The Composition of Benthic Vernal Diatoms Communities on the Lower Course of Bega River

Anca-Andreea MARIN^{1*}, Benoni LIXANDRU¹, Adrian SINITEAN², Milca PETROVICI², Florica MORARIU¹, Dumitru POPESCU¹, Valentin LATI¹

¹Banat University of Agricultural Sciences and Veterinary Medicine “King Michael I of Romania” from Timisoara, Faculty of Animal Science and Biotechnology,

²West University of Timișoara, Faculty of Chemistry Biology and Geography, Department of Chemistry-Biology, Timișoara, Romania

*Corresponding author: marin.aandreea@yahoo.com

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ABSTRACT

Diatoms are found in all aquatic habitats and species preferences can be used to make predictions about current and past conditions. Diatoms represents the multilateral and major importance in aquatic ecosystems as primary producers in the trophic networks, as producers of atmospheric O₂, as active organism in the circuit of chemical elements in nature, or as participants in the natural process of self-purification of water. In April 2014, 20 quantitative phytobenthic and planktonic samples were collected from Bega River in Timisoara area. The present paper attempts to identified and bring new contributions regarding to the composition of benthic vernal diatoms communities on the lower course of Bega River. Until now it was identified 26 species, distributed in 9 families, 6 orders and two classes, of the benthic diatoms from the Bega River.

Keywords: *Bega River water, diatom biomarkers, water quality.*

INTRODUCTION

Diatoms represents the multilateral and major importance in aquatic ecosystems as primary producers in the trophic networks, as producers of atmospheric O₂, as active organism in the circuit of chemical elements in nature, or as participants in the natural process of self-purification of water (Werner, 1977b).

Diatoms have been utilized to evaluate environmental and climatic changes in freshwater or brackish ecosystems (Denys & Verbruggen, 1989; Ryu *et al.*, 2008).

Organic indicators of water quality monitoring urbanized during the recent years have served as excellent tools in the area of water pollution studies. Among all the algae, fresh water diatoms are the most commonly used indicators of the conditions of water.

Diatoms are microscopic algae that live in both freshwater and marine environments. They

have a siliceous shell, or frustule, consisting of two valves, that are generally preserved in sediments.

Diatoms are found in all aquatic habitats and species preferences can be used to make predictions about current and past conditions (Lowe, 1974).

Benthic diatoms represent some of the best bioindicators of algae because they are the base of food webs and are the first organisms that respond to changes in the environment (Lowe & Pan, 1996), have short life cycles and therefore has a rapid response at the changes in the living environment factors, there are many species, widespread in different ecosystems and geographical areas so that lends itself to monitoring of large areas (Lavoie *et al.*, 2009).

They are an important constituent of the biofouling community in the aquatic ecosystem.

The present paper attempts to identified and bring new contributions regarding to

the composition of benthic vernal diatoms communities on the lower course of Bega River. A few studies were carried out along the whole river valley focusing on the composition of diatoms communities on the lower course of Bega River.

MATERIAL AND METHODS

In April 2014, 20 quantitative phytobenthic and planktonic samples were collected from Bega River in Timisoara area. The phytobenthic and planktonic samples were collected with planktonic net and stored in 4 % formaldehyde (Lixandru, 2006, Marin *et al*, 2014, Péterfi *et al*, 2002, Petrovici, 2009).

Samples were collected from the upstream, middle and downstream of Timisoara city.

The collecting stations (S) were located as follows (figure 1):

S1 is located upstream of Timisoara city, near Ghiroda village, upstream of potable water treatment station.

S2 is located upstream of sewage water treatment station of Timisoara.

S3 is located near Sânmihaiu Roman village from Timis County and downstream of sewage water treatment station of Timisoara.

S4 is located near Otelec village, before the border line with Serbia Country.

The samples were collected by brushing the surfaces of substrata (3-5 rocks or respectively plant fragments, completely covered by water). Epipellic samples were collected by suction with a syringe. Each sample stored in recipients and preserved in 4% formaldehyde.

In laboratory the samples were subsequently treated with strong mineral acids (HNO₃), and incinerated (for eight hours). The examination, taxonomic identification and the establishment of the floristic composition was done by using trinocular microscope (Olympus BX51), immersion objective (100x), and up-to-date identification books: Süsswasserflora von Mitteleuropa (Krammer and Lange-Bertalot - vol. 2/1, 1997; vol. 2/2, 2008; vol. 2/3, 2008; vol. 2/4, 2004; vol. 2/5, 2000), and Diatoms of Europe (coordinated by Lange-Bertalot - vol. 1, 2000; vol. 2, 2001; vol. 3, 2002; vol. 4, 2003). The light micrographs have been obtained with digital cameras adapted for the microscope (Olympus E330). The checklist of diatom flora was organized after the system presented in The Diatoms (Round *et al*, 2000).

RESULTS AND DISCUSSION

The taxonomic analysis of the benthic diatom flora from the Bega River until now, to

Fig. 1. The location of the sample collecting stations on Bega River water

the identification of 26 species, distributed in 9 families, 6 orders and two classes:

Bacillariophyta

Fragilariophyceae Round

Fragilariophycidae Round

Fragilariales Silva

Fragilariaceae Greville

1. *Diatoma moniliformis* Kützing

2. *Diatoma vulgare* Bory de St.-Vincent

3. *Fragilaria capucina* Desmazières

4. *Fragilaria tenera* (W. Smith) Lange-Bertalot

5. *Synedra ulna* (Nitzsch) Ehrenberg (*Fragilaria ulna* (Nitzsch) Lange-Bertalot)

Bacillariophyceae Haeckel

Eunotiophycidae D. G. Mann

Eunotiales Silva

Eunotiaceae Kützing

6. *Eunotia diodon* Ehrenberg

Bacillariophyceae Haeckel

Cymbellales D. G. Mann

Cymbellaceae Greville

7. *Cymbella affinis* Kützing

8. *Cymbella excisa* Kützing

9. *Cymbella minuta* Hilse

Gomphonemataceae Kützing

10. *Gomphonema acuminatum* Ehrenberg

11. *Gomphonema olivaceum* (Hornemann) Brébisson

12. *Gomphonema gracile* Ehrenberg

13. *Gomphonema minutum* (Agardh) Agardh

14. *Gomphonema parvulum* (Kützing) Kützing

15. *Gomphonema truncatum* Ehrenberg -

Achnanthales Silva

Achnantaceae Kützing

16. *Achnanthes minutissima* Kützing

Cocconeidaceae Kützing

17. *Cocconeis placentula* Ehrenberg

Naviculineae Hendey

Naviculaceae Kützing

18. *Navicula capitatoradiata* Germain

19. *Navicula cryptocephala* Kützing

20. *Navicula radiosa* Kützing

21. *Navicula tripunctata* Kützing

22. *Navicula viridula* (Kützing) Ehrenberg

Thalassiosiphonales D. G. Mann

Catenulaceae Mereschkowsky

23. *Amphora ovalis* (Kützing) Kützing

Bacillariales Hendey

Bacillariaceae Ehrenberg

24. *Nitzschia dissipata* (Kützing) Grunow

25. *Nitzschia inconspicua* Grunow

26. *Nitzschia tubicola* Grunow

27. *Nitzschia palea* (Kützing) W. Smith

Analyzing the samples we can say that the most taxa (90%) are characterized as cosmopolitan (e.g., *Diatoma vulgare*, *Synedra ulna*, , *Cymbella affinis*, *Gomphonema parvulum*, *Achnanthes lanceolata*, *Cocconeis placentula*, *Navicula capitatoradiata*, *Amphora ovalis*).

After laboratory work we can notice that the best represented family was *Gomphonemataceae*, and the best represented genus was *Gomphonema* with 6 specific taxa.

Fig. 2. *Diatoma vulgare* (left) and *Fragilaria capucina* (right)

Fig. 3. *Cymbella affinis* (left) and *Cymbella excisa* (right)

From the saprobic categories circumscribing the identified taxa in the present study, the β -mesosaprobic category is prevailing (53%).

CONCLUSIONS

Once the laboratory work was carried out, it was identified 26 species, distributed in 9 families, 6 orders and two classes, of the benthic diatoms from the Bega River until now. 53% of the species identified are indicators of a good level of water.

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