ASPECTS REGARDING PHYTOPLANKTON COMPOSITION FROM PECINEAGU DAM

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Abstract. The Pecineagu Dam is located in the water course of the Dâmboviţa River, in a depression located between Piatra Craiului and Iezer-Păpuşa mountains, at an altitude of 1,080 m. Pecineagu Reservoir is used for hydroelectricity and irrigations. The phytoplankton in Pecineagu Reservoir was characterized as being of high quality (systematic groups and identified species, dominant forms). Biologic determinations were realized through water sampling from representing sections (dam and end of the lake), from the deep floor (water surface and photic zone). There were identified 35 species belonging to 22 genera. In this research, there are described the monthly distributions of algocoenosis, phytoplankton composition characteristic to each month, as well the changes in their density.

Keywords: Pecineagu Dam, qualitative analysis, phytoplankton, taxonomic diversity, algocoenosis.

Rezumat. Aspecte privind compoziţia fitoplanctonului din barajul Pecineagu. Barajul Pecineagu este situat pe cursul superior al râului Dâmbovita, într-o depresiune dintre Munţii Piatra Craiului şi Munţii Iezer-Papuşa. Fitoplanctonul din lacul Pecineagu a fost caracterizat din punct de vedere calitativ (grupe sistematice şi specii indentificate, forme dominante). În lacul de acumulare Pecineagu au fost identificaţi 35 de taxoni din 22 de genuri. În lucrare sunt prezentate distribuţia pe luni a algocenozelor, componenţa cenozei fitoplanctonice aferente fiecărei luni din perioada studiată, precum şi variaţia densităţii acesteia.

Cuvinte cheie: Barajul Pecineagu, analiză calitativă, fitoplancton, diversitate taxonomică, algocenoze.

INTRODUCTION

Pecineagu Dam is located in the watercourse of the Dâmboviţa River, in a depression located between Piatra Craiului and Iezer-Păpuşa Mountains, at an altitude of 1,080 m. Years ago, this was a very important lake for fishing large trout, one of a few lakes where the Danube salmon lived and naturally reproduced.

The dam was built in order to capitalize the Dambovita river hydroelectric potential on the one hand, while on the other, to supply Bucharest with good quality fresh water.

Pecineagu Dam is a rock fill dam (Fig. 1), with a height of 107 meters and the crown length of 267 m, whose building began in 1984, after, the Industrial Minister, tried to finish this project for four years. The form of the dam is pyramidal, modelled after the American Kentucky dam, which, built in 1944, has been providing electric energy to New York and some other three smaller cities on the Atlantic east coast ever since.

In case of danger, the woods on the right side of the dam would fall in the dam, moving a large volume of water, which would break the dam in a half; thus, there appeared the necessity to give the dam the pyramid form in the idea of trampoline water, which can be thrown over the dam, without causing important damage.

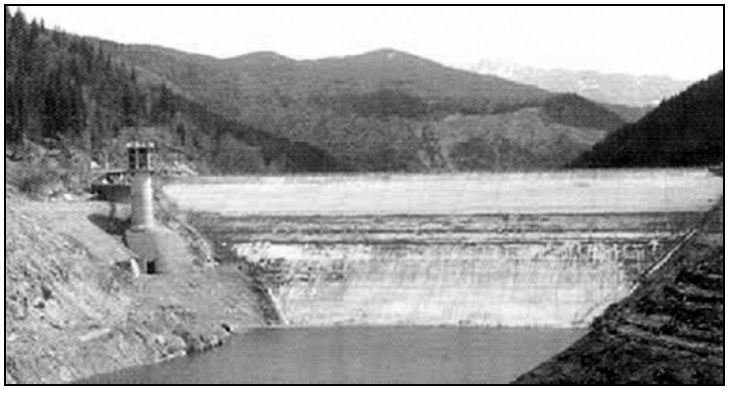

Figure 1. Pecineagu Dam. / Figura 1. Barajul Pecineagu (www.baraje.ro).

MATERIAL AND METHODS

The biological determinations were realized through water samples taken in February, April, July and November 2008, using typical methods (CANTER-LUND & LUND, 1995; GERTRAUD & ROGER, 1999), in glass vases with a volume of 0.25 - 0.3 l. Water samples were taken from representative sections (dam and end of the lake) and deep layers (water surface and photic zone).

The microscopic testing of fresh products was realized using the OPTIKA B-253 microscope, with 10, 20, 40 lens, and 10 and 15 ocular, and the photography was taken using the CANON A 630 camera.

For determining the species, the Romanian tools (IONESCU & PÉTERFI, 1979, 1981) and the European tools (FRANCISC & BARNA, 1998; HINDÁK et. al., 1975; HORTOBAGYI, 1973) representative for the study (UNGUREANU, 2006; MIRON, 1999; MĂLĂCEA, 1969) were used. Systematic classification of algae was made by REVIERS, 2003.

RESULTS AND DISCUSSIONS

Phytoplankton in Pecineagu reservoir was characterized in terms of quality (systematic groups and identified the species, dominant forms) (Table 1).

Table 1. The composition and the taxonomic diversity of the phytoplankton in Pecineagu Reservoir.
Tabel 1. Compoziția şi diversitatea taxonomică a fitoplanctonului din barajul Pecineagu.

No.	Taxa list	February	April	July	November
	Ochrophyta				
1	*Nitzschia* spp.				+
2	*Nitzschia acicularis*				+
3	*Nitzschia sigmoidea*				+
4	*Nitzschia vermicularis*				+
5	*Cymbella lanceolata*		+		
6	*Cymbella ventricosa*			++	
7	*Gomphonema constrictum*		+++		
8	*Fragillaria crotonensis*				++
9	*Navicula cryptocephala*			+	
10	*Navicula gracilis*	+	+	++	++
11	*Suriella ovata*				+
12	*Asterionella formosa*	+			
13	*Ceratoneis arcus*	+			++
14	*Melosira ambigua*	++	+++		+
15	*Melosira varians*		++		
16	*Cyclotella meneghiniana*				+
17	*Synedra acus*	++		++	
18	*Synedra ulna*	+	+++	+++	
19	*Diatoma vulgare*		+	+	
20	*Stauroneis* spp.	+			
21	*Stauroneis phoenicenteron*			+++	+
	Euglenophyta				
22	*Euglena intermedia*			+	
	Chlorophyta				
23	*Pediastrum duplex*		+++		
24	*Pediastrum boryanum*		+		
25	*Scenedesmus* spp.		+		
26	*Scenedesmus acuminatus*				+
27	*Scenedesmus acutus*				+
28	*Scenedesmus quadricauda*		++		
29	*Ulothrix zonata*			+++	
	Cyanophyta				
30	*Microcystis aeruginosa*	+	+++	+++	
31	*Oscillatoria limosa*			+	
32	*Oscillatoria tenuis*				++
33	*Aphanizomenon flos-aque*	+			
	Dinophyta				
34	*Cryptomonas ovata*			+	
35	*Ceratium hirudinella*			++	++

Legend: + (present species in the lake), ++ / +++ (many species present in the lake), - (species absent from the lake).
Legendă: + (specie prezentă în lac), + + / + + + (numeroase specii prezente în lac), - (specii absente în lac).

The monthly distribution of algocoenosis is given in figures 2, 4, 6 and 8 and the composition of phytoplankton conenosis, which corresponds to every month during the studied period, just as the variation in density are shown in figures 3, 5, 7, 9.

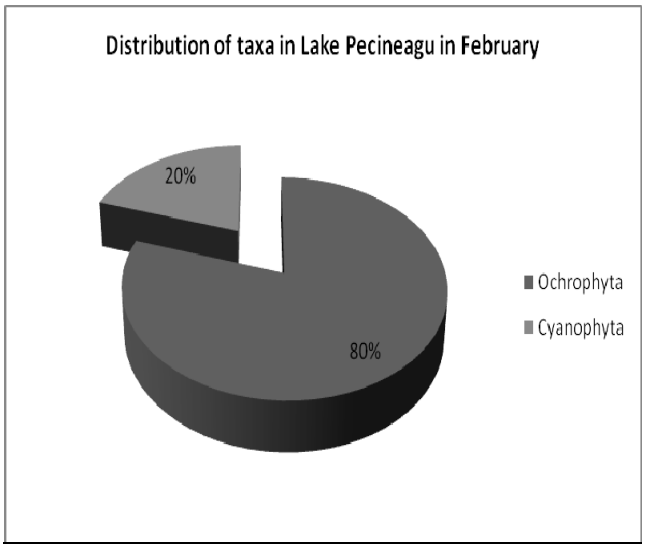

Figure 2. Distribution of taxa in Pecineagu Lake in February.
Figura 2. Distribuţia taxonilor din Lacul Pecineagu în luna februarie.

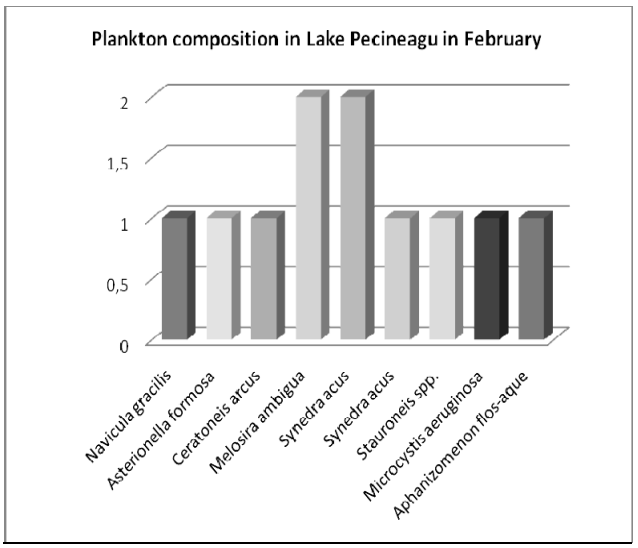

Figure 3. Plankton composition in Pecineagu Lake in February.
Figura 3. Compoziţia fitoplanctonului din Lacul Pecineagu în luna februarie.

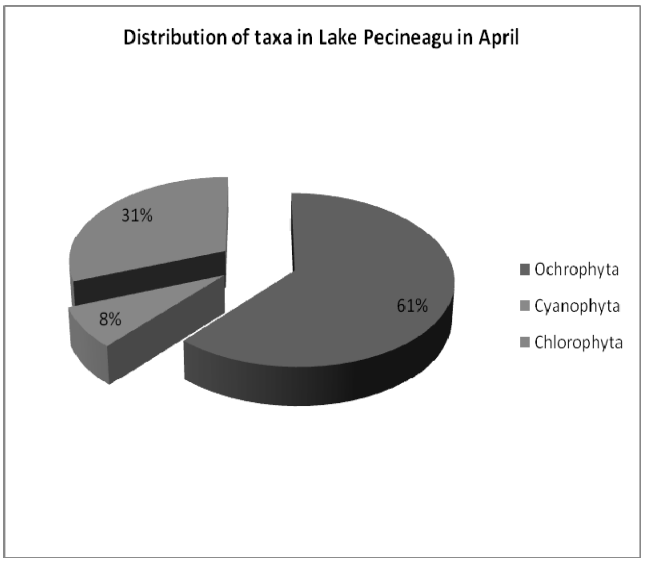

Figure 4. Distribution of taxa in Pecineagu Lake in April.
Figura 4. Distribuţia taxonilor din Lacul Pecineagu în luna aprilie.

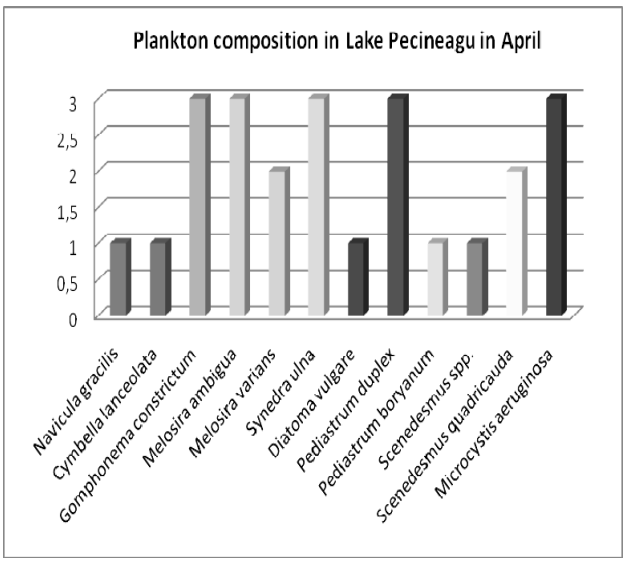

Figure 5. Plankton composition in Pecineagu Lake in April.
Figura 5. Compoziţia fitoplanctonului din Lacul Pecineagu în luna aprilie.

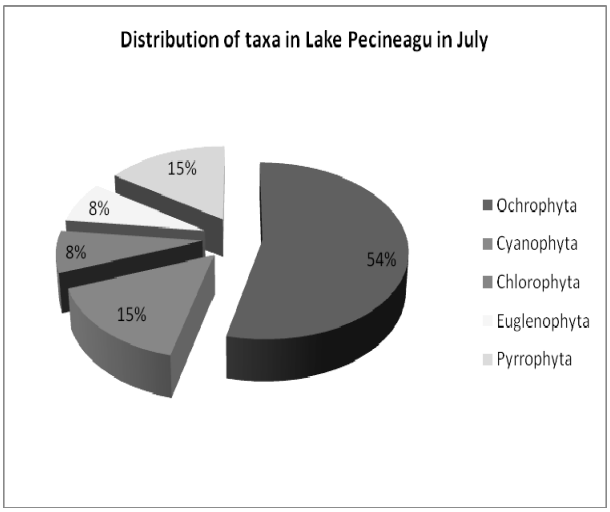

Figure 6. Distribution of taxa in Pecineagu Lake in July.
Figura 6. Distribuţia taxonilor din Lacul Pecineagu în luna iulie.

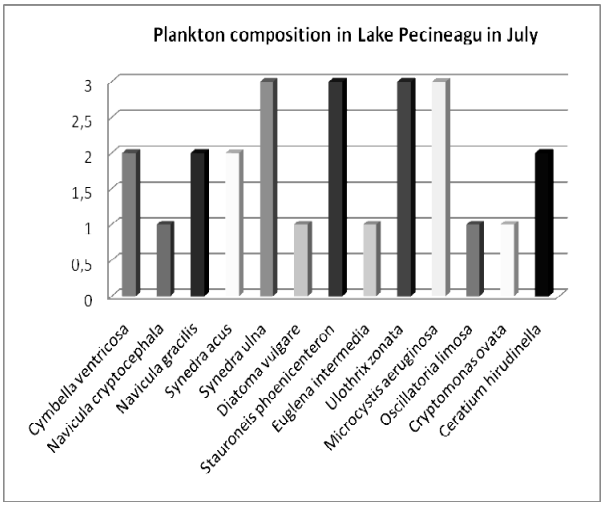

Figure 7. Plankton composition in Pecineagu Lake in July.
Figura 7. Compoziţia fitoplanctonului din Lacul Pecineagu în luna iulie.

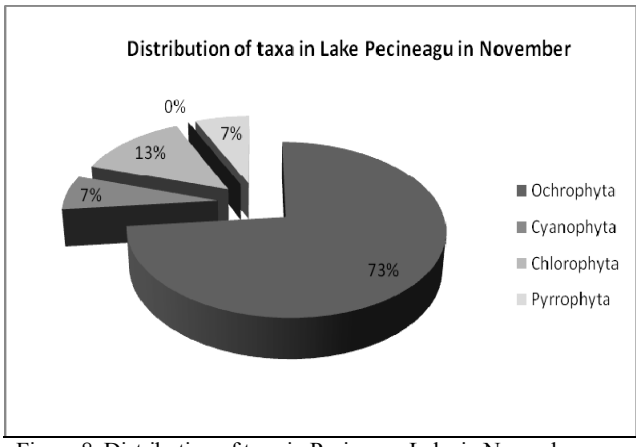

Figure 8. Distribution of taxa in Pecineagu Lake in November.
Figura 8. Distribuția taxonilor din lacul Pecineagu în luna noiembrie.

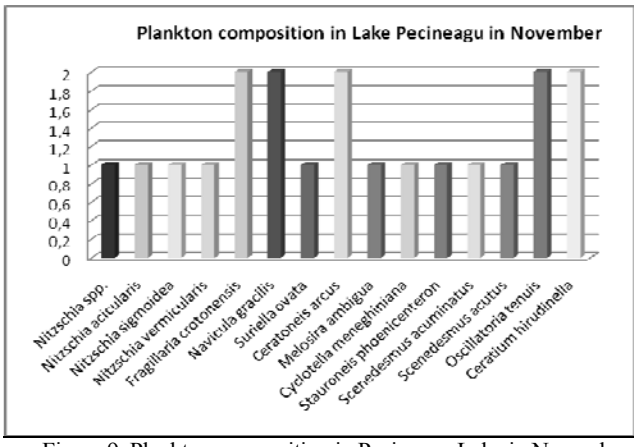

Figure 9. Plankton composition in Pecineagu Lake in November.
Figura 9. Compoziția fitoplanctonului din lacul Pecineagu în luna noiembrie.

Analysing these figures, it was found that the largest diversity was met when sampling in November (Figs. 8; 9); there were identified representatives of 15 species which belong to 11 genera. The taxonomic diversity was minimal in February, as there were noticed only nine species belonging to the diatoms and blue-green algae. The richest genera were: *Nitzschia* and *Scenedesmus*. During the warm season, respectively the months of April and July, phytoplankton reduced its diversity in terms of number of systematic groups to which the organisms identified in the sections of studied samples belong to (Tables 2; 3).

Table 2. Planktonic organisms found in Lake Pecineagu depending on the sampling depths.
Tabel 2. Organismele planctonice din lacul Pecineagu în funcție de adâncimea de la care au fost prelevate probele.

No.	Species	Water surface	Photic zone
1	*Aphanizomenon flos-aque*	+	
2	*Asterionella formosa*	+	
3	*Ceratium hirudinella*	+++	+
4	*Ceratoneis arcus*	++	+
5	*Cryptomonas ovata*		+
6	*Cyclotella meneghiniana*		+
7	*Cymbella lanceolata*	+	
8	*Cymbella ventricosa*	+	
9	*Diatoma vulgare*	++	
10	*Euglena intermedia*	+	
11	*Fragillaria crotonensis*	++	+
12	*Gomphonema constrictum*	+	+
13	*Melosira ambigua*	++	+++
14	*Melosira varians*	+	+
15	*Microcystis aeruginosa*	+++	++
16	*Navicula cryptocephala*	++	
17	*Navicula gracilis*	++++	+++
18	*Nitzschia* spp.		+
19	*Nitzschia acicularis*	+	
20	*Nitzschia sigmoidea*	++	
21	*Nitzschia vermicularis*	+	+
22	*Oscillatoria limosa*	+	
23	*Oscillatoria tenuis*	++	+
24	*Pediastrum duplex*	+	+
25	*Pediastrum boryanum*	+	
26	*Scenedesmus* spp.	+	
27	*Scenedesmus acuminatus*	+	
28	*Scenedesmus acutus*	+	
29	*Scenedesmus quadricauda*	+	+
30	*Suriella ovata*	+	
31	*Stauroneis* spp.	+	
32	*Stauroneis phoenicenteron*	+++	+
33	*Synedra acus*	++	++
34	*Synedra ulna*	++	+++
35	*Ulothrix zonata*	+	+

Table 3. Planktonic organisms found in Lake Pecineagu according to the section where samples were taken from.
Tabel 3. Organismele planctonice din lacul Pecineagu în funcție de secțiunea de unde au fost prelevate probele.

No.	Species	Dam	Lake Tail
1	*Aphanizomenon flos-aque*	+	
2	*Asterionella formosa*	+	
3	*Ceratium hirudinella*	++	++
4	*Ceratoneis arcus*	++	+
5	*Cryptomonas ovata*	+	
6	*Cyclotella meneghiniana*	+	
7	*Cymbella lanceolata*		+
8	*Cymbella ventricosa*	+	+
9	*Diatoma vulgare*		++
10	*Euglena intermedia*	+	
11	*Fragillaria crotonensis*	+	+
12	*Gomphonema constrictum*	+	+
13	*Melosira ambigua*	+++	+
14	*Melosira varians*	+	+
15	*Microcystis aeruginosa*	+++	++
16	*Navicula cryptocephala*	+	+
17	*Navicula gracilis*	+++	++
18	*Nitzschia* spp.	+	
19	*Nitzschia acicularis*	+	
20	*Nitzschia sigmoidea*	+	+
21	*Nitzschia vermicularis*	+	+
22	*Oscillatoria limosa*	+	
23	*Oscillatoria tenuis*	+	+
24	*Pediastrum duplex*	+	+
25	*Pediastrum boryanum*		
26	*Scenedesmus* spp.	+	+
27	*Scenedesmus acuminatus*		+
28	*Scenedesmus acutus*	+	+
29	*Scenedesmus quadricauda*	+	+
30	*Suriella ovata*		+
31	*Stauroneis* spp.	+	
32	*Stauroneis phoenicenteron*	++	++
33	*Synedra acus*	++	+
34	*Synedra ulna*	+++	++
35	*Ulothrix zonata*	+	+

The seasonal variations of Ochrophyta and Chlorophyta from Pecineagu are shown in figures 10 and 11 and emphasize that in the middle of the warm season, respectively in July, there were identified algae from five taxonomic groups: Cyanophyta, Euglenophyta, Ochrophyta, Pyrrophyta and Chlorophyta.

In April, an important recession of diatoms was observed and it was obvious that the green algae developed.

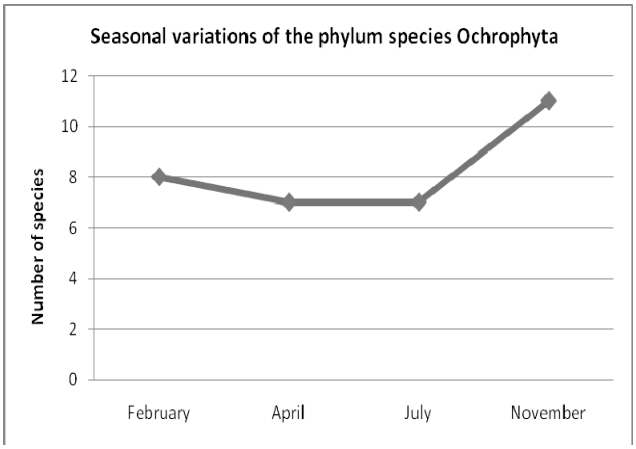

Figure 10. Seasonal variations of the phylum species Ochrophyta.
Figura 10. Variațiile sezoniere ale speciilor de Ochrophyta.

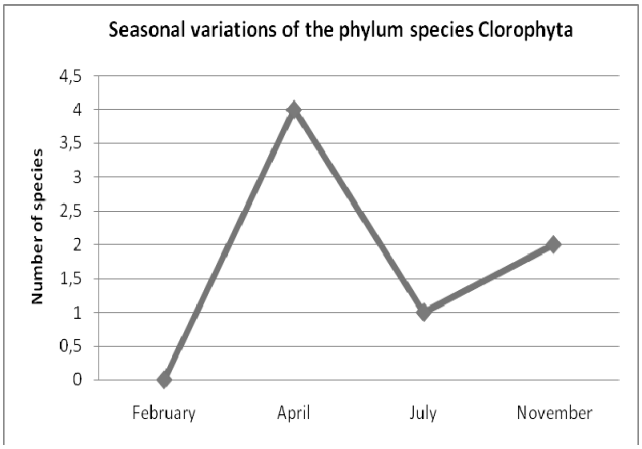

Figure 11. Seasonal variations of the phylum species Clorophyta.
Figura 11. Variațiile sezoniere ale speciilor de Chlorophyta.

Generally, the biological variety in Pecineagu Reservoir was reduced; 35 phytoplankton species from 22 genera were identified. The phytoplankton association presented a variety in quality and quantity, from one season to another, from one section extracted to another, displaying predominant autotroph forms against heterotroph forms.

The diversity of phytoplankton, dependent directly on the light factor and biogene substance, is divided differently in the throphogenic zone, the zone in which the light penetrates and the photosynthesis is realized, corresponding to the trophic zone and the tropholytic, aphotic, in which the breakdown process is predominant. At the water surface, there predominate green algae and diatoms, while on the deeper layers, they were better identified diatoms and blue algae.

In case of the phytoplankton, diatoms were dominant in the cold season of the year, and in the warm season, the green and blue algae become predominant.

Towards the end of fall and beginning of winter the development of the algae declines and can determine the stimulation of some large quantity of organic mass found in different stages of decomposition, especially in the deep water beds. The diatoms become dominant.

During the study of Pecineagu Reservoir, there were no flourishing algal registered**.**

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***. www.baraje.ro – accesed March 30, 2011.

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Received: March 24, 2011
Accepted: August 16, 2011