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THE SPECIES DIVERSITY OF BACILLARIOPHYTA IN WELLS AND OTHER AQUATIC BIOTOPES IN BOSNIA AND HERZEGOVINA

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ABSTRACT

The research and determination of diatoms (Bacillariophyta) have been carried out in the area of Semberija (Bosnia and Herzegovina) in several locations, which included 35 open draw-wells in 9 villages, the Sava River, at the site Bosanska Rača, the Drenovača pond in Velino Selo, artesian wells in Velino Selo and Donji Brodac, and ephemeral puddles in the immediate proximity of the researched wells. In all the investigated habitats of those locations that are subject of this study, a total of 149 species and infraspecific taxa of Bacillariophyta have been identified, of which 89 or 59.73% were identified only in the investigated wells in Semberija. On the basis of comparative analysis results, it can be concluded that 45 or 30.20% of species and infraspecific taxa of Bacillariophyta are common for the wells and other investigated localities (The Sava River, the Drenovača pond, artesian wells, ephemeral puddles). There have been identified 61 species and infraspecific taxa of Bacillariophyta or 40.93% in the Sava River, 57 species and infraspecific taxa in the Drenovača pond, or 38.25%, 21 species in front of the artesian wells and 16 species and infraspecific taxa in the ephemeral puddles. With the purpose of the objectification of the results of researched and identified diatoms in the mentioned biotopes, the numerical analysis of qualitative data on the structure of diatoms in similar biotopes, i.e. on their coenological similarities, has been carried out.

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INTRODUCTION

The largest number of the researched sites relate to the draw-wells that were created many decades ago by anthropogenic activities. The first studies on diatoms in draw-wells in our country, as well as in the world, were published by Jerković (1981, 1982). The author studies siliceous algae (Bacillariophyta) in the wells around Bosanski Šamac concerning them as possible causes of endemic nephropathy. Ćurčić (1985) explores the siliceous algae around Bijeljina. Jerković and Ćurčić (1987, 1990), Jerković and Radovanović (1990) keep researching Bacillariophyta in the draw-wells with the aim of the comparison of the flora in the different areas of Bosnia and Herzegovina, especially in nephropathic areas. Other research data on Bacillariophyta in draw-wells in our country are not known.

Previous studies on diatoms in wells are very rare in the world. They do not relate to draw-wells which are subject of Jerković's and our research. Apart from some individual findings in the literature, there are no comprehensive and exact data on the study of flora of diatoms in other types of wells. Studies by other authors (Hustedt, 1930, Budde, 1933 Beger, 1966, Foged, 1983, Reichardt, 1988) relate to saline wells and fountains. All investigated wells are open draw wells to with mainly wooden fence, rarely with a concrete fence. The height of well fence is 100-120 cm with a well diameter of about 1 meter. The depth of wells is between 5 and 9 m. All wells were built with bricks, which is covered by mosses, particularly 1.5m from ground level. All of them are freshwater. The settlements of the study area are located in the northeastern part of Bosnia, known as Semberija, to move the village Amajlije - Dvorovi - Dazdarevo - Trnjaci - Balatun - Meterizi

Donji Brodac - Velino Selo - Jelaz where the wells have been explored. The river Sava is close to the villages (2-10km), depending on the village, which was the one of the reasons for investigating diatoms for the purpose of comparative analysis of coenological similarities with silica algae found in wells. Silica algae of the river Sava as indicators of water quality explores Ćurčić (1999). Also, Hadžiahmetović (2012), Tomec et al. (2009) investigate siliceous algae in the Sava River Basin as indicators of water quality. Stanković and Ćurčić (2009, 2010) investigate siliceous algae in the Gromiželj wetlands belonging to the basin of the river Sava. Ćurčić (2013) investigates threats to biodiversity of the Gromiželj wetlands. Matoničkin et al. (1975) in the river Sava at the site of B. Rača B. identified only Diatoma vulgaris. Also, the identified algae in the pond Drenovača located in the village of Velino Selo, and siliceous algae in front of the artesian wells in Velino Selo and Donji Brodac were the subject of our research conducted in 2014 and 2015. These algae in front of the artesian wells have been explored by Ćurčić (2002).

For the purpose of marking locations, symbols in the form of initial letters of the name of the villages, wells or other localities investigated have been used in this paper, such as:

D_1- The well of Nikolić Cvijetin	D_3 – The well of Tomić Radivoje
D_4 – The well of Tomić Dimitrije	B_1 – The well of Božić Slavko
B_3 – The well of Ljubinković Branko	B_6 – The well of Lazić Mijo
B_7 – The well of Simić Ljubo	B_5 – The artesian well in Velino Selo
D - Pond Drenovača	D - Pond Drenovača
E - Ephemeral puddles	S – The Sava river

MATERIALS AND METHODS

Concerning the nature of the habitat and character of this study, and comparative analysis of diatomaceous flora of wells with diatomaceous flora of surrounding aquatic ecosystems, sampling of materials has been done in different ways. Specific problems were present during material sampling from wells with respect to the type of construction of wells: depth, a wall forming a circle, damaged and unsafe well fences, untidy environment of wells. Sampling of material from the well, especially the bottom sediments, as well as the moss from the well walls, required a specific equipment. For bottom sediments abstraction a small excavator for hydrobiological research was used. After removing the excavator from wells the sediments were stored in the labeled vials. Samples of the moss from the well walls were taken from an area of 100 cm2 with a special "buckets" for the capturing of moss (Ćurčić, 1993).

After extraction from wells, the samples of moss were stored in plastic bags that were immediately labeled. The material from other studied aquatic ecosystems (the Sava river, the Drenovača pond, artesian wells, ephemeral puddles) was being collected as bentos on stone, on concrete and other solid surfaces in water or in damp areas around artesian wells. The samples were stored in labeled vials and preserved with 4% formaldehyde. The nature of the habitat, or of the samples, was determining the methodology of processing the materials in the laboratory. Processing has been carried out immediately after returning from the field. The sediments of the bottom of the well, which had different impurities were separated and purified by decanting. Straight away, bottom sediment samples were viewed under a microscope "ZEISS" with middle magnification in order to determine the vitality of diatoms that come with moss from well wall or being mostly empty shells. The remaining material has been conserved in 4% formaldehyde. The samples of moss from the walls of the wells were subjected to washing with redistilled water, firstly with hands, where after each sample hands were being disinfected. Then the material was mixed with a glass rod and underwent the friction by the walls of the glass beakers. Washing and friction leads to separation of epiphyte diatoms from moss. Rinsing is always carried out in 100 ml redistilled water. The material was processed according to the method by Hustedt (1930), and depending on the material, according to the modified method by Jerković (1978) and the resulting suspension was used for making permanent preparations. Using a micropipette from each of the studied samples it was taken 0.2 ml of suspension for each specimen. As a switch medium for permanent preparations, Canada balsam index of 1.53 was used. Determination of taxa was done by Krammer, Lange-Bertalotu (1986, 1988, 1991a, 1991b).

RESULTS AND DISCUSSION

The research of the flora of diatom Bacillariophyta in the draw-wells in the area of Semberija (Ćurčić 1985, 1992, 1993, 1996), as well as the research diatom flora in the draw-wells in Posavina (BiH) (Jerković, 1981), represent the first and only research of this flora in our country and in the world so far. Draw-wells are characteristic of the climate in these areas and are traditional sources of drinking water (Figure 1 and Figure 2).

Figure 1. A shadoof well

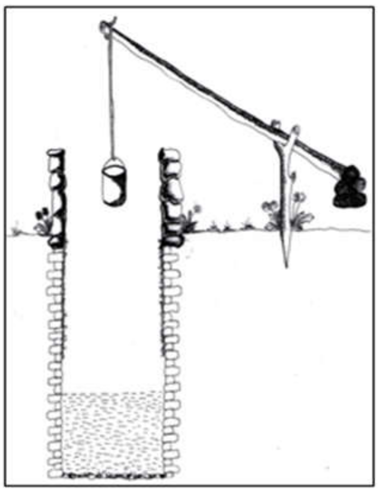

Figure 2. A vertical cross-section of a shadoof well

Taxon	Localities	
	B	O
Achnanthes hauckiana Grunow	+	–
Achnanthes conspicua A. Mayer	+	–
Ach. coarctata (Brebisson) Grunow in Cleve i Grunow	+	–
Ach. clevei. var. clevei Grunov in Cleve i Grunow	+	–
Ach. lanceolata ssp. lanceolata var. lanceolata (Brebisson) Grunow	+	+
Ach. lanceolata ssp. lanceolata var. eliptica Cleve	+	–
Ach. lanceolata ssp. rostrata (Oestrup) Lange-Bertalot	+	+
Ach. Hungarica (Grunow) Grunow in Cleve i Grunow	–	+
Aulacoseira granulata var. granulata (Ehrenberg) Simonsen	+	+
A. granulata var. angustissima (O. Miller) Simonsen	+	+
Amphora aequalis Krammer	–	+
A. montana Krasske	+	+
A. perpusilla Grunow	+	+
A. normanii Rabenhorst	+	–
A. libyca Ehrenberg	–	+
A. pediculus (Kützing) Grunow	+	+
A. ovalis (Kützing) Kützing	–	+
A. veneta Kützing	–	+
Anomoeneis sphaerophora f. sphaerophora (Ehrenberg) Pfitzer	–	+
Caloneis bacillum (Grunow) Cleve	+	+
Cocconeis pediculus Ehrenberg	+	+
C. placentula var. placentula Ehrenberg	+	+
C. placentula var. lineata (Ehr.) Van Heurck	+	+
C. placentula var. euglypta (Ehrenberg) Grunow	+	+
Cyclotella meneghiniana Kützing	–	+
C. bodanica var. affinis (Grunow) Cleve-Euler	–	+
Cymatopleura solea var. solea (Brebisson) W. Smith	–	+
Cymbella silesiaca Bleisch in Rabenhorst	+	+
C. affinis Kützing	–	+
C. sinuata Gregory	–	+
C. lanceolata (Ehrenberg) Kirchner	–	+
Diploneis oblongella (Naegeli) Cleve-Euler	+	+
D. puella (Schumann) Cleve	+	–
D. ovalis (Hilse) Cleve	+	+
D. elliptica var. elliptica (Kützing) Cleve	–	+
Diatoma vulgaris Bory	–	+
D. ehrenbergi Kützing	–	+
D. mesodon (Ehrenberg) Kützing	–	+
Eunotia bilunaris var. bilunaris (Ehrenberg) Mills	+	+
E. soleirolii (Kützing) Rabenhorst	+	–
E. parallela var. parallela Ehrenberg	+	–
E. parallela var. angusta Grunow	+	–
E. exigua (Brebisson) Rabenhorst	+	–
E. glacialis Meister	+	–
Fragilaria capucina. var. capucina Desmazieres	–	+
F. ulna var. ulna (Nitzsch) Lange-Bertalot	–	+
F. ulna var. acus (Kützing) Lange-Bertalot	–	+
F. pinata var. pinata Ehrenberg	+	+
F. brevistriata Grunow in Van Heurck	–	+
F. elliptica Schumann	–	+
F. tenera (W. Smith) Lange-Bertalot	–	+
F. dilatata (Brebisson) Lange-Bertalot	–	+
F. biceps (Kützing) Lange-Bertalot	–	+
Frustulia vulgaris (Thw.) De Toni	+	+
Gomphonema micropus Kützing	+	+
G. angustum Agardh	+	+
G. clavatum Ehrenberg	–	+
G. tergestinum Fricke	+	+
G. parvulum var. parvulum f. parvulum Kützing	+	+
G. grovei var. lingulatum (Hustedt) Lange-Bertalot	+	+
G. truncatum Ehrenberg	–	+
G. olivaceum var. olivaceum (Hornemann) Brebisson	–	+
G. gracile Ehrenberg	+	–
G. bohemicum Reichelt & Fricke	+	–
G. intricatum Kützing	+	–
G. abbreviatum Kützing	+	–
Gyrosigma scalproides (Rabenhorst) Cleve	–	+
G. nodiferum (Grunow) Reimer	–	+
G. acuminatum (Kützing) Rabenhorst	–	+
G. spencerii (Quekett) Griffith i Heufrey	–	+
Hantzschia amphioxys (Ehr.) Grunow	+	+
Meridion circulare var. circulare (Greville) C. A. Agardh	–	+
M. circulare var. constrictum (Ralfs) Van Heurck	–	+
Navicula atomus var. atomus (Kützing) Grunow	+	+
N. contenta Grunow	+	+
N. capitata var. capitata Ehrenberg	–	+
N. cuspidata (Kützing) Kützing	–	+
N. cryptocephala Lange-Bertalot	+	+
N. cincta (Ehrenberg) Ralfs in Pritchard	+	+
N. trivialis Lange-Bertalot	–	+
N. mutica var. mutica Kützing	+	+
N. mutica var. ventricosa (Kützing) Cleve & Grunow	+	+
N. elginensis var. elginensis (Gregory) Ralfs in Pritchard	+	+

Continue…………..

N. menisculus var. menisculus Schumann	–	+
N. pigmaea Kiitzing	–	+
N. goepertiana var. goepertiana (Bleisch) H. L. Smith	+	+
N. placentula (Ehrenberg) Kiitzing	–	+
N. viridula var. viridula (Kiitzing) Ehrenberg	–	+
N. nivalis Ehrenberg	+	+
N. lanceolata (Agardh) Ehrenberg	–	+
N. tripunctata (O. F. Miiller) Bory	–	+
N. bacillum Ehrenberg	+	+
N. cryptotenella Lange-Bertalot	–	+
N. recens (Lange-Bertalot) Lange-Bertalot	–	+
N. pupula var. pupula Kiitzing	+	+
N. pupula var. pseudopupula (Krasske) Hustedt	+	–
N. reinhardtii (Grunow) Grunow in Cleve et Moller	–	+
N. veneta Kiitzing	+	+
N. viridula var. rostelata (Kiitzing) Cleve	–	+
N. seminulum Grunow	+	+
N. seminulum var. radiosa Hustedt	+	–
N. gallica var. gallica (W. Smith) Lagerstedt	+	–
N. gallica var. perpusilla (Grunow) Lange-Bertalot	+	–
N. kotschyi Grunow	–	+
N. fosallis var. fosallis Krasske	+	–
N. minima Grunow in Van Heurck	+	–
N. gallica var. laevisima (Cleve) Lange-Bertalot	+	–
N. atomus var. excelsa (Krasske) Lange-Bertalot	+	–
N. paramutica Bock	+	–
N. suecorum var. dismutica (Hustedt) Lange-Bertalot	+	–
N. verecunda Hustedt	+	–
N. hustedtii Krasske	+	–
N. confervacea Kiitzing	+	–
N. hungarica var. capitata (Ehrenberg) Cleve	+	–
Nitzschia amphibia f. amphibia Grunow	+	+
N. hungarica Grunow	–	+
N. debilis Arnott	+	–
N. tryblionella Hantzsch in Rabenhorst	–	+
N. palea (Kiitzing) W. Smith	+	+
N. paleacea (Grunow) Grunow in Van Heurck	+	–
N. linearis var. linearis (Agardh) W. Smith	+	+
N. hantzschiana Rabenhorst	+	+
N. intermedia Hantzsch ex Cleve et Grunow	–	+
N. inconspicua Grunow	+	+
N. recta Hantzsch in Rabenhorst	–	+
N. disipatta var. media (Hantzsch) Grunow	–	+
N. calida Grunow in Cleve et Grunow	–	+
N. communis Rabenhorst	+	+
N. umbonata (Ehrenberg) Lange-Bertalot	–	+
N. frustulum var. frustulum (Kiitzing) Grunow in Cleve et Grunow	+	+
N. frustulum var. bulnheimiana (Rabenhorst) Grunow	+	–
N. denticula Grunow	+	–
N. sinuata var. delongei (Grunow) Lange-Bertalot	+	–
N. fonticola Grunow in Cleve	+	–
N. microcephala Grunow in Cleve et Moller	+	–
Neidium ampliatum (Ehrenberg) Krammer	–	+
Pinnularia maior (Kiitzing) Rabenhorst	–	+
P. viridis (Nitzsch) Ehrenberg	+	+
P. microstauron var. brebissonii (Kiitzing) Mayer	+	+
P. apendiculata (Agardh) Cleve	+	–
P. schroederii (Hustedt) Krammer	+	–
Orthoseira roeseana (Rabenhorst) O'Meara	+	–
Rhopalodia gibba var. gibba (Ehrenberg) O. Miiller	–	+
Roicosphaenia abbreviata (C. Agardh) Lange-Bertalot	+	+
Stauroneis anceps var. anceps Ehrenberg	+	+
S. smiithii var. smiithii Grunow	–	+
Surirella angusta Kiitzing	+	+
S. minuta Brebisson in Kiitzing	–	+

During our research in all these localities, i.e. in all the investigated habitats, the 149 species and infraspecific taxa of Bacillariophyta have been identified and determined. They are classified into 27 genera. The most dominant according to a number of species and infraspecific taxa are genera Navicula, Nitzschia, Achnanthes and Gomphonema. Here is the exhaustive summary of flora of Bacillariophyta in the wells (B) and flora of Bacillariophyta of other sites studied, i.e. habitats (O). Concerning the nature of construction of draw-wells, and the research of the flora of Bacillariophyta on the moss found on well walls and their presence in the sediments of the bottom of wells, it was found that the same floristic composition of Bacillariophyta inhabiting moss on the walls of wells and those found in sediments of wells indicates the autochthonism of this flora. A large qualitative difference between the flora of Bacillariophyta in the draw-wells in the area of Semberija and the flora of Bacillariophyta of the Sava River,the Drenovača pond and artesian wells and ephemeral puddles, also indicates the autochthonism of Bacillariophyta flora in the draw-wells.

The largest number of identified silicate algae (Bacillariophyta) in the draw-wells are aerophile algae, which, on the moss associations of well walls determined as associations Oxyrrynchio-Platyhypnidietum rusciformis (Grgić, 1984), demonstrated acceptable adaptive properties in such biotopes, thus making specific indigenous flora of wells. The researches of Bacillariophyta in the draw-wells within this work have been carried out in the 35 open draw-wells located in the wider area of Semberija. We have identified 89 species and infraspecific taxa of Bacillariophyta that are found in the mosses on the well walls, in the buckets for taking water from the wells and in the wells' sediments. The presence of a large number of aerophilic Bacillariophyta indicates a very rich flora of wells' ecosystems whose evolution was in the function of long-term anthropogenic activities. Therefore, these are specific wells' ecosystems as anthropogenic creations that show great similarities in physical and chemical characteristics. The result of the large uniformity of physical and chemical factors in the investigated wells is the presence of a large number of species of Bacillariophyta, common to all the investigated wells. Their natural habitat is not well water, but the mosses on the well walls that they inhabit permanently or temporarily. Findings of Bacillariophyta in well sediments are the result of long-term "falling" from well walls and from buckets for taking water, as well as of the deposition along with mosses that are their hosts, together with the forming of diatomite wells (Jerković, 1981). Accordingly, the chemical parameters were not taken as the factors that control the qualitative and quantitative relationships of Bacillariophyta in wells'sediments because well water is not their natural habitat. It means that the habitat of aerophilic Bacillariophyta in wells are moss association of well walls and buckets for taking water from wells that are humid throughout the year more or less, depending on a well. Humidity is the result of well water evaporation, precipitation, and spilling of water during taking it with a well bucket.

It was found out that the investigated wells compared to the total number of identified Bacillariophyta in them, 40 or 44.94% of the same taxa of Bacillariophyta inhabit the mosses of well walls and buckets for taking water from wells. Studies have shown that in draw-wells the majority of Bacillariophyta is common with two or more wells, but there are small number of taxa identified only in a particular well. Along with the study of flora of Bacillariophyta in draw-wells, we conducted the studies of flora of Bacillariophyta in other freshwater ecosystems that are in the near or distant environment of the investigated wells (the Sava river, the Drenovača pond, artesian wells and ephemeral puddles). Based on the comparative review of flora of Bacillariophyta in wells and other explored sites in Semberija, it was found that out of 149 taxa of Bacillariophyta identified in all investigated localities, 89 of them or 59.73% were found only in the wells, 61 or 40.93% only in the Sava river, 57 or 38.25% in the Drenovača pond, 21 or 14,09% in front of artesian wells, 16 or 10.73% in the ephemeral puddles around the wells, while 45 or 30.20% are common for wells and other investigated sites. In order to objectify the results we obtained by identification and determination of diatoms in the investigated habitats, the numerical analysis of qualitative data on the structure of Bacillariophyta in similar biotopes was carried out. The quotient of similarity (QS) shows the similarity between the two communities on the basis of the number of common and different species in both communities. In this paper, calculating the quotient of similarity based on population of Bacillariophyta was carried out using the Sorensen method (1948):

$$QS = \frac{2c}{a + b} \cdot 100$$

QS - Quotient of Similarity
a - a number of all taxa from cenosis A
b - a number of all taxa from cenosis B
c - a number of common taxa from cenosis A and B

Based on the Sorensen's quotient of similarity, the coenological similarity between the studied sites was calculated. The data are presented in the Tables 1 and 2. According to the results of coenological similarities, it was possible to determine the critical level of coenological similarities that demarcates the qualitative homogeneity and heterogeneity. Hagemeier and Stults (1964, cit. Sharon D. 1969) found that the similarity degree of 62.5 ± 2.5 % significantly demarcates areas of relative homogeneity.

Table 1. The quotient of similarity between researched wells

	B_4	B_1	B_6	B_3	D_3	D_4	D_1	B_7
B_4	–							
B_1	62.5	–						
B_6	68.5	62.8	–					
B_3	66.6	73.0	66.6	–				
D_3	66.6	60.8	72.0	70.5	–			
D_4	75.7	60.6	63.8	67.6	67.6	–		
D_1	66.6	66.6	66.6	64.5	76.4	73.8	–	
B_7	67.7	67.7	76.4	72.1	71.6	65.6	68.8	–

Table 2. The quotient of similarity between wells and other reasearched localities (the Sava river, the Drenovača pond, artesian wells and ephemeral puddles)

	B_7	S	D	B_6	B_5	E	D_3
B_7	–						
S	25.80	–					
D	27.27	41.32	–				
B_6	76.40	25.74	37.50	–			
B_5	46.80	20.25	27.00	55.50	–		
E	34.78	22.78	27.00	48.10	56.25	–	
D_3	71.60	32.00	33.68	72.00	49.05	41.90	–

The results from the Table 1 indicate that the investigated wells have a relatively high degree of qualitative similarity in the structure of Bacillariophyta. The critical level of similarity applies mostly to enable comparisons. The greatest coenological similarity among investigated wells has been shown in the wells: B_6 and B_7, D_3 and D_1, B_4 and D_4 etc., and the lowest in the wells B_1 and D_4. The results in the Table 2 indicate a very low level of coenological similarities between wells and other studied sites in the structure of Bacillariophyta. Thus, for example. The coenological similarity between the well B_6, which is the closest to the Sava River, and the river is only 25.74%. It resembles the well B_7 whose structure of Bacillariophyta is similar to the structure of Bacillariophyta from the Sava River only 25.80%. If we compare the structure of Bacillariophyta in the wells B_6 and D_3 which are away from each other about 15km, we conclude that the coenological similarity is 72%.

Also, the coenological similarities are present in the comparison of identified Bacillariophyta in the ephemeral puddles that are located right next to the researched wells researched and in the mere wells. The coenological similarity between the ephemeral puddle next to the well B_6 and the mere well B_6 is 48.1%, but the coenological similarity between the ephemeral pool and the Sava river is only 22.78%, and 27.0% compared to the Drenovača pond. These results indicate the similarity of diatom flora in wells and diatom flora in the ephemeral puddles near the studied wells. Also, the coenological similarity between the structure of Bacillariophyta on the moss found on the well walls and the structure of Bacillariophyta on the buckets for taking water from the well is relatively high and amounts to 59.54%. Therefore, the wells exhibit a homogeneity in terms of the high level of coenological similarity in the structure of Bacillariophyta, regardless of the distance from one well of the other. All these findings point out the autochthonism of Bacillariophyta flora in draw-wells in Semberija. A very low level of qualitative similarity in the structure of Bacillariophyta in the wells and other studied sites is the consequence of large ecological differences that have been observed throughout the year, such as, after all, the physical and chemical characteristics of the biotope suggest.

Conclusion

The research of Bacillariophyta flora comprised 35 draw-wells in the wider area of Semberije (BiH). For the purpose of comparison, i.e. the determination of the coenological similarity of Bacillariophyta flora in the wells and Bacillariophyta flora in surrounding freshwater ecosystems, the research has encompassed the Sava River (Bosanska Rača), the Drenovača pond, artesian wells and ephemeral puddles which are located right next to the studied wells. In the habitats of all the investigated sites 149 taxa of Bacillariophyta were identified, of which 89 or 59.73% were identified only in the investigated wells in Semberija. On the basis of the comparative results, it was concluded that 45 or 30.20% of Bacillariophyta taxa are common for the wells and other investigated localities (the Sava river, the Drenovača pond, artesian wells and ephemeral puddles). The identified siliceous algae in the wells are mainly connected to the well walls, or the moss associations that live there, then to the buckets for taking water from the wells and to the sediments of well bottom. The algological material from other studied sites was mainly taken as a bentos from different surfaces. Our research has shown that there is a great coenological similarity regarding the presence of a large number of diatoms, among the researched wells, and the highest similarity is in the structure of these algae identified in wells B_6 and D_3 which are distant from one another 15 km, having a coenological similarity of 72 %. Concerning a high coenological similarity, they are followed by the wells B_6 and B_7, D_3 and D_1, B_4 and D_4 etc. However, the results in theTable 2 indicate a very low level of coenological similarities between the wells and other studied sites in the structure of Bacillariophyta in the wider area of Semberija. All these results clearly demonstrate the autochthonism of Bacillariophyta flora in the wells, their homogeneity in terms of a high level of coenological similarity, regardless of the distance between the wells.

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