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Research Note / Araştırma Notu

Breeding Properties of *Tinca tinca* (L., 1758) Living in Hirfanlı Dam Lake (Kırşehir, Turkey)

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Özet: ***Hirfanlı Baraj Gölü'nde yaşayan* Tinca tinca *(L., 1758)'nın üreme özellikleri (Kırşehir, Türkiye).*** Hirfanlı Baraj Gölü'nde yaşayan *Tinca tinca* (L.,1758)'nın üreme özellikleri incelenmiştir. Eşeysel olgunluğa erişme yaşının III olduğu, üreme döneminin Mayıs ayında başladığı ve Temmuz ayında sona erdiği tespit edilmiştir. Yumurta sayısı 12088'den 37150'ya kadar değişmektedir. GSI değeri en yüksek Haziran, en düşük Temmuz ayında tespit edilmiştir.

Anahtar Kelimeler: *Tinca tinca*, Kadife, Üreme, Hirfanlı Baraj Gölü, Türkiye.

Abstract: This study is concerned with the breeding properties of *Tinca tinca* (L., 1758) population living in Hirfanlı Dam Lake. It was observed that the fish reach the sexual maturity at the age of III and the breeding period starts in May and ends in July. The fecundity varied between 12,088 to 37,150. The GSI value was the highest in June and the lowest in July.

Key Words: *Tinca tinca*, Tench, Breeding, Hirfanlı Dam Lake, Turkey.

Introduction

T. tinca was originated in Near-East and Siberia and spread all over the world (Lukowicz and Proske, 1979). It is known that this species is abundantly present in the rivers which flow into Black Sea and lakes located in various parts of Anatolia (Lukowicz and Proske; 1979, Kuru, 1994). The fish has a fairly slow growth rate and is of very little economic importance. It is consumed locally. However it has an important role in the mineralization of the water since it constantly stirs the mud at the bottom (Demirsoy, 1998). Some of the researches related to *T. tinca* in *Turkey* and in the world are as follows:

Cerny (1968) studied the growth, Lukowicz and Proske (1979) breeding, Alaş (1998) bio-ecologial features, Altındağ et. al. (1998) growth features and Balık et. al., (2004) structure, mortality and growth, Yılmaz (2002) reproductive biology, Carral et.al. (2006) biology, Göktaş (1987), Q'Maoileidigh and Bracken (1989), Horoszewicz (1983), Vetlugina (1992), Neophiotu (1993), Pimpicka (1990, 1991), Hubenova-Siderova et al. (1995), Perez-Regadera and Gemio (1995) and Yılmaz (1997) bio-ecology and Bircan (1988) and Şanlı (1998) feeding of *T. tinca*. Balık et al. (1997) investigated the effects of implanting this fish into two different lakes.

Material and Method

This study was carried out on 241 *T. tinca* (98 females and 116 males) caught between August 1996 and July 1997 in Hirfanlı Dam Lake constructed on Kızılırmak River (Figure 1). The fish were caught with trap nets having a length of 20, 40, 60 m width of 2.5 - 3 m and mesh size of 18, 23, 32, 36, 45, 55 and 60 mm.

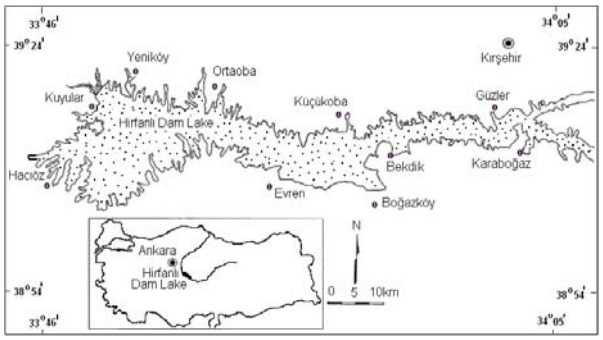

Figure1. Hirfanlı Dam Lake.

The weight and the length of the fish were measured at an accuracy of 0.1 g and 1mm. There were 30-40 scales taken from dorsal fin to ligne lateral of each fish and they were appropriately prepared to determine the ages of the fish (Lagler, 1966; Geldiay ve Balık, 1988).

The gender of the fish was determined from their gonads. The fecundity was investigated on 98 female individuals. The ovaries of each fish were weighted. There was a one gram piece taken from each ovaries and the number of eggs it contained was counted under microscope. The total fecundity of each individual was then determined by the use of the ratio of this one gram piece to the total weigh of the ovary.

The radii of approximately thirty eggs taken from the upper, middle and lower parts of the ovaries were measured by the use of calipers and the change of the radii according to months was determined.

The ovaries of the females were followed throughout the breeding period and the number and the ratio of the ones

which did not spawn eggs were tabulated. The period of breeding was determined according to gonado-somatic index (GSI), variation in egg radii according to months and the number of individuals who did not spawn eggs.

Results

The investigation of the gonads of *T. tinca* individuals living in Hirfanlı Dam Lake showed that they reach the sexually maturity at the age of III. The monthly variations in GSI values and egg radii were followed. The GSI value was found to be the highest in June and the lowest in July and started to increase after that (Figure 2). It was determined that the egg diameter reached the maximum value of 1.29 mm in June and ovariums were empty in July (Figure 3). The fecundity was determined to range between 12.088 and 37.150 and increase with the age (Table 1 and Figure 4).

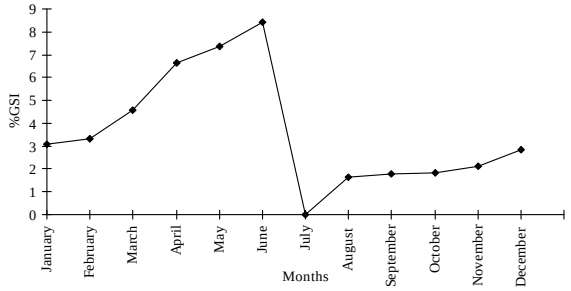

Figure 2. The variation of gonado-somatic index (GSI) *T. tinca* living in Hirfanlı Dam Lake according to months

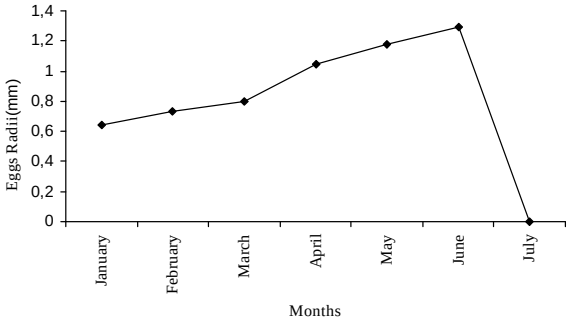

Figure 3. The variation of egg radii *T. tinca* living in Hirfanlı Dam Lake according to months

Table 1. The average weight, average length and fecundity of female *T. tinca* according to age (SD: Standart Deviation).

Age	N	L (mm) ± SD	W (g) ± SD	F ± SD	F / L	F / W
III	28	255±23	300±49	12088±2213	47.40	40.29
IV	30	276±18	399±40	18594±6844	67.37	46.60
V	21	300±22	524±98	24591±11031	81.97	46.92
VI	7	318±5	663±39	37150±6068	116.82	56.03

It was determined that number of individuals which spawned eggs increased with the increase in temperature (Table 2). The examination of the monthly variations of GSI values and egg radii of the fish revealed that its breeding takes place between May and June.

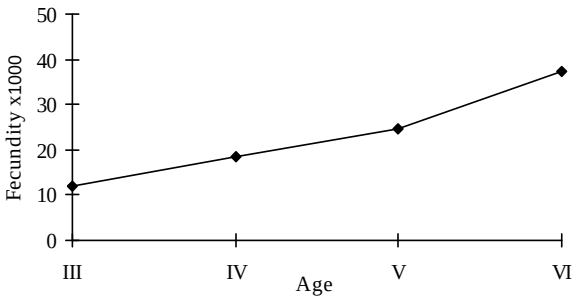

Figure 4. The change of the fecundity of female *T. tinca* living Hirfanlı Dam Lake according to age

Table 2. The numbers and ratios of female *T. tinca* which did and did not spawn their eggs

Date	Number of fish	The one which did not spawn their eggs (% N)	The ones which spawned their eggs (% N)	Surface temperature ºC
28 April	13	100	0	12.9
6 May	5	80	20	16.4
28 May	4	75	25	22.2
5 June	5	60	40	24.3
28 June	4	25	75	24.7
5 July	8	100	0	26.3

Discussion

The breeding age of *T. tinca* living in Hirfanlı Dam Lake was found to be III. Göktaş (1987) determined the breeding age of the *T. tinca* individuals in Mogan Lake as III for females and III-IV for males and Yılmaz (2002) found the same values as III for females and III-IV for males in *T. tinca* population living in Porsuk Dam Lake. Neophitou (1993), on the other hand determined the age of breeding for *T. tinca* inhabiting Pamvotida Lake in Greece as III for both sexes.

The spawning period of *T. tinca* individuals living in Hirfanlı Dam Lake was determined to be between the end of April and to the beginning of July. Göktaş (1987) and Yılmaz (2002), on the other hand determined this period as July–September and April–July for *T. tinca* populations in Mogan and Porsuk Dam Lakes. Neophitou (1993) states that the spawning period of *T. tinca* individuals in Pamvotida Lake in Greece as May- June.

Poncin et al. (1987) *T. tinca* individuals spawned their eggs in June and July which began to develop in April. Nikolsky (1963) reported that *T. tinca* individuals carried out their breeding activities from mid April to beginning of August. Berg (1963) however claims that the breeding period of *T. tinca* is between May and June.

The surface water temperature of Hirfanlı Dam Lake was 16.4ºC-22ºC in May and 24.3ºC-24.7ºC in June when *T. tinca* spawns its eggs. The increase of temperature was found to have a positive effect on egg spawning process. Alaş (1998), reports that the surface water temperature of Kayaboğazı Dam Lake was 18 ºC–23.5 ºC in June–July, the breeding period of *T. tinca*. Yılmaz (2002) indicates that the surface

water temperature of Porsuk Dam Lake was 23.4 ºC in June and 25.6 ºC in July which corresponds to the breeding period of *T. tinca* population living there. Neophitou (1993) says that the surface temperature of Pamvotida Lake in May–June was 18 ºC- 20 ºC when *T. tinca* living in the lake start to breed. Finally Perez-Regadera and Gemio (1995) reported that the *T. tinca* individuals living in culture pools spawned their eggs in May-June when the surface water temperature was 18 ºC.

Alaş (1998) calculated the average fecundity of *T. tinca* individuals as 42.723 in Kayaboğazı Dam Lake. Yılmaz (1997) determined this value as 21.954 for *T. tinca* population in Porsuk Dam Lake. This value was found to be 23.105 for Hirfanlı Dam Lake.

The egg radii of *T. tinca* were found to range between 0.606 and 1.195 mm in Porsuk Dam Lake (Yılmaz, 1997) and 0.532 and 1.078 mm in Kayaboğazı Dam Lake (Alaş, 1998). This range was determined to be 0.400 and 1.300 in Hirfanlı Dam Lake.

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