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Feeding Habits of Tench (*Tinca tinca* L., 1758) in Beyşehir Lake (Turkey)

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Abstract

In this study, alimentary canal contents of 188 tench (*Tinca tinca* L., 1758) caught from Beyşehir Lake (Turkey) between April 2004 and March 2005 were examined for feeding habits. Phytoplanktonic and zoooplanktonic organisms, insects, detritus (animal and vegetable) and two most common parasites of tench, *Ligula intestinalis* and *Asymphylodora tincae* were determined in observed in the alimentary canal of fish. There was a significant difference between the frequency of the existance of *Chlorella*, *Coscinidiscus*, *Fragilaria*, *Mougetia*, *Phytoconis*, *Pinnularia*, *Rivularia*, *Synedra*, *Ulotrix*, *Brachionus*, *Gammarus* sp., and *Ligula intestinalis* among seasons (df=3, P<0.05). Only 6 of these genera (*Chaetophora, Coscinidiscus*, *Phytoconis*, *Surirella*, *Synedra*, *Daphnia*) had a significant difference among age classes (df=5, P<0.05). Additionally, it was found that only 5 of the 188 tench (2.66%) were observed to have almost empty alimentary canal. Algae and macrophytes were found to be the most considerable food types in the present study, which is followed by zooplankton and insect larvae.

Keywords: Feeding habits, *Tinca tinca*, Beyşehir lake, Turkey

Beyşehir Gölü (Türkiye)'nde Yaşayan Kadife Balığı (*Tinca tinca* L., 1758)'nın Beslenme Alışkanlıkları

Özet

Bu çalışmada, beslenme alışkanlıklarını belirlemek için Nisan 2004 ve Mart 2005 tarihleri arasında Beyşehir Gölü (Türkiye)'nden yakalanan 188 adet Kadife Balığı (*Tinca tinca* L., 1758)'nın sindirim kanalı incelenmiştir. Balıkların sindirim kanalında fitoplanktonik ve zooplanktonik organizmalar, böcekler, detritus (bitkisel ve hayvansal) ve kadife balığında en yaygın iki parazit türü olan *Ligula intestinalis* ve *Asymphylodora tincae* tespit edilmiştir. Mevsimler arasında *Chlorella, Coscinidiscus, Fragilaria, Mougetia, Phytoconis, Pinnularia, Rivularia, Synedra, Ulotrix, Brachionus, Gammarus* sp., ve *Ligula intestinalis*'in bulunma sıklıkları arasında önemli bir fark mevcuttur (df=3, P<0,05). Bu cinslerden yalnızca 6 tanesi (*Chaetophora*, *Coscinidiscus*, *Phytoconis*, *Surirella*, *Synedra*, *Daphnia*) yaş sınıfları arasında önemli bir farka sahipti (df=5, P<0,05). Ayrıca, 188 kadife balığından 5 tanesinin (%2,66) sindirim kanalının hemen, hemen boş olduğu bulunmuştur. Bu çalışmada, algler ve makrofitlerin en çok tercih edilen besin tipi olduğu, bunu zooplanktonlar ve böcek larvalarının takip ettiği tespit edilmiştir.

Anahtar Kelimeler: Beslenme alışkanlıkları, *Tinca tinca*, Beyşehir gölü, Türkiye

Introduction

Tench (*Tinca tinca* L., 1758) is generally distributed in Europe and Asia, and has been introduced into America, South Africa and Australia (Rosa, 1958). According to Karabatak 1994, this species was implanted to natural lakes and dam lakes in 1970. It has been introduced into various inland waters in Turkey (Çelikkale, 1988, Geldiay and Balık, 1998). Tench is economically an important fish this species is appreciated from a sport-fishing viewpoint and has been cultivated in Great Britain and Central Europe (Wright and Giles, 1991).

Tench (*Tinca tinca* L., 1758) is expressed to feed in regions that macrophytes grow densely in Europe (Rowe, 2004). It lives commonly in stagnant waters and slow flowing streams. Except to Beyşehir Lake, Tench is very common and found nearly in Mogan Lake (Ankara), Terkos Lake (Istanbul), Gala Lake (Edirne), Pamuklu Lake (İpsala), Işıklı Lake (Çivril-Denizli), Kesikköprü Dam Lake, Hirfanlı Dam Lake, Kayaboğazı Dam Lake, Porsuk Dam Lake, Black sea

basin, Sakarya basin and streams in Turkey (Kuru, 1996; Geldiay and Balık, 1998; Alaş and Solak, 2004; Balık *et al*., 2004). According to Benzer *et al*. (2007), among the contents the digestive tract of Tench have identified to be zooplanktonic (Cladocera, Copepoda, Rotatoria, Ostracoda) bentic (Diptera, Oligochaeta, Gastropoda) and phytoplanktonic organism (Cyanophyta, Chlorophyta, Bacillariophyta, Euglenophyta), plant fragment, various pollens and detritus mud. Studies about of *Tinca tinca* are rather restricted in Turkey (Atasagun and Karabatak, 1995; Aydoğdu *et al*., 1996; Alaş *et al*., 1998; Altındağ *et al*., 1998; Ergonul and Altındağ, 2005; Yavuzcan *et al*., 2003; Shah and Altındağ, 2005; Alaş and Solak, 2004; Alaş and Ak, 2007).

Sander lucioperca, *Tinca tinca*, *Carassius gibelio* and *Atherina boyeri* have been introduced by fishermen. After these introductions, endemic fish, *Alburnus akili* has disappeared in Beyşehir Lake. Eventually, due to the introduction of *Sander lucioperca* within Beyşehir Lake, the biotic ecology of this lake has changed. In addition to *Sander lucioperca*, *Tinca tinca* has been introduced in recent years and its effects on the lake ecology are unknown. In order to know its impacts on the Beyşehir Lake ecosystem, feeding strategies of tench should be investigated. Therefore, the purpose of this study is to determine the feeding habits of tench in Beyşehir Lake.

Materials and Methods

In this study, alimentary canal contents of 188 tench (*Tinca tinca*) collected from Beyşehir Lake between April 2004 and March 2005 were examined. Fish were captured by trammel nets having 18–60 mm mesh size. Alimentary canals of fish were conserved in 4% formaldehyde solution subsequent to dissection. Later on nourishment contents of alimentary canals were examined under a stereomicroscope. Identification of organisms found in alimentary canal was made according to Prescott (1961), Segers (1995), De Smet (1996), and Şahin (1991).

Since tench is known to be an omnivor fish, instead of counting alimentary canal content, frequency of existance method (Eliot, 1977) and volumetric analysis method (Bagenal, 1978) were used in order to calculate the proportions of organisms found in total food based on the following formula:

$$F\ \%(a) = (Na / N) \times 100$$

F %(a) = frequency of existance of the species "a"
N(a) = the number of the species "a" in the diet
N = the number of the total species in the diet

The significance of the frequencies of the food components of tench among age classes and seasons were checked with Chi-square test.

Description of Study Area

Beyşehir lake (37°45′ N-31°36′ E) is located in the east of West Taurus Mountains and is the third biggest lake in Turkey after Van lake and Salt lake. The Lake's altitude is 1150 m over the sea level, its surface area is 690 km^2, average depth is 6 m, and its rainfall area is 1,246 km^2. Since the lake is found in a karstic region, it is mostly feeding with underground water from the bottom. Springs feeding the lake are Deliçay and Bademli rivulets. There are many islets on the west part of the lake. Its excess water flows to Suğla Lake by Beyşehir rivulet. It is thought to be connected with Mediterranean Sea as a result of some karstic events (Figure 1) and its water is considered to be tasty (T.Ç.V., 1993).

The lake's surrounding is covered with swamp and reed bed, especially on the south parts. Its water is rich in plankton and is greenish gray in color. In a recent study, the fish fauna of Beyşehir lake was

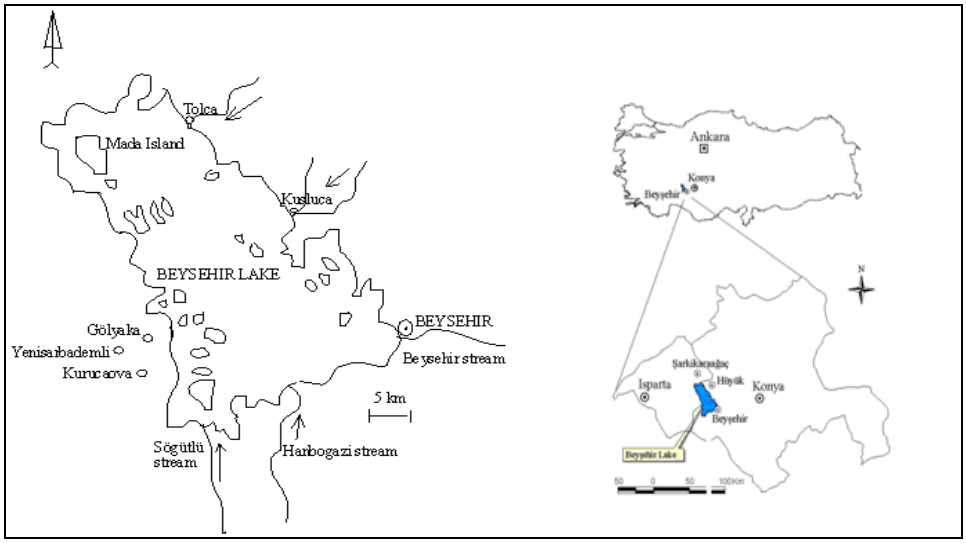

Figure 1. Map of Beyşehir Lake.

reported as *Cyprinus carpio*, *Sander lucioperca, Carassius gibelio*, *Tinca tinca, Chondrostoma regium*, *Leuciscus lepidus*, *Aphanius anatoliae anatoliae*, *Atherina boyeri*, *Gambusia affinis*, *Knipowitschia caucasica* and *Pseudophoxinus anatolicus* (Yeğen *et al*., 2006).

In addition, *Astacus leptodactylus* inhabits in the lake. From fishes in this lake, *Sander lucioperca, Tinca tinca, Carassius gibelio* and *Atherina boyeri* have subsequently introduced. Tench has been caught commercially by fishermen. The lake's water is drinkable and utilizable only after chlorination, without any other clarification process (Balık *et al*., 1997; Akköz, 1998).

Because of its ecological importance, Beyşehir lake was declared as a National Park by Forestry of Turkey, on January 11 1993 (Yarar and Magnin, 1997).

Results

A total of 188 tench were collected monthly between April 2004 and March 2005 and their alimentary canal contents were examined. Food types ingested by the fish and their frequencies are given in Table 1. Phytoplanktonic and zoooplanktonic organisms, insects, detritus (animal and vegetable) and two most common parasites of tench, *Ligula intestinalis* and *Asymphylodora tincae* were determined in observed in the alimentary canal of fish.

There was a significant difference between the frequency of the existance of *Chlorella, Coscinidiscus*, *Fragilaria, Mougetia*, *Phytoconis, Pinnularia, Rivularia, Synedra*, *Ulotrix*, *Brachionus*, *Gammarus* sp.*,* and *Ligula intestinalis* among seasons (df=3, P<0.05). There were no significances between other organisms among seasons (Table 2).

According to Table 3, only 6 of these genera (*Chaetophera*, *Coscinidiscus*, *Phytoconis*, *Surirella, Synedra*, *Daphnia*) had a significant difference among age classes (df=5, P<0.05).

The ratio of ingested food particles found in tench's alimentary canal were as follows: phytoplanktonic organisms (82.61%), vegetable detritus (66.30%), *Asymphylodora tincae* (33.15%), *Ligula intestinalis* (29.89 %), zooplanktonic organisms (22.83%), fish items like eggs, fins etc. (23.94%), Culicidae extremity (4.89%), Ostracoda (3.26%), Isoptera (1.63 %), Diptera (*Chironomus* sp.) (0.54 %), and Hemiptera (0.54%). Mostly, organisms belonging to Bacillariophyta Division (*Navicula, Cymbella*, *Fragilaria*, *Diatoma*, *Coscinodiscus* etc.) were consumed as phytoplankton. Monthly consumed food volumes were given in Table 4. As it is seen from table, the highest amount of food was consumed in November 2004 (2.55 cm^3) whereas the lowest were in August 2004 (0.93 cm^3).

Mostly, *Daphnia* sp. which is followed by *Brachionus* sp., *Lecane* (7.46%), *Notholca* (5.97%), *Asplanchna* (4.48%), *Keratella* (1.49%), *Conochilus* (1.49%), *Monammata* (1.49%), *Rotaria* (1.49%), *Lophocharis* (1.49%), *Colurella* (1.49%) consumed from Cladocera group of Crustacea. Mainly, *Cyclops* sp. consumed from Copepoda group which is composed of 7.46% of total nutrient and it was found to be dominant food item during the research time. The genus *Arctodiaptomus* was rarely found (1.49%) in alimentary canal of tench. The only genus of Ostracoda was determined to be 3.26%. *Gammarus* sp. of Amphipoda group was found to be 1.63%. Isoptera, Diptera, and Hemiptera from Insecta group were found to be 1.63%, 0.54%, and 0.54%, respectively.

Discussion

Parasitic species *Asmyphylodora tincae* (Digenea) (33.15%) and *Ligula intestinalis* (29.89%) were determined in alimentary tract of tench. Both of these parasites were frequently reported from Turkey in studies with *Tinca tinca* (Aydoğdu *et al.*, 1996; Yavuzcan *et al.*, 2003; Ergönül and Altındağ, 2005; Özan *et al.*, 2006). The first host of *Asymphylodora tincae*, which is mostly found in tench's alimentary tract, had been determined as *Radix limos*a, *Lymnea stagnalis,* and *Planorbis carinatus* and the second host had been various mollusk species in İznik Lake (Aydoğdu *et al*., 1996) according to feeding behaviour of fish. *A. tincae* was the most encountered parasitic species in tench (79.94% n=267) (Özan *et al.*, 2006) which was followed by the pleurocercoids of *L. intestinalis* (52.99% n=177).

In this study, it was found that only 5 of the 188 tench (2.66 %) were observed to have almost empty alimentary canal. Since the food items in alimentary canal were frequently digested completely or partly, it was possible to make identifications only in genus or in some instances at family level. According to analysis results, *Tinca tinca* population were typically feeding omnivorous.

Alimentary canal content volumes were found to be increased as age of fish increased (except sixth age) according to volumetric measurement results (Table 4). Alimentary canal content volume of sixth age group was slightly lower than that of fifth age group fish. Monthly alimentary canal contents were detected to be the highest in November 2004 (2.55 cm^3) while the least in August 2004 (0.93 cm^3). Seasonal content were found to be the highest in spring (8.3%) and the lowest in winter (5.5%), which were 7.7% in autumn and 4.3% in summer.

In many studies, primary food items of tench were determined as benthic macro invertebrates (Rowe, 2004). However, some researchers also reported that tench feed also on zooplankton and insects (Weatherley, 1959; Giles *et al.*, 1990; Perez-Bote *et al.*, 1998; Gonzales *et al.*, 2000).

Nutrient types recorded for tench fish up to now are zooplankton (cladocerans, copepods and

Table 1. Food types ingested by *Tinca tinca* and their frequencies in Beyşehir Lake

Gut contents	The number of fish (F) consumed each food item	Frequency (%)	Gut contents	The number of fish (F) consumed each food item	Frequency (%)
CRUSTACEA			PHYTOPLANKTON		
Copepoda			*Closterium*	4*	2.12
Cyclops sp.	3	2.65	*Staurastrum*	3*	1.59
Arctodioptomus sp.	2*	1.06	*Diatoma*	38	28.19
Cladocera			*Nodularia*	14	6.91
Daphnia sp.	26	13.29	*Zygnema*	4*	4.25
Amphipoda			*Pinnularia*	28	12.76
Gammarus sp.	2	1.63	*Epithemia*	24	17.02
			Ankistrodesmus	41	22.87
ROTIFERA			*Chlorogonium*	6*	3.19
Rotaria sp.	1*	0.53	*Ulotrix*	25	12.76
Keratella sp.	1*	0.53	*Closteriopsis*	11	7.44
Brachionus sp.	15	7.97	*Tabellaria*	29	21.80
Lecane sp.	4	2.65	*Amphora*	28	15.95
Asplanchna sp.	5	1.59	*Chaeptophora*	63	32.44
Notholca sp.	3	2.12	*Coscinodiscus*	33	34.00
Monommata sp.	2	0.53	*Gamphosphearia*	7*	3.72
Anuraeopsis fissa	2*	1.06	*Sphaerocystis*	9*	4.78
Lophocharis sp.	1*	0.53	*Chaetoceros*	1*	2.65
Colurella adriatica	1*	0.53	*Oedogonium*	7*	3.72
			Oocystis	6*	3.10
OSTRACODA	6*	3.26	*Surirella*	26	18.02
Cypris sp.			*Rivularia*	22	12.76
			Chlorella	15	7.95
INSECTA			*Bacteriastrum*	21	7.95
Diptera			*Coelastrum*	4*	2.12
Chironomus sp.	1*	0.54	*Phytoconis*	18	7.44
Isoptera	3*	1.63	*Cymatopleura*	14	7.95
Culicidae	9*	4.89	*Mougeotia*	14	7.95
Hemiptera	1*	0.54	*Cladophora*	3*	1.59
			Gomphonema	4*	2.12
PHYTOPLANKTON			*Cosmarium*	18	9.04
Oscillatoria	3*	1.59	*Microphora*	1*	0.53
Navicula	69	43.60	*Anabena*	1*	0.53
Cymbella	47	30.85	*Cocconeis*	1*	0.53
Lyngbya	2*	1.06	*Pediastrum*	1*	0.53
Nitzchia	2*	1.06	*Skletonema*	1*	0.53
Gyrosigma	5*	2.65	*Closterium*	1*	0.53
Scenedesmus	8*	4.25	*Asterionella*	1*	0.53
Tetraedron	1*	0.53	Fish items like eggs, fins		
Euglena	7*	3.72	etc.	44	23.94
Fragilaria	60	37.76	Vegetal detritus	148	66.30
Synedra	22	13.80	*Asymphlodora tincae*	64	33.15
Spirogyra	17	10.10	(Digenea)		
Merismopedia	4*	2.12	*Ligula intestinalis*	54	29.89
Total kind of food item					74

*It was not calculated statistically because the number was inadequate for this organism in fish alimentary canal.

ostracods), benthic crustacea (amphipods and decapods), benthic insects (chironomids, odonats, ephemeropterans, hemipterans, corixids and hirudinids) and gastropods. Therefore, it seems that tench feed on various aquatic invertebrates and bigger tenchs consume small prey in environments which may include many fish species (Rowe, 2004).

Weatherley (1959) found that tench feed mainly on zooplankton. He also found that fish bigger than 10 cm consumed amphipods and insect larvae.

Petridis (1990) observed abundant chironomids and gastropods in alimentary tract of tench in Lancester Canal. However, positive selection of an Isopod *Asellus aquaticus* whereas negative selection of chironomids. No results were seen like this in the present study.

In contrast to other studies, fish items like eggs and fins, etc. were found in our samples. This is very important for food competition of fish species in this lake. Some data taken from Beyşehir Fishery Cooperative and Konya Provincial Agriculture Administration supported our idea about this subject

Table 2. Food types ingested by *Tinca tinca* and their frequencies according to seasons (df=3)

Gut contents	Winter (examined fish samples=35)		Spring (examined fish samples=44)		Summer (examined fish samples=71)		Autumn (examined fish samples=37)		Pearson Chi-Square
	F	Frequency (%)	F	Frequency (%)	F	Frequency (%)	F	Frequency (%)	Asymp. Sig. (2-sided)
Amphora	6	17.1	7	15.9	10	14.1	6	16.2	.977
Ankistrodesmus	10	28.6	6	13.6	18	25.4	8	21.6	.380
Bacteriastrum	5	14.3	2	4.5	11	15.5	4	10.8	.333
Chaetophora	8	22.9	6	13.6	14	19.7	7	18.9	.756
Chlorella	3	8.6	1	2.3	10	14.1	1	2.7	.074*
Closteriopsis	2	5.7	5	11.4	4	5.6	0	.0	.194
Coscinidiscus	8	22.9	2	4.5	11	15.5	2	5.4	.039*
Cosmarium	4	11.4	2	4.5	10	14.1	2	5.4	.282
Cymatopleura	2	5.7	1	2.3	6	8.5	5	13.5	.270
Cymbella	13	37.1	6	13.6	19	26.8	10	27.0	.120
Diatoma	10	28.6	5	11.4	15	21.1	8	21.6	.293
Epithemia	6	17.1	6	13.6	7	9.9	5	13.5	.757
Fragilaria	13	37.1	9	20.5	21	29.6	18	48.6	.048*
Mougetia	0	.0	1	2.3	13	18.3	0	.0	.000*
Navicula	10	28.6	16	36.4	31	43.7	13	35.1	.484
Nodularia	1	2.9	4	9.1	5	7.0	4	10.8	.603
Palmella	2	5.7	2	4.5	7	9.9	1	2.7	.469
Phytoconis	0	.0	2	4.5	10	14.1	6	16.2	.037*
Pinnularia	0	.0	8	18.2	16	22.5	4	10.8	.017*
Rivularia	5	14.3	5	11.4	12	16.9	0	.0	.073*
Spirogyra	2	5.7	7	15.9	5	7.0	3	8.1	.339
Surirella	6	17.1	4	9.1	8	11.3	8	21.6	.332
Synedra	9	25.7	5	11.4	5	7.0	3	8.1	.036*
Tabellaria	5	14.3	3	6.8	13	18.3	8	21.6	.255
Ulotrix	2	5.7	4	9.1	17	23.9	2	5.4	.010*
Asplanchna	0	.0	2	4.5	3	4.2	0	.0	.358
Brachionus sp.	0	.0	0	.0	5	7.0	0	.0	.039*
Cyclops extremity	0	.0	1	2.3	2	2.8	0	.0	.581
Daphnia	2	5.7	6	13.6	13	18.3	5	13.5	.374
Gammarus extremity	0	.0	2	4.5	0	.0	0	.0	.087*
Lecane	0	.0	0	.0	3	4.2	1	2.7	.353
Monommata	0	.0	1	2.3	1	1.4	0	.0	.692
Notholca	0	.0	2	4.5	1	1.4	0	.0	.308
Asymphylodora tincae	12	34.3	22	50.0	20	28.6	10	30.3	.115
Fish items like eggs. fins etc.	20	57.1	27	62.8	44	62.0	23	62.2	.956
Vegetal detritus	30	85.7	75	75.0	59	83.1	28	75.7	.518
Ligula intestinalis	9	25.7	12	34.3	22	50	11	15.5	0.02*

*Significant

(Table 5). These data showed that the tench are very well adapted to Beyşehir Lake and became the dominant population.

In the study of Atasagun and Karabatak (1995), in Mogan Lake, animal food of tench was mostly zooplanktons and benthic organisms. From these, mostly *Chironomus* sp., *Daphnia* sp. and *Diaptomus* sp. were consumed. However, in the present study mostly phytoplankton and plant remains were determined in alimentary tract of tench.

Two different habitats of tench were chosen (lake and river) and feeding differences between the two populations were observed yearly by Gonzales *et al.* (2000). They determined the relationship between food type of tench and macro invertebrate community and chironomid larvae to be the preferred food in both of the habitats. In addition small crustacean in lake habitat; but gastropods in river habitat were found to be preferred food. According to their results, tench was not highly selective and a predator which is feeding on invertebrate community found in the habitat. However, in this study mostly zooplanktonic microcrustacean, *Daphnia* sp., were consumed as animal food, which is followed by some insect larvae (Isoptera, Culicidae, and Hemiptera). Very rarely chironomid larvae were found among fish food. Zooplankton and ground sediment were found to be the main food of 2^{+} *Tinca tinca* in a polyculture pool by Adamek *et al.* (2003).

Generally, tench were determined to be feeding as benthic carnivorous and nutrients mostly found in the environment comprising their predominant prey. Presumably large, soft crustacean are preferred to smaller preys (Rowe, 2004).

Table 3. Food types ingested by *Tinca tinca* and their frequencies according to age classes (df=5)

Gut contents	AGE CLASSES												Pearson Chi-Square
	1 (examined fish samples=26)		2 (examined fish samples=25)		3 (examined fish samples=54)		4 (examined fish samples=38)		5 (examined fish samples=21)		6 (examined fish samples=21)		
	F	Frequency (%)	F	Frequency (%)	F	Frequency (%)	F	Frequency (%)	F	Frequency (%)	F	Frequency (%)	
Amphora	3	11.5	5	20.0	4	7.4	7	18.4	5	23.8	4	19.0	.412
Ankistrodesmus	4	15.4	8	32.0	11	20.4	7	18.4	6	28.6	5	23.8	.694
Bacteriastrum	2	7.7	3	12.0	6	11.1	4	10.5	2	9.5	4	19.0	.890
Chaetophora	4	15.4	4	16.0	10	18.5	7	18.4	1	4.8	9	42.9	.052*
Chlorella	1	3.8	5	20.0	5	9.3	2	5.3	0	.0	2	9.5	.168
Closteriopsis	4	15.4	2	8.0	2	3.7	2	5.3	1	4.8	0	.0	.285
Coscinidiscus	0	.0	2	8.0	12	22.2	4	10.5	2	9.5	3	14.3	.099*
Cosmarium	2	7.7	5	20.0	3	5.6	2	5.3	3	14.3	3	14.3	.301
Cymatopleura	1	3.8	3	12.0	4	7.4	4	10.5	1	4.8	1	4.8	.826
Cymbella	4	15.4	4	16.0	13	24.1	10	26.3	6	28.6	10	47.6	.146
Diatoma	3	11.5	6	24.0	9	16.7	10	26.3	4	19.0	6	28.6	.607
Epithemia	3	11.5	2	8.0	5	9.3	5	13.2	4	19.0	5	23.8	.531
Fragilaria	10	38.5	11	44.0	14	25.9	12	31.6	6	28.6	7	33.3	.675
Mougetia	0	.0	2	8.0	6	11.1	3	7.9	2	9.5	1	4.8	.629
Navicula	11	42.3	7	28.0	23	42.6	13	34.2	7	33.3	8	38.1	.828
Nodularia	4	15.4	3	12.0	1	1.9	3	7.9	1	4.8	2	9.5	.321
Palmella	3	11.5	2	8.0	4	7.4	1	2.6	0	.0	2	9.5	.554
Phytoconis	2	7.7	5	21.7	2	3.7	4	10.5	0	.0	5	23.8	.030*
Pinnularia	7	26.9	4	16.0	6	11.1	7	18.4	1	4.8	3	14.3	.347
Rivularia	1	3.8	3	12.0	7	13.0	2	5.3	4	19.0	5	23.8	.211
Spirogyra	1	3.8	2	8.0	5	9.3	7	18.4	1	4.8	1	4.8	.326
Surirella	1	3.8	5	20.0	4	7.4	11	28.9	5	23.8	0	.0	.004*
Synedra	2	7.7	1	4.0	5	9.3	7	18.4	6	28.6	1	4.8	.064*
Tabellaria	2	7.7	4	16.0	6	11.1	7	18.4	5	23.8	5	23.8	.490
Ulotrix	6	23.1	2	8.0	5	9.3	4	10.5	4	19.0	4	19.0	.427
Asplanchna	2	7.7	0	.0	2	3.7	1	2.6	0	.0	0	.0	.476
Brachionus	3	11.5	0	.0	1	1.9	2	5.3	1	4.8	3	14.3	.160
Cyclops extremity	2	7.7	0	.0	1	1.9	0	.0	0	.0	0	.0	.170
Daphnia	5	19.2	1	4.0	3	5.6	7	18.4	5	23.8	5	23.8	.081*
Gammarus extremity	0	.0	0	.0	2	3.7	0	.0	0	.0	0	.0	.428
Lecane	0	.0	0	.0	3	5.6	1	2.6	0	.0	0	.0	.412
Monommata	0	.0	0	.0	2	3.7	0	.0	0	.0	0	.0	.428
Notholca	0	.0	0	.0	2	3.7	1	2.6	0	.0	0	.0	.663
Asymphylodora tincae	7	28.0	5	20.0	21	38.9	17	45.9	4	19.0	10	50.0	.115
Fish items like eggs. fins	17	65.4	17	70.8	29	53.7	28	73.7	10	47.6	12	57.1	.245
Vegetal detritus	18	69.2	21	84.0	48	88.9	31	81.6	13	61.9	17	81.0	.102
Ligula intestinalis	25	96.15	20	80.00	5	9.3	2	5.3	0	0	2	9.5	0.121

*Significant

Table 4. Monthly consumed food volumes of *Tinca tinca* in Beyşehir Lake

Month	Mean volume (cm^3)	Month	Mean volume (cm^3)
April 2004	2.32	December 2004	1.14
May 2004	2.47	January 2005	1.74
June 2004	1.79	February 2005	1.91
July 2004	1.03	March 2005	1.85
August 2004	0.93	May 2005	1.41
September 2004	2.38	June 2005	1.95
October 2004	1.76	July 2005	1.47
November 2004	2.55	August 2005	2.15

Table 5. Quantities of the commercial aquatic products (ton/year) in Beyşehir Lake*

Species	Years			
	2002	2003	2004	2005
Tinca tinca	315.00	553.00	1486.00	945.00
Stizostedion lucioperca	307.00	220.00	673.00	304.00
Cyprinus carpio	103.00	143.00	608.00	83.00
Astacus leptodactylus	4.00	4.20	6.80	9.80

*These datas were taken from Beyşehir Fishery Cooperative and Konya Provencial Agriculture Administration.

Rarely, tench were recorded to feed on makrophytes and algae (Weatherley, 1959; Coad, 2003). This can only be seen when benthic invertebrates found rarely in the environment.

Algae and macrophytes were found to be the most considerable food types in the present study, which is followed by zooplankton and insect larvae. This may be due to the decrease in invertebrates as a result of eutrophication recently. As a result, tench in Beyşehir Lake are not selective in their feeding habits and they consume most of the vegetable organisms found in their surroundings. Among animal food items, mostly zooplankton and some insect larvae were consumed.

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