Algoflora of river Zhegra during spring season 2009

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Abstract

The aim of of this investigation it was to investigate the algoflora and according the algae bioindicators to evaluate the level of pollution of water of river Zhegra, during the spring season,2009 in river Zhegra, nearby Gjilani City.The determined taxa of the Zhegra river are 83 species of algae, belonging to 4 divisions, were found. By their abundance, the algae from the divisions Bacillariophyta and Cyanophyta predominated in all locality of the longitudinal profile of the river and by their relative occurrence. Bacillariophyta 51 taxa, Cyanophyta 12 taxa, Euglenophyta 7 taxa and Chlorophyta 13 taxa.

***Key word**: algae, river, Zhegra, Gjilan, Kosovo.*

Introduction

In recent years the aquatic ecosystems from Kosovo have undergone great changes that led to the essential disturbance in biocenosis structure, the balance of the nutritive elements, the decrease of bioproductivity and the worsening of the water quality (Obuh *et al.*, 2006). These changes take place due to the intensification of human activity, which results in considerable increase in the amount of biogenic substances that fall into water from the polluted air, fertilized soil, domestic and industrial wastewater.

Algae are a group of organisms that play an important role in the activity of any biocenosis. It represents the basis of the food chains, participating in the primary production of organic substances and in the circuit of the elements in the nature, is involved in the processes of self-regulation, water purification and water auto-pollution. Many species of algae serve as indicators of organic pollution of water pools.

Volume 1, ISBN 978-619-203-015-5

Material and methods

The samples were collected at 5 sampling stations along the river Zhegra in the spring of 2012. Water samples were collected in 500 ml glass bottles, 10 cm beneath the water surface, using standard methods. Conductivity, pH, salts, TDS (Total Disolved Salts), were measured in situ using mobile instruments (HACH), O_2 were measured with mobile instrument such as oxygenometer (Hana Instrument) and nutrients (N, P, Si) were analysed by standard methods.

Epilithon brushed from the stones with toothbrush and the upper layer of epipelon was pipetted off with a vacuum suction system. Epiphyton sampled with the substrate and palced in the plastic bottles. The algae examined using a Leica microscope, with a digital camera Fujifilm, which filmed the algae directly from the sample.

Diatoma cleaning

Cleaning of diatom frustules, preparation of permamnent slides and determinations follow Krammer & Lange-Bertalot (1986-2001).

Algal identification

Algal identification was done according to the keys:*Cyanophyta*: Elenkin 1938, 1949; Starmach 1966.*Bacillariophyta*: Kramer, Lange-Bertalot 1986, 1988, 1991a, 1991b. *Euglenophyta*: Starmach 1983; *Chlorophyta*: Starmach 1972.

Results

We identified a high degree of species richness within the phytoplankton communities in the river Zhegra,

This algal study is a contribution to the knowledge of algal flora of the river Zhegra.

The results of this study are presents in Table 1, total number of identified taxa is 83 (Cyanophyta 12, Bacillariophyta 51, Euglenophyta 7, Chlorophyta13).

The division Bacillariophyta is represented through its highest number of species(51) and genus(23 genus), among which the genus Nitzschia with 11 species, Navicula 6, while 9 genus are represents with lower number of species such is: Cocconeis, Cymbella, Diatoma, Fragilaria, Gomphonema, Gyrosigma, Synedra. Some genus are represented with one species such as: *Rhoicosphaenia, Stauronei, Surirella.*

The filum Cyanophyta is represents with 12 taxa(in 10 genus), where only genus Oscillatoria has 2 species, while other genus are represents by 1 taxa, Division

Chlorophyta is represented by 7 gender, with dominating gender Cladophora with 4 taxa.

Filum Euglenophyta is represented by 3 gender with dominating genus: Euglena(3 taxa), while Phacus and Trachelomonas with 2 species.

Registered 31 bioindicators species, where dominate the bioindicators species which belongs to betamesosaprobic level of saprobity (15 taxa), followed by oligosaprob and oligo- betamesosaprob bioindicators- 6 taxa,, xeno-oligo saprob bioindicators 3 taxa, xenosaprob bioindicators- 1 species.

According the bioindicators the waters of river Zhegra belongs oligosaprob to betmesosaprob class of bonity (Meybeck,R. Helmer, 1989, Hellawell J.M. 1986). Algae can be found in all aquatic habitats. In most streams and rivers, algae are the most diverse assemblage of organisms that can be sampled easily and identified readily to species or variety (Stevenson *et al.*, 2003). Algal species are excellent indicators of water quality and environmental change (Dixit *et al.,* 1992, Hynes *et al.,* 1964).

Table 1. Algal determination during spring season 2009 in river Zhegra

			LOCALITIES				
	Division CYANOPHYTA	***Level of Saprobity***	***1***	***2***	***3***	***4***	***5***
81	***Total number of algae***						
	Division CYANOPHYTA						
1	*Anabaena plantonica Brunnth.*		*1*		*1*		*1*
2	*Chroococcus varius Al.Br.*					*1*	*1*
3	*Dactylococcopsis acicularis Lemm*			*1*			
4	*Gloetrichia echinulata (G.S.Smith).P.Richt.*	*β*			*1*		
5	*Microcystis grevillei f.grevillei (Hass)Elenk.*			*1*			*1*
6	*Merismopedia tenuissima*	*β*				*1*	
7	*Nodularia spomigena Mert.*		*1*				*1*
8	*Oscillatoria mirabilis Böcher*		*1*		*3*		*1*
9	*O.nitida Schkord*				*1*		
10	*Phormidium ambiguum Gom.*	*β*		*1*			*1*
11	*Spirulina platensis (Nordst)Geitler.*	*β*		*1*	*1*		
12	*Spirulina sp.*				*1*		*1*

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	Division CYANOPHYTA		*LOCALITIES*				
		Level of Saprobity	***1***	***2***	***3***	***4***	***5***
	Division BACILLARIOPHYTA						
1	*Achnanthes hungarica (Grunow) Grunow*	*o*	*1*		*1*		
2	*Achnanthidium minutissimum(Kütz.)Czarneck*		*1*		*1*	*1*	
3	*Amphora lybica Ehrenberg*		*1*	*1*			*1*
4	*A. normani Rabenhorst*	*o*	*1*		*3*		*1*
5	*Aneumastus stroesei (Ostrup) Mann*			*1*			
6	*Cocconeis pediculus Ehrenberg*	*o- β*		*1*		*3*	*1*
7	*C. placentula var. lineata (Ehrenberg) Cleve*		*3*	*1*	*1*	*3*	
8	*Cyclotella ocellata Pantocsek*			*1*		*1*	
9	*Cymatopleura solea (Brébisson) W.Smith*	*β*			*1*	*1*	
10	*Cymbella affinis Kützing*	*o- β*	*3*		*3*		*1*
11	*C. helvetica Kützing*	*o*		*1*		*3*	*1*
12	*Diatoma ehrenbergii Kützing*		*3*	*1*		*3*	
13	*D. moniliforme Kützing*				*3*		*1*
14	*D. vulgaris Bory*	*β*		*1*		*3*	
15	*Epithemia adnata (Kützing) Brébisson*						*1*
16	*Fragilaria capucina Desmazières*	*o- β*	*3*	*1*			
17	*F. ulna (Nitzsch) Lange-Bertalot*				*1*		*1*
18	*F. ulna complex oxyrhynchus Lange-Bertalot*		*1*			*1*	
19	*Gomphonema carolinense Hagelstein*				*1*		*1*
20	*G. olivaceum (Hornemann) Brébisson*	*β*	*1*		*1*	*1*	
21	*G. parvulum (Kützing) Kützing*	*β*		*1*			*1*
22	*Gyrosigma acuminatum (Kützing) Rabenhorst*	*β*			*1*		
23	*G. attenuatum (Kützing) Rabenhorst*	*β*			*1*	*1*	
24	*Luticola goeppertiana (Bleish) Mann*		*1*			*1*	*1*
25	*Melosira varians Agardh*	*β*	*1*		*1*	*1*	
26	*Meridion circulare (Grev.) C. Ag.*	*o*	*1*		*1*		*1*
27	*Navicula capitatoradiata Germain*			*1*		*1*	*1*
28	*N. cryptotenella Lange-Bertalot*				*3*	*3*	
29	*N. species aff radisafallax Lange-Bertalot*		*1*				*1*
30	*N. tripunctata (O.F.Müller) Bory*		*3*			*3*	*1*
31	*N. trivialis Lange-Bertalot*		*3*			*1*	

	Division CYANOPHYTA		*LOCALITIES*				
		Level of Saprobity	***1***	***2***	***3***	***4***	***5***
32	*N. tuscula Ehr.*	*o- β*		*1*		*1*	
33	*Nitzschia acula Hantzsch in Rabenhorst*			*1*			*1*
34	*N. acicularis (Kütz.) W. Sm.*			*1*		*1*	
35	*N. capitellata Hustedt*		*3*			*1*	
36	*N. closterium(Ehrenberg)W.Smit*					*1*	*1*
37	*N. constricta(Kützing)Ralfs*		*1*			*3*	
38	*N. commutata Grun.*				*1*	*1*	
39	*N. dissipata (Kützing) Grunow*	*o- β*	*1*		*3*		
40	*N. elegantula Grunow in Van Heurck*			*1*	*1*	*3*	*1*
41	*N. eglei Lange Bertalot*			*1*			*1*
42	*N. litoralis Gruow*			*1*		*1*	
43	*N. linearis (Agardh) W.Smith*	*o- β*	*1*				*1*
44	*Pinnularia microstauron (Ehrenberg) Cleve*	*o-x*	*3*	*1*			*1*
45	*P.microstauron var. brebisonii(Kützing)Mayer*	*x*		*1*			
46	*Rhoicosphaenia abbreviata (Ag.)L.Bertalot*	*x-o*	*1*		*1*	*1*	
47	*Stauroneis smithii Grunow*	*x-o*	*1*				
48	*Surirella angusta Kützing*	*o*		*1*			*1*
49	*Synedra acus Hustedt*		*1*	*1*		*1*	*1*
50	*S.nana Meister*				*1*		
51	*S.ulna Kützing*		*1*			*1*	*1*
	Division EUGLENOPHYTA						
1	*Euglena acus Ehrenb.*	*β*		*1*			
2	*E.minima Fr.*	*o*	*1*	*1*			*1*
3	*E.oblonga Lemm.*		*1*			*1*	*1*
4	*Phacus orbicularis Hübn.*	*β*			*1*		*1*
5	*Ph.pusillus Lemm.*			*1*		*1*	
6	*Trachelomonas affinis Lemm.*		*1*			*1*	*1*
7	*T. bituricensis Ehrenberg*			*1*			*1*
	Division CHLOROPHYTA						
1	*Cladophora glomerata Kützing*	*β*			*1*	*1*	
2	*C.praelongum Bréb.*		*1*		*1*		*1*

Volume 1, ISBN 978-619-203-015-5

	Division CYANOPHYTA		*LOCALITIES*				
		Level of Saprobity	***1***	***2***	***3***	***4***	***5***
3	*C.pronum Bréb.*			*1*			*1*
4	*Closterium moniliferum Nitzsch*	*β*					
5	*C.praelongum Bréb. 1 1*						
6	*6 C.pronum Bréb. 1*						
7	*7 C.strigosum(Breb)*						
8	*Coelastrum reticulatum (Dang)Sen*						
9	*Desmodesmus perforatus (Lemm.) Hegew.*			*1*		*1*	*1*
10	*Microspora flocosa (Vauch)Thuret.*				*1*		*1*
11	*M.elegans Hansg.*		*1*	*1*			
12	*Pediastrum boryanum (Turp.) Menegh.*						
13	*Scenedesmus quadridens Meyen*						

Discussion

According to the number of species and varieties of algae observed in the river periphyton, the diatoms dominate.

Between the two classes of phylum *Bacillariophyta,* the representatives of the class *Pennatophyceae* (with 51 species) have an important role in shaping the algocenosis of Zhegra river. Genus *Navicula* with 6 species, are in accordance with results of Nedbaliuc(2013). The families *Fragilariaceae, Achnanthaceae* and *Nitzschiacea,* with the genera *Fragilaria, Achnanthes, Synedra, Cocconeis, Nitzschia* etc. have a great importance in forming algal communities.

It was determined 31 algal bioindicators in the river. Phytoplankton diversity and productivity are strongly related to water quality(Moss, 1988) as well as to biotic factors (Scheffer, 1998). Singh (1965) stated that temperature, pH, alkalinity and phosphate have been emphasized to be significant factors for controlling distribution of

Cyanophyceae which is also corroborated with the present study.

Concerning to the level of the saprobity we determine from xenosaprob till alfamesosaprob bioindicator species.

Conclusion

On the basis of algoflora analysis of the river Zhegra, we can conclude:

- Higher diversity of algae in spring season.
- During the study period (spring season 2009) we identified 83 algal
- species.
- Dominate diatoma with 51 species.
- Determined 31 bioindicators species
- Dominate the betamesosaprob species (15 species).

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Volume 1, ISBN 978-619-203-015-5