

Zooplankton of Beyhan Dam Lake (Elazığ, Turkey)

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Abstract

Seasonal variations of the zooplankton were studied in Beyhan Dam Lake between March 2011 and February 2012. Samples were collected from 2 different stations basis with plankton net, both horizontally and vertically. In Beyhan Dam Lake 32 zooplankton species were identified. Zooplankton samples were consisted of 93.38% Rotifera, 3.99% Cladocera, and %2.63 Copepoda, including 24, 5, and 3 taxa, respectively. Rotifera was the dominant group of zooplankton with respect to species numbers, frequency of occurrence, and density. All of the zooplanktonic species have been detected for the first time in Beyhan Dam Lake with this study. Some chemical and physical parameters as pH, dissolved oxygen, water temperature were also measured during the research.

Key words: Zooplankton, Rotifera, Cladocera, Copepoda, Beyhan Dam Lake

Beyhan Baraj Gölü Zooplanktonu (Elazığ, Türkiye)

Özet

Beyhan Baraj Gölü zooplanktonu'nun mevsimsel değişimi Mart 2011- Şubat 2012 tarihleri arasında incelendi. Zooplankton örnekleri 2 farklı istasyondan plankton ağıyla hem horizontal hemde vertical olarak toplandı. Baraj Gölü'nde toplam 32 zooplankton türü teşhis edildi. Göldeki zooplanktonik organizmaların sayısal (birey/m³) olarak % 93.38'ini Rotifera, % 3.99'nu Cladocera ve % 2.63'ünü Copepoda türlerinin oluşturduğu belirlendi. Rotifera grubundan 24, Cladocera grubundan 5, Copepoda grubundan ise 3 takson bulundu. Rotifera grubu tür sayısı, ortaya çıkış sıklığı ve yoğunluk bakımından zooplankton içinde baskın grubu teşkil etmiştir. Beyhan Baraj Gölü'ndeki tüm zooplanktonik türler ilk kez bu çalışma ile teşhis edildi. Çalışma boyunca pH, çözülmüş oksijen, su sıcaklığı gibi bazı fiziksel ve kimyasal parametreler de ölçüldü.

Anahtar kelimeler: Zooplankton, Rotifera, Cladocera, Copepoda, Beyhan Baraj Gölü

1. Introduction

In the lake ecosystem, zooplankton that occupies the second trophic level of food chain and are important food source for invertebrates and fishes. Additionally, some studies show that certain species of zooplankton are usually considered to be useful indicators of water quality, trophic status and pollution [1-3]. A lot of studies have been carried out on the zooplankton fauna of Turkey [4-16]. But zooplankton of Beyhan Dam Lake has not been studied before. The aim of this study was therefore conducted to determine the zooplankton composition in Beyhan Dam Lake and hence contribute to the knowledge of the zooplankton fauna of East Anatolia and also Turkey.

2. Material and Methods

Beyhan Dam Lake is located on Murat River, 95 km far from Elazığ. Zooplankton samples were collected from 2 different stations. Coordinates of stations in Beyhan Dam Lake are given in Table 1.

Table 1. Coordinates of stations in Beyhan Dam Lake

Stations	Locations
1	38°43'18"N 40°02'20"E
2	38°43'37"N 40°07'28"E

Vertical hauls were used for calculating zooplankton density and those collected by horizontal hauls were used for species identification. Zooplankton samples were collected with a standard plankton net (Hydrobios Kiel, 25 cm in diameter 55 µm in

mesh size). Collected samples were poured in to 250 ml bottles and were preserved in 4 % formaldehyde solution soon after collection. The taxonomical identification of species was performed according to following publications Kolisko [17], Koste [18-19], Segers [20] for Rotifera; Flössner [21], Negrea [22] for Cladocera; Einsle [23], Dussart and Defaye [24] for Copepoda. Temperature and dissolved oxygen were measured by a Oxi 315i/SET oxygen meter, pH by a Lamotte (pH 5-WC) pH meter digital device.

3. Results

During the study period identified zooplankton samples indicated the presence of 24 species of Rotifera, 5 species of Cladocera and 3 species of Copepoda. Zooplankton species identified in Beyhan Dam Lake were as follow;

Rotifera

Asplanchna priodonta Gosse, 1850
Brachionus angularis Gosse, 1851
Cephalodella auricula (Müller, 1773).
Cephalodella gibba (Ehrenberg, 1838)
Cephalodella ventripes Dixon-Nuttall, 1901
Colurella adriatica Ehrenberg, 1831
Colurella colurus (Ehrenberg, 1830)
Euchlanis dilatata Ehrenberg, 1832
Filinia terminalis (Plate, 1886)
Keratella cochlearis (Gosse, 1851)
Keratella quadrata (O. F. Müller, 1785)
Keratella tecta (Gosse, 1851)
Lecane bulla (Gosse, 1886)
Lecane luna (O. F. Müller, 1776)
Lecane lunaris (Ehrenberg, 1832)
Lepadella ovalis (O.F.Müller, 1786)
Lepadella patella (O.F. Müller, 1786)
Notholca squamula (O.F. Müller, 1786)
Notommata glyfura Wulfert, 1935
Polyarthra dolichoptera Idelson, 1925
Proales fallaciosa Wulfert, 1937
Synchaeta oblonga Ehrenberg, 1831
Synchaeta pectinata (Ehrenberg, 1832)
Trichotria tetractis (Ehrenberg, 1830)

Cladocera

Bosmina longirostris (O.F. Müller, 1785)
Chydorus sphaericus (O.F. Müller, 1776)
Daphnia longispina O.F.Müller, 1875
Disparalona rostrata (Koch, 1841)

Daphnia cucullata Sars, 1862

Copepoda

Acanthocyclops robustus (G.O.Sars, 1863)
Cyclops vicinus Uljanin, 1875
Acanthodiaptomus denticornis (Wierzejski, 1887)

Seasonal distribution of zooplankton in Beyhan Dam Lake is given in Table 2. Some parameters (pH, dissolved oxygen, and surface water temperature) were measured during field trips. There was a market decrease in total zooplankton species richness and individual number in winter and a sharp increase in spring and autumn months. The most taxa were observed in spring, but less taxa were observed in winter. Species richness of Rotifera was found high (24), while species richness of Cladocera (5) and Copepoda (3) was found low. Some water parameters (pH, dissolved oxygen, and surface water temperature) were measured during field trips.

4. Discussion

According to Segers [25], all of the recorded rotifer species in the present study are widely distributed around the world. Also many of the recorded species are common in Turkey [26-28]. Species richness of Rotifera was found quite high, when compared to Cladocera and Copepoda in Turkish inland waters [6;29-31]. The highest species richness was found in Rotifera (with 24 species) in the present study, as in other studies in Turkey. Dominant Rotifera species was *Keratella cochlearis* followed by *Polyarthra dolichoptera*.

Table 2. Seasonal distribution of zooplankton in the Beyhan Dam Lake (ind/m³)

Seasons	Spring		Summer		Autumn		Winter	
Stations	1	2	1	2	1	2	1	2
Rotifera								
<i>A. priodonta</i>					2547		407	407
<i>B. angularis</i>					203			
<i>C. auricula</i>	203							
<i>C. gibba</i>	6114	4076			203	407		
<i>C. ventripes</i>	2038	1528						
<i>C. adriatica</i>			203	203			203	203
<i>C. colurus</i>	407	509						
<i>E. dilatata</i>						407		
<i>F. terminalis</i>	1019				203			
<i>K. cochlearis</i>	5095	7133	4076	4076	4585	4076		203
<i>K. quadrata</i>					1528	4076	3566	1528
<i>K. tecta</i>			407	203	407	407		
<i>L. bulla</i>			407	203				
<i>L. luna</i>			1528					
<i>L. lunaris</i>								203
<i>L. ovalis</i>					203			
<i>L. patella</i>	407							
<i>N. squamula</i>								2038
<i>N. glyfura</i>	1528							
<i>P. dolichoptera</i>	6114	5095	407		5095	1528	203	203
<i>P. fallaciosa</i>	203							
<i>S. oblonga</i>			203	2038				
<i>S. pectinata</i>	1019	509	1528	3566	203			
<i>T. tetractis</i>	203							
Total	24350	18850	8759	10289	15177	10901	4379	4785
Cladocera								
<i>B. longirostris</i>	407	407		203		203	1528	
<i>C. sphaericus</i>				203				
<i>D. longispina</i>	203		407			203		
<i>D. rostrata</i>			203					
<i>D. cucullata</i>				203				
Total	610	407	610	609		406	1528	
Copepoda								
<i>A. robustus</i>	203						407	203
<i>C. vicinus</i>	203	407				203	407	407
<i>A. denticornis</i>	203							
Total	609	407				203	914	610
General total	25569	19664	9369	10898	15177	11510	6821	5395

Only five species of Cladocera such as *Bosmina longirostris*, *Chydorus sphaericus*, *Daphnia longispina*, *Disparalona rostrata* and *Daphnia cucullata* were observed.

Bosmina longirostris was the dominant Cladoceran species. *Cyclops vicinus* was the dominant Copepoda species. *K.cochlearis* the most abundant species was observed in every season during the study period and showed its peak in spring with 7133 ind/m³ while the lowest were recorded in winter with 203 ind/m³. The codominant species was *P.dolichoptera* occurred in 7 months. The highest number of this species was recorded in spring with 6114 ind/m³ and the lowest in winter with 203 ind/m³. Rotifera showed higher diversity compared to other groups, reaching also high densities throughout the study period. In this study, *K. cochlearis* and *P. dolichoptera* were determined in all seasons and *N. squamula* was observed in winter in Beyhan Dam Lake. Kolisko [17]'s, reported *N. squamula* as a cold water form. Her report has showed accordance with *N. squamula* distribution in Beyhan Dam Lake. Total zooplankton of Beyhan Dam Lake was recorded in highest individual numbers in spring and the lowest individual numbers in winter months (fig.1).

Among the identified Rotifera species, *Keratella cochlearis*, *Polyarthra dolichoptera*, *Synchaeta pectinata* were observed in the zooplankton almost throughout the sampling period. In contrast, *Brachionus angularis*, *Cephalodella auriculata*, *Euchlanis dilatata*, *Filinia terminalis*, *Lecane luna*, *Lecane lunaris*, *Lepadella ovalis*, *Lepadella patella*, *Notholca squamula*, *Notommata glyfura*, *Proales fallaciosa*, *Trichotria tetractis* are rarely found in the Dam lake. Kolisko [17], reported that *P. dolichoptera* and *K. cochlearis* are perennial species. Similar results have been reported in this study. The ecological features of the recorded species show that most of them are cosmopolitan and littoral inhabiting aquatic macro-vegetation [1-3]. However, Beyhan Dam Lake also includes distinctive species of oligotrophic and mesotrophic lakes. According to Kolisko[17], the predominant representatives of oligotrophic lakes in temperate climatic regions are *Synchaeta oblonga*, *Polyarthra*

vulgaris, *Polyarthra dolichoptera*, *Keratella cochlearis* and *Asplanchna priodonta*.

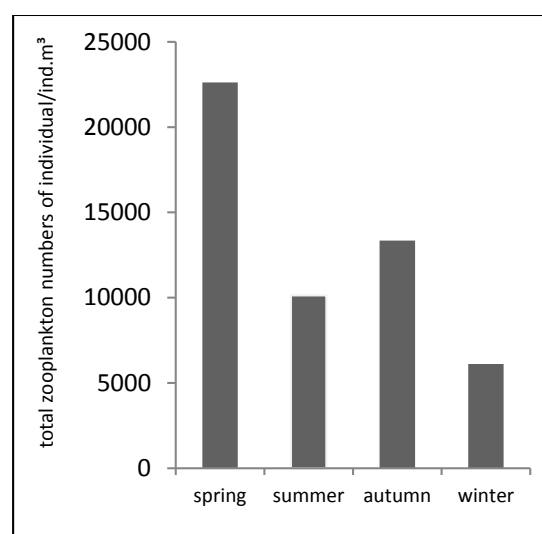


Figure 1. Seasonal changes of total zooplankton in Beyhan Dam lake

However, eutrophic lakes of the same regions contain some of the same species, along with *Euchlanis dilatata*, *Trichocerca sp.*, *Pompholyx sp.*, *Keratella quadrata* and *Filinia longiseta*.

Additionally, among the recorded species, *B. longirostris* and *C. vicinus*, *P. dolichoptera*, *K. cochlearis* are well known indicators of eutrophy [32-33]. *D. longispina*, and *C. sphaericus*, of the Cladocera group, were dominant in the lake; however, these species are generally found in eutrophic lakes [34]. All of these species were recorded in Beyhan Dam Lake.

In Beyhan Dam Lake water temperature were recorded between 6.1-27.2 °C, pH variations was between 7.2-8.0 and dissolved oxygen values were recorded between 6.2-10.3 mg/L. Temperature is known as one of the limiting factors for zooplankton abundance and distribution [35]. It is known that there is a positive correlation between temperature and species richness of zooplankton in aquatic environments [36-38]. Species richness of zooplankton is positively affected by increasing temperature so that zooplankton distribution profile of Beyhan Dam Lake supports this hypothesis that species richness of zooplankton increased in warm and hot months as spring and summer.

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