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Araştırma/Research Article

Seasonal Changes of Larval Chironomids in Berdan Dam Lake (Içel, Turkey)

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Abstract: This study was carried out between September 1998 and August 1999. In the study, the seasonal variations of species macroinvertebrates of Berdan Dam Lake were presented. Eleven species belong to the family Chironomidae were recorded from dam lake. *Procladius sp*. is observed throughout the study. Temperature of lake water, pH, dissolved oxygen and depth were measured monthly.

Keywords: Chironomidae larvae, Berdan Dam Lake, Macroinvertebrate

Berdab Baraj Gölündeki Chronomid Larvalarının Mevsimsel Değişimi

Özet: Çalışma, Eylül 1998-Ağustos 1999 döneminde yürütülmüştür. Çalışmada, Berdan Baraj Gölü makroomurgasız türlerinin mevsimsel değişimleri ortaya konulmuştur. Baraj gölünde Chironomidae familyasına ait 11 tür tespit edilmiştir. Çalışma süresince *Procladius sp*. gözlenen tür olmuştur. Su sıcaklığı, pH, çözünmüş oksijen ve derinlik aylık olarak ölçülmüştür.

Anahtar Kelimeler: Chironomidae larva, Berdan baraj gölü, Makroomurgasız

Introduction

Benthic studies are the important stages of limnologic studies. Identification of the benthic fauna has an important role to in the determination of the biological productivity of lake. Besides, the species composition of benthic organisms, biomass, seasonal changes and some species are the important indicators that identify the quality of water and ecological structure of lakes. For instance, the benthic organisms are of vital importance and have a great function in the food chain of the lake in terms of both fishery and the science of limnology (Ahıska, 1999). The benthic organisms living in a lake ecosystem follow the phytoplankton, zooplankton and constitute the third ring of the lake food chain. They have an important role in the transformation of food and that they are effective in the biological productivity of the lake (Ahıska and Karabatak, 1994). Argues that Chironomidae larvae and Oligochaeta species which are some of the bottom organisms prevent the putrification and effecting mineralization, the crucial elements for photosynthesis are provided and that material transformation is effected in a positive way (Sözen and Yiğit, 1999).

It was aimed to determine seasonal changes and species of Chironomidae larvae in Berdan Dam Lake in which different kinds of fish such as *Cyprinus carpio, Capoeta sp., Barbus sp., Leuciscus cephalus* take place even though it was constructed having a goal of drinking and watering over Berdan River in Içel, which was started to be operated in 1984 and which has a 670 ha lake area was investigated.

Materials and Methods

The study was carried out between September 1998-August 1999 and the samples were monthly taken from 3 stations with different depth (Fig 1).

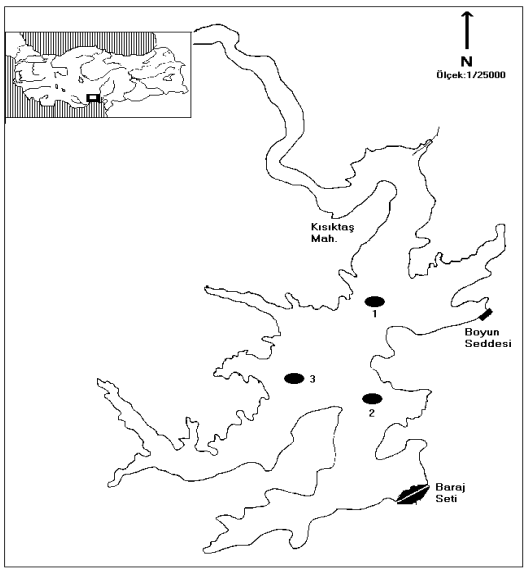

Figure 1. Berdan Dam Lake and Sampling Stations

Sampling is impossible in January because of weather conditions. Samples were taken by using Ekman grab (15x15 sampling area) from each station two times. Sample was washed by using 100-2000 µm sieve series and then organisms were fixed in 4% formaldehyde. Samples were examined quality and quantitatively (Şahin, 1984) and identified (Şahin, 1987, Şahin, 1991; Kırgız, 1988; Pennak, 1989; Merrit and Cummins, 1996). Temperature,dissolved oxygen and pH of lake water were measured. Water samples from deep stations were taken by using Nansen bottles.

Results

It was observed that the level of water in Berdan Dam Lake was increasing especially at the end of spring and during summer. The depth in the stations was measured as 10-26 m throughout the study.
Water temperature is 25^0 C in maximum in August, minimum 12^0 C in March. Dissolved oxygen ranged from 5.3 to 9.0 mgl^{-1}; pH values ranged from 7.8 to 8.5; that water temperature changed from 12 to 24^0 C and that these values are found in the natural environment of the lake (Fig 2).

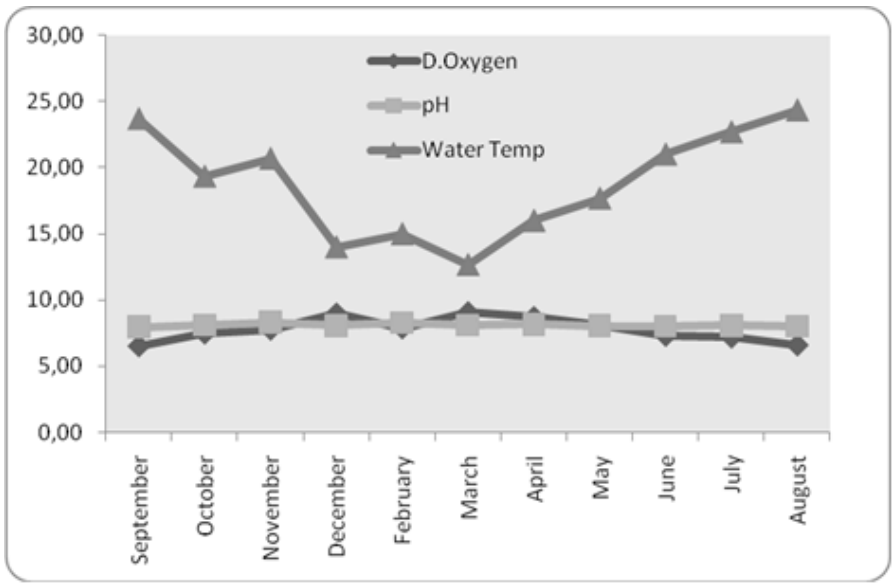

Figure 2. Monthly distribution of water temperature, dissolved oxygen and pH in Berdan Dam Lake

In this study, 10 species belonging to Chironomidae family were determined. The list of the species is given Table 1 and their monthly distributions are seen in Fig 3.

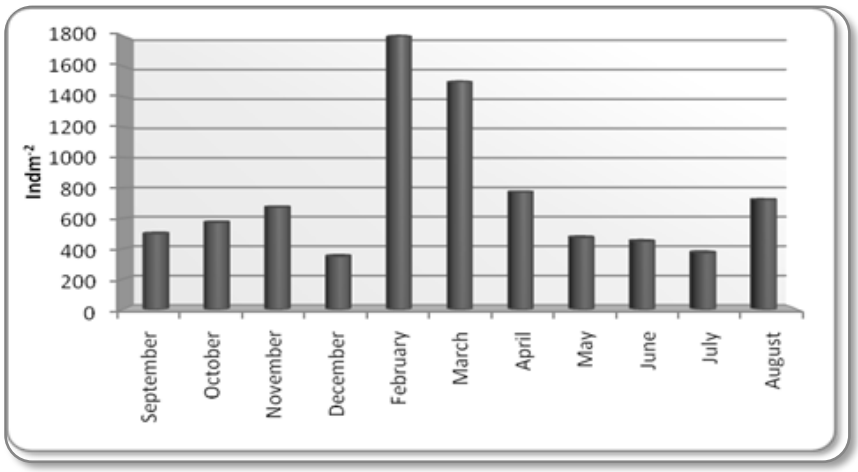

Figure 3. Monthly distribution of Chironomids in the Berdan Dam Lake.

Procladius sp. belonging to Chironomidae is observed throughout the study. *Chironomus sp*. and *Cryptotendipes holsatus* (August), and *Micropsectra notescens* (July) are examined only 1 month.

Chironomidae larvae are found maximum individuals in February with 21.95% and minimum individuals in December with 4.27%.

Table 1. Species of Chironomidae in Berdan dam lake.

Phylum	Arthropoda
Class	Insecta
Ordo	Diptera
Family	Chironomidae
Subfamily	Tanypodinae
	Tanypus puctipennis (MEIGEN,1818) *Procladius* sp (SKUZE,1889)
Subfamily	Chironominae
	Chironomus sp (MEIGEN,1803) *Chironomus plumosus* (LINNEAUS, 1758) *Chironomus anthracinus* (ZETT, 1855) *Cryptochironomus conjugens* (KIEFFER,1921) *Cryptochironomus defectus* (KIEFFER, 1921) *Cryptotendipes holsatus* (LENZ, 1941) *Paracladopelma* sp (HARN, 1923) *Micropsectra notescens* (WALK, 1956)

50.63% of the specified 24600 Chironomidae larvae are determined in the first station 30.95% in the second and 18.42% in the third (Fig 4).

Procladius sp. is commonly encountered with a percentage of 82.52% (Fig 5) and *Crytotentipes holsatus* is rarely found with 0.3%.

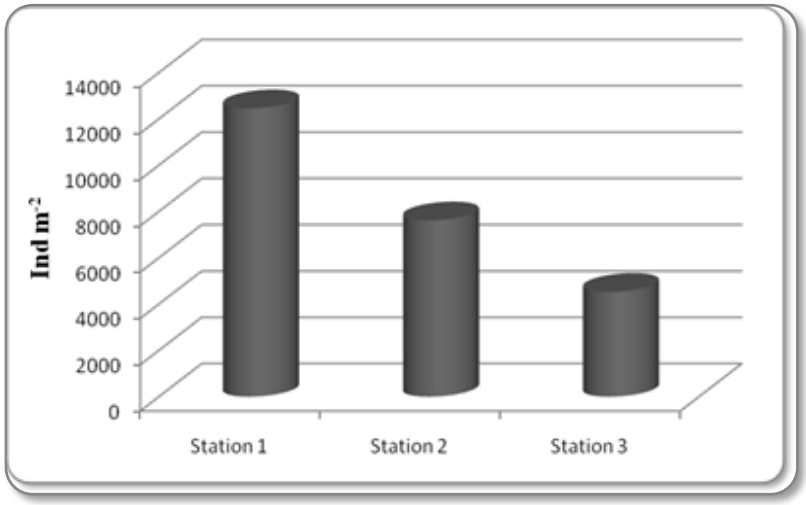

Figure 4. Distribution of Chironomids in sampling stations.

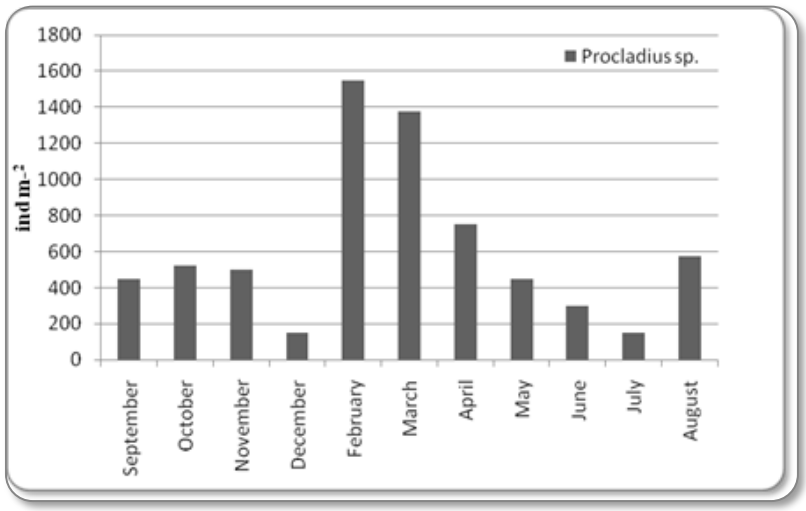

Figure 5. Monthly distribution of *Procladius sp*

Discussion

Since there is not a scientific study about the benthic fauna in Berdan Dam Lake before, the distribution of benthic fauna over years and how this distribution is affected has not been evaluated. However, there has been a comparison with the results received from the studies done in some other lakes.

As the lake mean 745 individuals in m^2 are determined. Chironomidae organisms in Berdan Dam Lake are less than in Seyhan Dam Lake which is another important dam lake of Mediterranean Region. Because according to Kırgız (Thorp and Covich, 1991), in Seyhan Dam Lake which is determined to be a mezotroph lake, mean numbers of 3000 organisms are found in m^2. 18.16% of these are belonging to Oligochaeta species, 77.27% belonging to Chironomidae larvae and 4.13% belonging to other animals. It is suggested that Chironomidae species are more than Oligochaeta species in benthic fauna because Oligochaeta species are much more affected from the carps in the lake. Furthermore, the percentage of Chironomidae is higher amounts when compared to Oligochaeta in oligothrophic lake, but in eutrophic lake oligochaeta species are higher than Chironomidae species (Epler, 1995)

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Procladius sp. which is belonging to Chironomidae larvae is dominant species in all stations. When the seasonal distribution of the species is examined, it is determined that the highest level they reach in the lake is winter and the lowest level is summer. This distribution of the species has some similarities with the distribution in Eğirdir Lake (Şahin, 1987), Kesikköprü dam lake (Ahıska, 2009) and the distribution of Keban Dam Lake (Özdemir and Şen, 1991) which are considered to have these organisms as dominant species.

It is stated that *Procladius sp*. larvae found in the lake are the dominant species in Chironomidae and the monthly changes taken place in these species reflect on all Chironomidae populations. Since *Procladius sp*. larvae are carnivore they cause the decrease of the number of individuals of other Chironomidae larvae in m^2 (Şahin, 1987). The same situation is observed in Berdan Dam Lake.

Chironomids are the first rank to show biological aspects of the lakes (Sözen and Yiğit, 1999). The characteristic animal bottom organisms of the benthic fauna are formed by *Orthocladius sp*., *Tanytarsus* sp., *Sergentia* sp. from Chironomidae group in Oligotroph lakes; *Chironomus sp*., *Glyptotendipes sp*., *Stichtochironomus sp*., *Crytochironomus sp*. species from Chironomidae group, *Chaoborus sp.* larvae which is a Diptera species in eutroph lakes (Şahin, 1987). The dominant presence of *Chironomus sp.* and the confrontation with *Corethra* sp. in all the examined mud are accepted as biological evidence that the lake is eutrophic (Ahıska and Karabatak, 1994). All of these factors show that Berdan dam lake seems to be mesothrophic

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