoeta* of the Cyprinidae family has a wide distribution in Southwest Asia and contains about 20 species, of which 10 occur in Iran [13]. *Capoeta capoeta gracilis* present in all Rivers, Lagoons, Bays and water reservoirs in the south Caspian Sea basin. In the basin besides, its ecological significance of *C. c. gracilis* is an important taxon for sport fishing [14], inland water fishing in some rivers. It comprises 33% of captured fishes and zoogeography [15]. Several studies applied on the characteristics of the ecology and biology of Khrumulia [16-20]. River is one of breeding areas for most species of Caspian Sea fish, including carp [21]. Therefore, we examined biological characteristics, absolute fecundity, relative fecundity and Gonadosomatic index of Khrumulia in Sefidroud River in 2010.

MATERIALS AND METHODS

In this study, sampling of fish applied in may until June 2010. Catch of 36 Khrumulia were done at different locations of Sefidroud River. Then body weight, total length, fork length, standard length and gonad weight were measured [3]. Reading scales were used to determine the age of fish [22]. For the detection of age, we were used binocular loop.

Following equation was used to determine Gonadosomatic index [23]:

$$\text{Gonadosomatic index} = \frac{\text{Gonad weight}}{\text{Total body weight}} \times 100$$

Data were analyzed by SPSS 16 software and ANOVA and Tukey (for normal data), nonparametric tests of Kruskal-Wallis and Mann-Whitney (for non-normal data) in significant level 95%. Graphs Were drawn by 2003 Excel software.

RESULTS

The results of biometry in male fishes are presented in Table 1. The total length of Khrumulia male fishes had significant difference between different ages based on ANOVA test ($F(2, 33) = 58.967$, Sig= 0.000, $P < 0.05$). The fork length of Khrumulia male fishes had significant differences among different ages based on ANOVA test ($F(2, 33) = 57.751$, Sig= 0.000, $P < 0.05$). The standard length of Khrumulia male fishes had significant differences among different ages based on ANOVA test ($F(2, 33) = 51.668$, Sig= 0.000, $P < 0.05$). Tukey test showed that total length, fork length and standard length of Khrumulia male fishes have significant differences among the following ages: (1-year fishes, 2-year fishes) (1-year fishes, 3-year fishes) (2-year fishes, 3-year fishes). According to the Kruskal-Wallis test, weight has significant differences among different ages of Khrumulia male fishes ($X^2 = 25.955$, $df = 2$, Sig= 0.000, $P < 0.05$). Mann-Whitney test showed that weight of Khrumulia male fishes has significant differences among the following ages: (1-year fishes, 2-year fishes) (1-year fishes, 3-year fishes) (2-year fishes, 3-year fishes).

The results of gonad weight and Gonadosomatic index in male fishes are presented in Figures 1 and 2. The gonad weight of Khrumulia male fishes had significant differences among different ages based on ANOVA test ($F(2, 33) = 10.787$, Sig= 0.000, $P < 0.05$). Tukey test showed that gonad weight of Khrumulia male fishes have significant differences among the following ages: (1-year fishes, 2-year fishes) (1-year fishes, 3-year fishes).

According to the ANOVA test, Gonadosomatic index has no significant differences between different ages of Khrumulia male fishes ($F(2, 33) = 0.014$, Sig= 0.986, $P > 0.05$).

Table 1: Biometry of male fishes in the Sefidroud River at reproduction season of 2010

Parameters	Age & number of fish	Mean \pm SD	Range of changes	
			Minimum	Maximum
Total length (mm)	1-year fishes= 8	121.25 \pm 14.88 ^a	100	139
	2-year fishes= 22	155.36 \pm 9.64 ^b	141	171
	3-year fishes= 6	186.67 \pm 12.36 ^c	173	209
Fork length (mm)	1-year fishes= 8	111.75 \pm 14.73 ^a	90	130
	2-year fishes= 22	144.64 \pm 8.79 ^b	130	158
	3-year fishes= 6	173.67 \pm 11.93 ^c	161	196
Standard length (mm)	1-year fishes= 8	102.63 \pm 15.1 ^a	80	120
	2-year fishes= 22	133.23 \pm 8.79 ^b	117	147
	3-year fishes= 6	160.5 \pm 10.37 ^c	149	180
Weight (g)	1-year fishes= 8	21.81 \pm 6.68	12.8	29.8
	2-year fishes= 22	38.55 \pm 6.23	29.2	49.6
	3-year fishes= 6	66.45 \pm 14.25	55.2	94.4

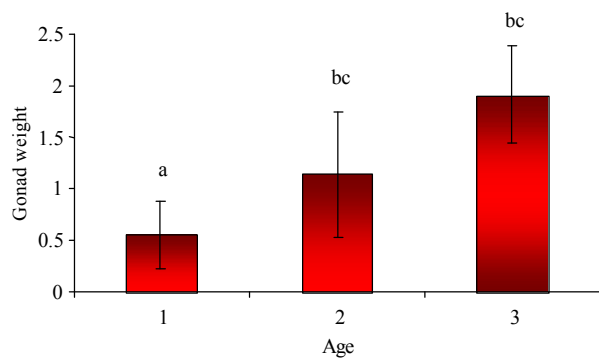


Fig. 1: Gonad weight of male fishes in the Sefidroud River at reproduction season of 2010

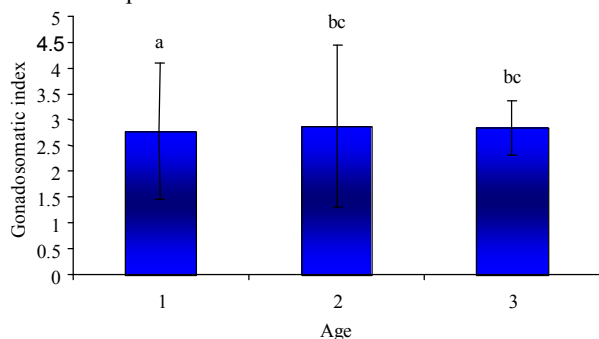


Fig. 2: Gonadosomatic index of male fishes in the Sefidroud River at reproduction season of 2010

DISCUSSION

One of the basic aims of rational fisheries management is to determine the reproduction properties of fish species. Thus, the determination of properties such as spawning age and season and fecundity is

important for fisheries management [24]. Efficient uses from water resources require knowing components of an ecosystem, that this information can not be possible except with investigation and study of biology characterization and fish ecology [3, 22].

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 bio-technology [25]. Generally, most cyprinids mature in length of less than 300 millimeter [26].

This study showed that the highest and the lowest length in male Khamulua were related to 3-years fishes (186.67 \pm 12.36 mm) and 1-years fishes (121.25 \pm 14.88 mm). The highest and the lowest weight of male Khamulua were related to 3-years fishes (66.45 \pm 14.25 mm) and 1-years fishes (21.81 \pm 6.88 mm). Generally, growth of this fish is slowly, so 3-years fishes have 14.4 cm length and 225 g weigh [27]. Most bony fish, especially cyprinids spawn in spring and after the first maturation each year. For example, each year spawn of *Rutilus frisii kutum* in the Caspian Sea and Chinese cyprinids in the reproduction and breeding institutes. In this fishes, gametogenesis occurs in autumn and spawns in spring and summer [28] and temperature is hypo of spawning in this species [22]. The obtained results showed the highest and the lowest Gonadosomatic index in male Khamulua were 2.86 and 2.76.

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