

Seasonal Variation of Cladocera Fauna of Sultan Marshes and Its Environment (Central Anatolia, Türkiye)

Murat Kaya^{1,*}, Ahmet Altındağ², Göksal Sezen³

¹ Aksaray University, Faculty of Science and Letters, Department of Biotechnology and Molecular Biology, 68100, Aksaray, Türkiye

² Ankara University, Faculty of Science, Department of Biology, Tandoğan, Ankara, 06100, Türkiye

³ Harran University, Faculty of Science-Literature, Department of Biology, Şanlıurfa, Türkiye.

*Corresponding author e-mail: muratkaya3806@yahoo.com

Received: 07 May 2012, Accepted: 07 August 2012

Abstract: In this study, eight water bodies located in Sultan Marshes and its environment (Zamantı River, Homurlu Stream, Ağcaşar Dam Lake, Soysallı Pond, Çayırözü Pond, Lake Söbe, Lake Camız and Sultan Marshes centre) were analyzed in order to determine Cladocera fauna collected from seasonal samples in 2007; and totally thirteen species of Cladocera were identified. In terms of species richness of each water body, 7 species were identified in Lake Söbe besides 5 species in Zamantı River, Ağcaşar Dam Lake and Çayırözü Pond respectively; in addition to these, 3 species were determined in Lake Camız, 2 species in Homurlu Stream, Soysallı Pond and Sultan Marshes center. Detailed results of seasonal variation belonging to the aquatic regions were being given in the text.

Key words: Zooplankton, *Cladocera*, species richness, seasonal variation, Sultan Marshes

Sultan Sazlığı ve Çevresi (İç Anadolu, Türkiye)'nin Cladocera Faunasının Mevsimsel Değişimi

Özet: Bu çalışma, 2007 yılında mevsimsel olarak toplanan örneklerle, Sultan Sazlığı ve çevresinde bulunan 8 su bölgesi (Zamantı Irmağı, Homurlu Çayı, Ağcaşar Baraj Gölü, Soysallı Göleti, Çayırözü Göleti, Söbe Gölü, Camız Gölü ve Sultan Sazlığı merkez)'nin Cladocera faunasını belirlemek üzere gerçekleştirilmiştir. Cladocera grubuna ait 13 tür tespit edilmiştir. Her bir su bölgesine tür zenginliği açısından bakıldığında, Söbe Gölü'nden 7 tür, Zamantı Irmağı'ndan 5 tür, Ağcaşar Baraj Gölü, Çayırözü Göleti ve Camız Gölü'nden 3 tür, Homurlu Çayı, Soysallı Göleti ve Sultan Sazlığı Merkez kısmından da 2 tür tespit edilmiştir. İlgili bölgelere ait mevsimsel değişim detayları metin içerisinde belirtilmiştir.

Anahtar kelimeler: Zooplankton, *Cladocera*, tür zenginliği, mevsimsel değişim, Sultan Sazlığı.

1. Introduction

Cladocera is distributed to a large variety of aquatic areas such as temporary ponds, ponds, lakes and running waters [1]. There are only a few species that usually live in marine and inland waters.

Until today, approximately 620 Cladocera species have been identified worldwide, but in reality this amount is estimated to be 3 times more [2]. Two hundred forty five cladoceran species belonging to 60 genera are determined from Palaearctic [3]. Ninety three species of them are determined in Turkey [4-6].

The purpose of this study is to determine Cladocera fauna and seasonal changes in Sultan Marshes and its environment.

2. Material and Methods

Seasonal samples were collected from 8 water bodies (Zamanti River, Homurlu Stream, Ağcaşar Dam Lake, Soysallı Pond, Çayırözü Pond, Lake Söbe, Lake Camız and Sultan Marshes centre) from Sultan Marshe and its neighborhood by using a plankton net (55 μ mesh size) (Figure 1). Samples collected from the field were stored in 4% formaldehyde solution in 100 ml plastic bottles.

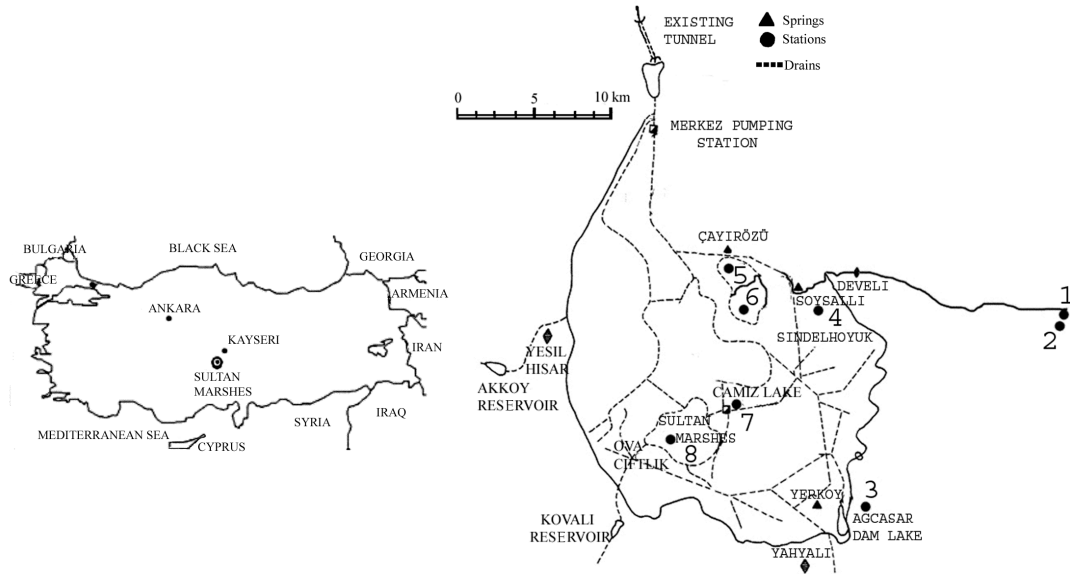


Figure 1. Map of the sampling area and locations (It was taken by from Kaya et al., 2010).

Localities: 1. Zamanti River, 2. Homurlu Stream, 3. Ağcaşar Dam Lake, 4. Soysallı Pond, 5. Çayırözü Pond, 6. Lake Söbe, 7. Lake Camız, 8. Sultan Marshes.

3. Results and Discussion

Sultan Marshes region and neighborhood of 8 (Zamanti River, Homurlu Stream, Ağcaşar Dam Lake, Pond Soysallı, Çayırözü Pond, Sobe Lake, Lake Camız and Sultan Marshes center) aquatic areas were examined seasonally by collecting samples for Cladocera Fauna in 2007. 13 species were identified (Table 1). Seven species were determined in Lake Söbe, 5 species in Zamanti River, Ağcaşar Dam Lake and Çayırözü Pond; 3 species were determined in Lake Camız; 2 species were observed in Homurlu River, Pond Soysallı and Sultan Marshes center. Seven of these 13 species were observed in only one season, and in only one water body.

Table 1: Sampling localities, recorded species and months of collection. Presence (x) or absence (blank) of cladoceran species (A, April; J, July; O, October; D, December)

Recorded species	Zamantı River				Homurlu Stream				Ağcaşar Dam Lake				Soysallı Pond				Çayırözü Pond				Lake Söbe				Lake Camız				Sultan Marshes			
	A	J	O	D	A	J	O	D	A	J	O	D	A	J	O	D	A	J	O	D	A	J	O	D	A	J	O	D	A	J	O	D
<i>Alona affinis</i> Leydig, 1860									X																							
<i>A. quadrangularis</i> (O.F. Müller, 1776)					X																											
<i>A. rectangula</i> Sars, 1861													X				X				X				X				X			
<i>Alonella excisa</i> (Fischer, 1854)																	X				X											
<i>Bosmina longirostris</i> (O.F. Müller, 1776)	X			X	X	X	X		X	X	X										X											
<i>Chydorus sphaericus</i> (O. F. Mueller, 1785)			X								X		X	X	X		X	X				X	X		X				X			
<i>Daphnia cf. curvirostris</i> Eylmann, 1878				X																												
<i>Daphnia longispina</i> (O.F. Müller, 1776)									X																							
<i>Disparalona rostrata</i> (Koch, 1841)											X																					
<i>Leydigia leydigii</i> (Schödler, 1863)	X																															
<i>Macrothrix laticornis</i> (Jurine, 1820)																					X											
<i>Pleuroxus aduncus</i> (Jurine, 1820)																	X					X										
<i>Simocephalus vetulus</i> (O. F. Müller, 1776)	X		X														X	X			X	X			X							

In terms of searching about seasonal species richness; 8 species were observed in summer, 7 species in autumn, 3 species in winter and spring. In some studies, the temperature increase is related with the increase in the richness of zooplankton species [8, 9, 10, 11]. In this study, the highest species richness was recorded in summer which is the same with the results of studies mentioned above.

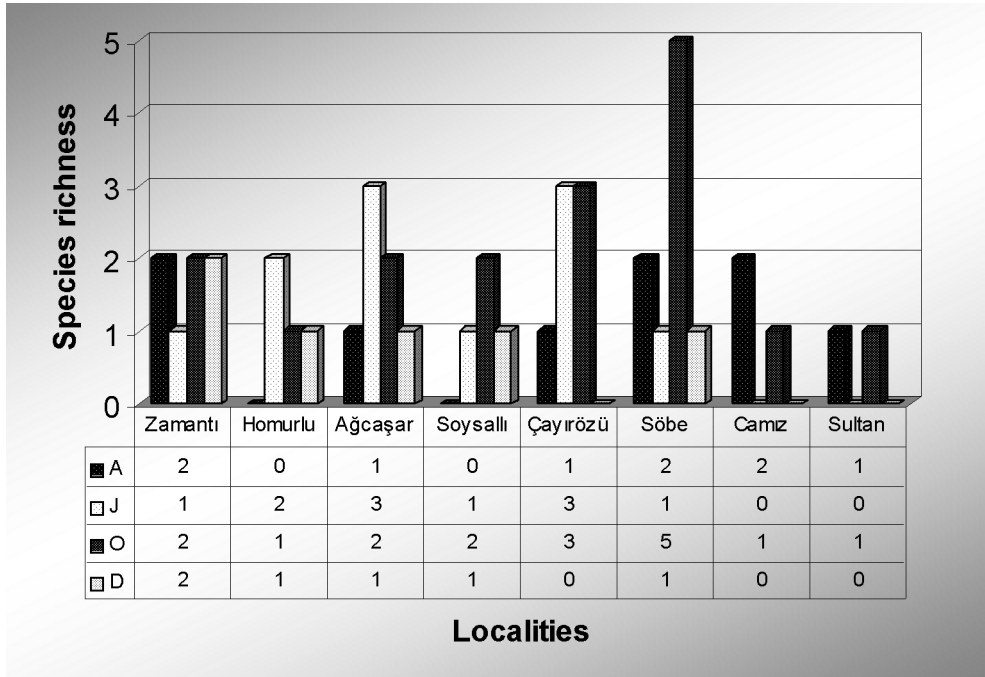


Figure 2. Seasonal species richness of Cladocera for each locality in Sultan Marshes and its environment (A, April; J, July; O, October; D, December)

Chydorus sphaericus was observed in 6 water bodies, and respectively *Bosmina longirostris* and *Simocephalus vetulus* in 4 water bodies. These species are cosmopolitans and the world-wide distributed [2].

We classified water bodies in terms of salinity according to [12]. Three types of waters (FW: freshwater, SS: subsaline, HS: hyposaline) were found (Table 2). Only three sampling time, we recorded hyposaline water bodies in July in Lake Söbe, Lake Camız and Sultan Marshes center (Table 2). Some other studies support that there is negative correlation between salinity and species richness of zooplankton [13-16]. We found that hyposaline conditions restrict species richness of Cladocera. Our results are in good agreement with literature results.

Table 2: Localities and water types in terms of salinity

Localities	Water Types
Zamantı River	
April	Freshwater
July	Freshwater
October	Freshwater
December	Freshwater
Homurlu Stream	
April	Freshwater
July	Freshwater
October	Freshwater
December	Freshwater
Ağcaşar Dam Lake	
April	Subsaline
July	Subsaline
October	Freshwater
December	Freshwater
Soysallı Pond	
April	Freshwater
July	Freshwater
October	Freshwater
December	Freshwater
Çayırözü Pond	
April	Subsaline
July	Subsaline
October	Freshwater
December	Freshwater
Lake Söbe	
April	Freshwater
July	Hyposaline
October	Freshwater
December	Freshwater
Lake Camız	
April	Subsaline
July	Hyposaline
October	Subsaline
December	Subsaline
Sultan Marshes Center	
April	Subsaline
July	Hyposaline
October	Subsaline
December	Subsaline

Rotifera fauna of Sultan Marshes and its environment were published by [7]. In the study, relationship between recorded species and water parameters were revealed. In the present study, Cladocera fauna of the same water bodies located in Sultan Marshes and its environment were identified. The same field trip was done for these studies and the

same water parameters were measured. For knowledge about more water parameters for localities, please look at [7].

References

- [1] Leveque C., Balian E.V., Martens K., 2005. An assessment of animal species diversity in continental waters, *Hydrobiologia*, 542: 39-67.
- [2] Forro L., Korovchinsky N.M., Kotov A.A., Petrusek A., 2008. Global diversity of cladocerans (Cladocera; Crustacea) in freshwater, *Hydrobiologia*, 595: 177-184.
- [3] Balian E.V., Segers H., Leveque C., Martens K., 2008. The Freshwater Animal Diversity Assessment: an overview of the results, *Hydrobiologia*, 595: 627-637.
- [4] Gündüz E., 1997. A Checklist of Cladoceran Species (Crustacea) Living in Turkish Inland Waters, *Turkish Journal of Zoology*, 21: 37-45.
- [5] Ustaoglu R., 2004. A Check-list for Zooplankton of Turkish inland waters, *E.U. Journal of Fisheries and Aquatic Sciences*, 21: 191-199.
- [6] Yalim F.B., Ciplak B., 2005. Digging more deeply into the *verrucosa*-group of the genus *Alona* (Anomopoda, Chydoridae): *Alona mediterranea* new species from the Mediterranean part of Anatolia (Turkey), *Crustaceana*, 78(5):565-578.
- [7] Kaya M., Fontaneto D., Segers H., Altındağ A., 2010. Temperature and salinity as interacting drivers of species richness of planktonic rotifers in Turkish continental waters, *Journal of Limnology*, 69(2): 297-304.
- [8] Matsubara T., 1993. Rotifer community structure in the south basin of Lake Biwa, *Hydrobiologia*, 271: 1-10.
- [9] Friberg N., Milner A.M., Svendsen L.M., Lindegaard C., Larsen S.E., 2001. Macroinvertebrate stream communities along regional and physico-chemical gradients in Western Greenland, *Freshwater Biology*, 46: 1753-1764.
- [10] Castro B.B., Antunes S.C., Pereira R., Soares A.M.V.M., Gonçalves F., 2005. Rotifer community structure in three shallow lakes: seasonal fluctuations and explanatory factors, *Hydrobiologia*, 543: 221-232.
- [11] Hessen D.O., Bakkestuen V., Walseng B., 2007. Energy input and zooplankton species richness, *Ecography*, 30: 749-758.
- [12] Hammer U.T., Shames J., Hayness R. C., 1983. The distribution and abundance of algae in saline lakes of Sas-katchewan, Canada. *Hydrobiologia*, 105: 1-26.
- [13] Lancaster J., Scudder G.G.E., 1987. Aquatic Coleoptera and Hemiphera in some Canadian saline lakes: patterns in community structure. *Can. J. Zool.*, 75: 1383-1390.
- [14] Williams, W.D., Boulton A.J., Taaffe R.G., 1990. Salinity as a determinant of salt lake fauna: a question of scale. *Hydrobiologia*, 197: 257-266.
- [15] Kling G.W., O'Brien, W.J., Miller M.C., Hershey A.E., 1992. The biochemistry and zoogeography of lakes and rivers in arctic Alaska. *Hydrobiologia*, 240: 1-14.
- [16] Egborge A.B.M., 1994. Salinity and the distribution of rotifers in the Lagos Harbour- Badagry Creek system, Nigeria. *Hydrobiologia*, 272: 95-1004.

Ahmet Altındağ e-posta: altindag@science.ankara.edu.tr

Göksal Sezen e-posta: sezen@harran.edu.tr