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SHORT COMMUNICATION KISA BİLGİLENDİRME

ZOOPLANKTON COMMUNITY STRUCTURE OF OHI STREAM (ELAZIG-TURKEY)

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Abstract: This study was completed with periodical surveys in Ohi Stream between November 2010 - October 2011 period. During the study, a total of 23 species (16 belonging to Rotifera, 5 to Cladocera and 2 to Copepoda) were identified in Ohi Stream. All of the zooplanktonic species have been detected for the first time in Ohi Stream. And also some chemical and physical parameters as pH, dissolved oxygen, water temperature were measured during field trips.

Keywords: Rotifera, Cladocera, Copepoda, Ohi Stream, Community, Turkey

Özet: **Ohi Çayı (Elazığ-Türkiye) Zooplankton Kommünite Yapısı**

Bu çalışma Kasım 2010 - Ekim 2011 tarihleri arasında periyodik olarak alınan örnekler üzerinden yapılmıştır. Çalışma sırasında, toplam 23 tür (16 Rotifera, 5 Cladocera, 2 Copepoda'ya ait tür) teşhis edilmiştir.Teşhis edilen bütün zooplanktonik türler Ohi Çayı için ilk kayıttır. Aynı zamanda pH, çözünmüş oksijen, sıcaklık gibi bazı kimyasal ve fiziksel parametreler arazide anında ölçülmüştür.

Anahtar Kelimeler: Rotifera, Cladocera, Copepoda, Ohi Çayı, Kommunite, Türkiye

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Introduction

In freshwater ecosystems, three groups of zooplankton, namely Rotifera, Cladocera, and Copepoda, have been reported (Berzins and Pejler, 1987). Zooplankton occupies the second trophic level in the food chain, the first being occupied by phytoplankton. In aquatic ecosystems, these organisms are the main food source for invertebrates, fishes, and sometimes for aquatic birds. Some species have been reported as characteristic indicators of water quality and trophic level of lakes (Sladecek, 1983; Herzig, 1987; Saksena, 1987).

Many studies were carried out on zooplanktonic organisms in Turkey, Ozdemir and Sen (1994), Saler and Sen (2002), Saler (2004, 2009), Tellioglu and Yılmazturk (2005), Yigit (2006), Ipek and Saler (2008), Saler and Ipek (2009), Saler and Sen (2010), Saler *et al.* (2010), Saler *et al.* (2011a, b). We carried out this study to explain the zooplankton fauna of Ohi Stream and to discuss the species compositions and species richness. The importance of this study is that this is the first research on zooplankton in Ohi Stream.

Materials and Methods

Ohi Stream is 105 km far from Elazıg and 52 km far from Bingol, placed in the North of Elazıg. Ohi Stream borns from the Sarıcan Village and joins to Peri Stream (URL, 1). Sampling was made monthly between November 2010 - October 2011 period. Three sampling stations were chosen in different areas of Ohi Stream (Table 1).

The zooplankton samples were collected with a standart plankton net (Hydrobios Kiel, 25 cm diameter, 55 µ mesh size) horizontal hauls and the specimens were preserved in 4% formaldehyde solution in 100ml plastic bottles. Zooplankton species were examined under Leitz inverted microscope. Relevant literatures as Edmondson (1959), Scourfield and Hardig (1966), Dussart (1969), Flössner (1972), Harding and Smith (1974), Kiefer (1978), Koste (1978 a, b), Dumont and De Ridder (1987), Reedy (1994) were used for the identification of the species. In addition, some physical and chemical parameters as water temperature and dissolved oxygen were measured with Oxi 315i/SET oxygen meter, pH was measured with Lamotte (pH 5-WC) pH meter in situ.

Results and Discussion

In Ohi Stream, 23 species were found, including 16 Rotifera, 5 Cladocera and 2 Copepoda species Based on the number of individuals, rotifers were the dominant group in the stream (69.56 %) followed by Cladocera (21.72 %) and Copepoda (8.69 %).Dominant Rotifera species was *Keratella cochlearis* followed by *Polyarthra dolichoptera*. *Alona rectangulata* and *Ceriodaphnia reticulata* were the dominant cladoceran species. *Cyclops vicinus* was the dominant Copepoda species. The seasonal distributions of species are given in Table 2.

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 number of species were observed in spring (*A. saltans , A. priodonta, B. angularis, F. Longiseta, K. longispina, K. cochlearis, K. hispida , P. dolichoptera, S. pectinata , C. reticulata, A. rectangulata, A. denticornis, C. vicinus*) but less number of species were observed in winter *K. cochlearis P. dolichoptera, N. Squamula, K. longispina , B. longirostris, D. cucullata, L. leydigi.* The most number of species were recorded in the second station with 16 species (11 belonging to Rotifera, 4 to Cladocera and 1 to Copepoda) in spring and the less number of species were recorded in the third station with 3 species (2 belonging to Rotifera and 1 to Copepoda) in winter. Temperature, dissolved oxygen and pH values of the Ohi Stream were shown in the Table 3.

Zooplankton species are important indicators for aquatic habitats since most of them are used to determine the water quality, the trophic level and level of polutions in lakes and streams. For example, *Keratella cochlearis* and *Polyarthra dolichoptera* species of Rotifera are indicators of productive habitats, while *Notholca squamula* is an indicator of cold waters. These species were also observed in Ohi Stream. Species richness of Rotifera was found quite high, as compared to Cladocera and Copepoda in Turkish inland waters.In other zooplanktonic studies that conducted in rivers, similar results were recorded (Saler *et all* 2011 a, b). In this study highest species richness and individual numbers were found to belong to Rotifera with 16 species.

Table 1. Coordinates of stations in Ohi Stream

	1. Station	2. Station	3. Station
Ohi Stream	$38^0$57′34″N$40^0$01′43″E	$38^0$57’31″N$40^0$01’45″E	$38^0$57′29″N$40^0$01′49″E

Table 2. Seasonal distribution of zooplankton fauna in the stations of Ohi Stream

Seasons	Autumn			Winter			Spring			Summer		
Stations	1	2	3	1	2	3	1	2	3	1	2	3
Rotifera												
Ascomorpha ovalis (Bergendahl,1892)	-	+	-	-	-	-	+	-	-	-	-	-
Ascomorpha saltans Bartsch,1870	+	+	-	+	-	-	+	+	-	+	+	-
Asplanchna priodonta (Gosse,1850)	+	-	+	+	+	-	+	+	-	+	-	+
Asplanchna sieboldi (Leydig,1854)	-	+	-	-	-	-	-	+	+	-	-	-
Brachionus angularis Gosse,1851	+	+	-	-	+	-	+	+	-	-	+	-
Cephalodella gibba (Ehrenberg, 1830)	+	-	+	-	-	-	+	-	+	-	+	-
Euclanis dilatata Ehrenberg,1832	-	-	-	-	-	-	-	+	+	+	-	-
Filinia longiseta (Ehrenberg,1834)	-	+	-	+	-	-	+	-	+	+	-	+
Kellicottia longispina (Kellicott,1879)	+	+	-	+	-	+	-	+	+	+	-	+
Keratella cochlearis(Gosse,1851)	+	+	+	+	+	-	+	+	+	+	+	+
Keratella hispida (Lauterborn,1890)	-	-	+	-	-	-	+	+	-	-	+	-
Keratella quadrata (Muller,1786)	+	-	-	-	-	-	+	-	+	-	+	-
Keratella tecta (Gosse,1851)	-	-	+	-	-	-	-	+	+	-	+	-
Notholca squamula (Muller,1786)	-	-	-	+	+	-	-	-	-	-	-	-
Polyarthra dolichoptera Idelson, 1925	+	-	+	-	+	+	+	+	+	+	+	+
Synchaeta pectinata Ehrenberg,1832	+	-	+	-	-	-	-	+	+	+	-	-
Cladocera												
Alona rectangulata Sars,1862	+	+	-	+	-	-	+	-	+	-	+	+
Bosmina longirostris (Muller,1785)	+	+	-	-	-	-	-	+	-	+	-	+
Ceriodaphnia reticulata (Jurine,1820)	+	-	+	-	+	-	+	+	+	+	-	-
Daphnia cucullata Sars,1862	-	-	+	-	-	-	-	+	-	-	+	-
Leydigia leydigi (Schoedler,1863)	+	+	-	-	+	-	-	+	-	-	+	-
Copepoda												
Acanthopdiaptomus denticornis (Wierjesky, 1887)	-	-	+	-	+	-	+	-	+	+	-	+
Cyclops vicinus Uljanin, 1875	+	+	-	-	-	+	+	+	+	-	+	+

Table 3. Seasonal average values of temperature, dissolved oxygen and pH in Ohi Stream

Seasons	Autumn			Winter			Spring			Summer		
Stations	1	2	3	1	2	3	1	2	3	1	2	3
Temperature (C^o)	11.5	9.1	7.7	8.4	12.0	13.0	14.3	17.6	20.3	22.0	18.3	15.5
pH	9.1	9.7	11.2	10.3	9.4	8.3	7.6	7.4	7.3	7.1	7.8	8.6
Dissolved Oxy-gen(mg/L)	7.0	6.4	6.3	6.7	7.2	7.7	7.3	7.5	7.4	7.9	7.6	7.3

All the recorded Rotifer species in the present study are widely distributed around the world. *Keratella cochlearis, Keratella quadrata, Notholca squamula, Asplanchna priodonta, Bosmina longirostris, Cyclops vicinus* are cosmopolitan species and all of these species were recorded in Ohi Stream. (Kolisko, 1974, Segers, 2007). Also many of the recorded species are common in Turkey (Saksena 1987, Dumont and De Ridder 1987, Kaya and Altındag, 2007).

Only five species of Cladocera were observed in the stream. Among the identified species *Leydigia leydigi, Daphnia cucullata* were rarely found in the stream. *Ceriodaphnia reticulata* and *Alona rectangulata* were observed throughout all seasons. *Cyclops vicinus* and *Acanthodiaptomus denticornis* were the representatives of Copepods. Both species were recorded in all seasons too. These two species were recorded in Geban and Gorgusan Stream, Peri Stream, Kurk Stream (Ipek and Saler 2012, Saler *et al*. 2011a, b) In all of these streams rotifers were observed as dominant zooplanktonic group .

The ecological features of the recorded species showed that most of them are cosmopolitan and littoral inhabiting (Kolisko, 1974). Additionally, among the recorded species, *Bosmina longirostris* and *Cyclops vicinus, Polyarthra dolichoptera, Keratella cochlearis* are well known indicators of eutrophy (Ryding and Rast, 1989). *Polyarthra dolichoptera, Keratella cochlearis* are predominant in the stream *Ascomorpha ovalis* and *Notholca squamula* are a perennial species while, *Notholca squamula* is a winter form in the stream.

According to Stember and Gannon (1978) oligotrophic systems are represented by Copepoda fauna, and large groups of small herbivorous zooplankters. Rotifera and Cladocera are found in advanced eutrophic habitats. In other words, Rotifera forms an important part of biomass in eutrophic water systems. Rotifers were found in high number of individuals and high number of species in Ohi stream. Also they have showed an increase in spring and autumn. The zooplankton distribution and pattern of Haringet Stream, Seli Stream, Pulumur Stream, Kurk Stream and Peri Stream showed similarities with our findings (Ozdemir and Sen, 1994; Ipek and Saler, 2008; Saler 2010; Saler *et al*., 2011a, b). In all of these streams, rotifers were found to be the dominant species as species richness and frequency of occurrence.

It is known that there is a positive correlation between temperature and species richness of zooplankton in aquatic enviroments (Matsubara, 1993; Castro *et al.*, 2005; Hessen *et al.*, 2007). Temperature fluctuations effect the zooplankton distribution and number of individuals. In the present study, species richness of zooplankton is positively affected by increasing temperature, so that this study supports the hypothesis that species richness of zooplankton is positively affected by increasing temperature.

Conclusions

Cladocera, Copepoda and Rotifera groups constituted the zooplankton of Ohi Stream. Rotifers were recorded as dominant group and represented with 16 species. Rotifera showed higher species richness, frequency of occurrence and individual number when compared to other zooplankton groups.

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