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Research Article

Aquatic/semi-aquatic Heteroptera (Hemiptera) Diversity of Kızıl Lake (Tomarza: Kayseri) and Some Physicochemical Conditions

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ABSTRACT: This study was conducted to identify the aquatic and semi-aquatic heteroptera fauna of Kızıl Lake, a natural lake in Türkiye, and to provide information about the habitats of these aquatic insects by determining their current water quality. For this aim, samplings in water and sediment were done in the August of 2025 . Some physicochemical parameters (pH, temperature, dissolved oxygen, salinity, and electrical conductivity) of water were measured simultaneously with collection of insect samples. A total of 10 aquatic/semi-aquatic Heteropteran species were identified in the research area. The species *Gerris lacustris* (Linnaeus, 1758) and *Sigara nigrolineata* (Fieber, 1848) were recorded first time in Kayseri Province. Also, according the measured physicochemical parameters, water quality level was evaluated.

KEYWORDS: Aquatic Heteroptera, water analysis, natural lake, Kızıl lake

INTRODUCTION

Only 2.5 % of the world's total water resources can be used safely for domestic, industrial and agricultural purposes (Chin, 2000). These freshwater resources are under anthropogenic and ecological pressures. Especially in recent years, global climate change has also negative effects on water resources. Therefore, protecting

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existing water resources and monitoring the ecological characteristics of them is crucial for their sustainability (TCKB, 2018).

Also, freshwater ecosystems are habitats for living things and they host approximately 10% of the world's fauna. However, human activities are structurally and functionally impacting freshwater resources, reducing their usability. Therefore, freshwater ecosystems are considered among the most threatened globally, and accordingly, vigilance is required to protect aquatic life (Lopez-Lopez & Sedeno-Diaz, 2015).

Aquatic insects are food sources for the other invertebrates and vertebrates, and they contribute to the trophic structure of ecosystems by assuming different roles, from detritivores to predators (Starr & Wallace, 2021).

The suborder Heteroptera is one of the most diverse insect groups in the world and is classified under the order Hemiptera (Schuh & Weirauch 2020). The species belonging to this group constitute 10.13% of the total insect species in Türkiye. All hemipterans that are adapted to an aquatic lifestyle and live in water and they belong to the suborder Heteroptera (Yang et al., 2004; Çerçi et al., 2024).

In this study, it was aimed to determine aquatic/semi-aquatic Heteroptera fauna of Kızıl Lake located in the Tomarza district of Kayseri province that has not been scientifically studied before. Also, it was determined some physicochemical characters of the lake to obtain current quality of the water.

MATERIALS AND METHODS

1. Research Area

Kızıl Lake has approximately 17,200 m^2 area and it is located in Kızıldağ, Işıklar District, Tomarza District, Kayseri Province, at the coordinates of 38°21'28.77" N 36° 3'29.83" E and at an altitude of 1665 meters (Figures 1,2). It is a natural lake fed by snow water and rain water filtered from the high mountains around it. The lake is generally covered with dense vegetation. Because the sampling took place in the summer, the lake's water has receded considerably. The vegetation surrounding the lake, which is also used for grazing by animals, suggests seasonal fluctuations in water levels.



Figure 1. Location of the research area (Google Earth View)



Figure 2. A photo from the Research Area (Photo by H. Özdamar)

2. Collecting Heteroptera Samples

The insect samples were collected according to the standard (TS EN ISO 10870) published by the General Directorate of Water Management of the Ministry of Forestry and Water Affairs. While some aquatic specimens have been found in shallow, muddy coastal areas by mixing the mud with a hard object, the others were collected from deeper, vegetated areas near the lake center using waterproof cloth nets and metal water strainers (twenty-nine cm diameter fine-pored).

The obtained heteroptera specimens were put to the bottles (200 cc polyethylene and lidcontaining 70% ethyl alcohol for preparation. Labelled bottles were stored in the field bags and were transferred to the laboratory to identify the species. For sampling methodology was utilised from Kıyak (2000). It was used Poisson (1957), Jansson (1986), Rabitsch (2005), Andersen (1990; 1993), Soos et. al. (2009), Fent et. al. (2011), Heiss & Jansson (1985) literatures to identification of the species.

3. Measuring Physicochemical Parameters

Water samples were taken from under surface in the lake using a 120-milliliter jar. Some physicochemical values of water (pH, temperature, dissolved oxygen, salinity, and electrical conductivity) were measured directly onto a measurement template at the site using a multiparameter measuring device.

The obtained values were evaluated according to the Quality Criteria for Türkiye's Inland Surface Water Resources According to Classes published in the Official Gazette (SWQR, 2021), and the current water quality class was determined.

RESULTS

The values of measured physicochemical features were given in Table 1 and their water quality class was determined according to SWQR (2021).

According to this, pH value was observed in very good quality class while dissolved oxygen and conductivity were measured at good quality level.

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Table 1. The values of measured Physicochemical parameters (DO: Dissolved Oxygen, EC: Electrical conductivity, Temp: Temperature, Salin: Salinity, WQC: Water Quality Class)

pH		**DO** (mg/L)		**EC** (µS/cm)		**Temp.** (°C)	**Salin.** (‰)
Value	**WQC**	**Value**	**WQC**	**Value**	**WQC**	**Value**	**Value**
7,73	I	6,8	II	683	II	23,7	0,33

A total of 10 aquatic and semiaquatic Heteroptera species were identified in this study. These species and the families are listed in Table 2. According to the identification results, a total of two species (*Gerris lacustris* and *Sigara nigrolineata*) were recorded the first time in Kayseri Province.

Table 2. Aquatic and semiaquatic Heteroptera species identified in the research area (+: Species reported from Kayseri province in previous studies, *: First report from Kayseri province)

Families	**No**	**Species**	**Current status of spe-**
		Semiaquatic Heteroptera Species	
Gerridae	1	*Gerris argentatus* Schummel, 1832	+
	2	*Gerris lacustris* (Linnaeus, 1758)	*
	3	*Gerris thoracicus* Schummel, 1832	+
		Aquatic Heteroptera Species	
Nepidae	4	*Nepa cinerea* Linnaeus, 1758	+
Corixidae	5	*Corixia punctata* (Illiger, 1807)	+
	6	*Hesperocorixa linnaei* (Fieber, 1848)	+
	7	*Sigara nigrolineata* (Fieber, 1848)	*
	8	*Sigara striata* (Linnaeus, 1758)	+
Naucoridae	9	*Ilyocoris cimicoides cimicoides* (Linnaeus, 1758)	+
Pleidae	10	*Plea minutissima minutissima* Leach, 1817	+

DISCUSSION

According to the available literature, nineteen aquatic/semi-aquatic heteropteran species have been recorded in Kayseri: *Mesovelia furcata* Mulsant and Rey, 1852, *Gerris argentatus* Schummel, 1832, *Gerris gibbifer* (Schummel, 1832), *Gerris maculatus* Tamanini, 1946, *Gerris thoracicus* Schummel, 1832, Saldula pallipes (Fabricius, 1794), *Saldula palustris* (Douglas, 1874), *Nepa cinerea* Linnaeus, 1758, *Ranatra linearis* (Linnaeus, 1758), *Micronecta pusilla* (Horváth, 1895), *Callicorixia jakowleffi* Horváth, 1880, *Corixia punctata* (Illiger, 1807), *Hesperocorixa linnaei* (Fieber, 1848), *Paracorixa concinna concinna* (Fieber, 1848), *Sigara albiventris* (Horváth, 1911), *Sigara striata* (Linnaeus, 1758), *Sigara lateralis* (Leach, 1817), *Ilyocoris cimicoides cimicoides* (Linnaeus, 1758), *Plea minutissima minutissima* Leach, 1817 (Fent et al., 2011; Dursun & Fent, 2018; Yazıcı, 2020). In this study, the

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species *Gerris lacustris* (Linnaeus, 1758) (Gerridae) and *Sigara nigrolineata* (Fieber, 1848) (Corixidae) were recorded for the first time in Kayseri province (Table 2). Thus contributing to the faunistic literature by increasing the number of existing aquatic/ semi-aquatic Heteroptera species in Kayseri Province were updated to twenty-one. Also, this study provides the first inventory of Kızıl Lake's faunistic composition. It also adds the first information to the literature on the condition and quality of the lake's water. The water quality of the lake was determined to be good quality.

Aquatic insects respond differently to changes . According to literature information, it is seen that the parameters discussed in this study are quite effective on living things. Aquatic and semi-aquatic heteropteran are also directly related with aquatic ecosystems. They use the ecosystem as habitat for both feeding and for their own survival. Therefore, they can be directly affected by changes in environmental conditions of water. To protect lake water quality and monitor and track changes, similar studies should be conducted monthly/yearly to observe changes. This way, the continuity of water and aquatic heteroptera can be ensured.

Legal Information

This study was carried out with the research permit numbered E-21264211-288.04-17752416 from the General Directorate of Nature Conservation and National Parks of the Ministry of Agriculture and Forestry of the Republic of Turkey.

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Dear Dr. Hakan ÖZDAMAR,
The articles you submitted to our journal, have been accepted for publication in the second issue of Volume 7 of the journal "J.Het.Turk" on November 30, 2025.

"Determination of the Aquatic Heteroptera Diversity of Çubuk Stream and Evaluation of Water Quality Based on Some Physicochemical Parameters (Çubuk: Ankara)"

"Determination of the Aquatic Heteroptera Diversity of Kızıl Lake and Evaluation of Water Quality Based on Some Physicochemical Parameters (Tomarza: Kayseri)"

Relevant articles are attached. Thank you for your contributions.

Sincerely,

Editor in Chief

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"Accepted Letter"