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RESEARCH ARTICLE

Ecological Observations on Epipelic Algae in Euphrates River at Hindiya and Manathira, Iraq

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Abstract

An environmental study conducted on epipelic algae in Euphrates River between two districts (Hindiya and Manathira**).** Four sites selected along the studied area and monthly sampling for the period between March 2010 and February 2011.The study included some physicochemical factors for water and sediment of the river. the study also conducted quality and quantity of epipelic algae. The factors were ranged as: 3-43°C, 10-32°C for air and water temperature respectively, 7.3-8.4, 3.6-10.5mg/l, 0.1-6.4 mg/l for pH, dissolved oxygen and biochemical oxygen demand respectively. Chlorophyll-a concentration was ranged ND- 11.2 µg/l, while phaeophytin a concentration was ND- 31 µg/l. Total organic carbon of the sediment ranged 0.18-1.3%. A total of 169 taxa of epipelic algae identified and comprised of Bacillariophyceae (71% and 120 species), Cyanophyceae (23 species), Chlorophyceae (14 species), Euglenophyceae (9 species) and Pyrrophyceae (3). Total number of epipelic algae ranged 1.7- 5200 individuals/cm^2. Some species showed dominance during most of the study period, such as: Melosira italica, Navicula caspidata, Cyclotella comta, Syndra ulno, Nitzschia sp., Oscillatoria sp. and Scendesmus sp.

Introduction

Benthos, periphyton and aufwuches are phrases used frequently to describe the benthic habitat, and the most common of them is periphyton to describe the microflora that grow on different substrates (Wetzel, 2001). Periphyton includes microalgae, bacteria and fungi, these organisms are associated with each other in a mucosa template, that secreted by bacteria and algae, so it is not preferable to use this phrase to describe the algae just (Sutherland et al., 1998). The epipelic algae are algae that grow on or in sediment and have ability to tolerate the paucity of light and oxygen (Stevenson , and Stoermer, 1981). In lotic system, the benthic algae have important roles in primary production, stabilizing sediment, nutrient cycles, and transfer of energy between sediment and water column (Poulickova et al., 2008, Kadhim et al., 2013, Salman et al., 2013). Moreover, its role as a source of food for aquatic invertebrates (Mayer and Likens, 1987) and as sinks of nutrients due to decomposition of materials in sediment; hence it may reduce or prevent usage of these nutrients by phytoplankton in water column (Cahoon et al.,1990). A few studies talked about epipelic algae in the middle region of Euphrates in Iraq while southern part of the river took more attention (Salman et al., 2013). Alkim et al. (2003) studied on the epipelic algae in Diwaniya River showed the dominancy of Bacillariophyceae (83%), followed by Cyanophyceae and Chlorophyceae, and noticed their increasing biomass in autumn, spring and summer. While another study on algae in Al-Abasia River also, recorded the dominancy of Bacillariophyceae (74%) but followed by Chlorophyceae and Cyanophyceae (Alasady et al., 2009), similar results were obtained by the study of Salman et al. (2013) study in Hilla river. The

present study was aimed to contribute to fill the information of quality and quantity of epipelic algae along the main Euphrates River in its middle region inside Iraqi territory.

Material and Methods

The Euphrates River at its middle region ramified into two rivers; one is the main river basin and heading to the southern of Iraq and the other is Hilla River. The present study selected four sites along the main river basin between two cities (Hindiya and Manathira) with total length of 250 km (Fig. 1). Monthly sampling was taken for the study period of March 2010- February 2011.

The physicochemical parameters were measured as: air and water temperature by thermometer, pH by portable pH-meter model HI 9811-0.HI 9811-5, dissolved oxygen (DO) and biochemical oxygen demand (BOD) followed PAHA (2003). Chlorophyll-a and phaeophytin-a of epipelic algae were estimated according to Eaton and Moss (1966). Total organic carbon of the sediment was measured according to Gaudette et al. (1974), and sediment profile done followed Folk (1974).

Epipelic algae were isolated from sediment according to Eaton and Moss (1966). The identification of algae were done followed the references: Desikachary 1959; Prescott,1973; Czarnecki and Blinn, 1977; Germain, 1981; Hinton and Maulood, 1982; Hadi et al., 1984; Pentecost , 1984; Hustedt, 1985; Al-Hassany and Hassan, 2014.

The quantitative study were done according to Vollenweider (1974) by using transect methods (for Bacillariophyceae counting) and hemocytometer (for non diatoms).

Results and Discussion

The water temperature of the study river was varied in relation to recorded air temperature during the study area, the water and air temperature ranged 10-30°C and 3-43 °C respectively (Fig 2). This variation is known in lotic system relation between water and air temperature (Wetzel, 2001). The long monthly term of high temperature were effected on the behavior, physiological and distribution of aquatic organisms (Srivastava et al., 2009; Shehata et al., 2009).

The buffering capacity of Iraqi inland water was recorded in many studies (Salman et al., 2013; Al-Saadi et al., 2000; Hassan et al. 2008; Hassan et al. 2010; Hamdan et al.2010). This characterization was also recorded in the present study that the pH in the alkaline range (fig 2), and noticed fluctuate values may be due to photosynthetic activities (Shehata et al., 2009). The study results revealed that the studied area was well aerated and no anoxia status recorded during the study period. The oxygen concentration ranged between 3.6 mg/l to 10.5 mg/l at sites 4 and 2 respectively (fig 2). Unexpected value of dissolved oxygen recorded in August 2010 that may be due to pump a large quantity of water from the Al-Hindyia barrage which lead to mixing processes, as well as the effectiveness of phytoplankton and aquatic macrophytes (Tomas , 2007). A high value (6.4 mg/l) for BOD_5 was recorded at site 3 in August 2010, while the lowest value was 0.1 mg/l at site 3 in July 2010 (Fig. 2). Only one value of BOD5 was exceed the permissible limitation according to APHA (2003), may be due to high organic material loading in the river as less efficiency of domestic treatment plant (Salman et al., 2013).

Total organic carbon has effect on many chemical and biological processes in sediment, in spite of the importance of organic carbon as a source of feeding for different organisms, on other hand increase their quantity lead to anoxic condition that will be harmful for many organisms including algae (Folger, 1972). The sediment texture of the studied area was silt-clay (fig 3) in most sites that may be lead to load more amount of TOC (Salman et al., 2013).

The qualitative study showed a clear variation in species composition among sites (fig 4 and table 1). The identified epipelic algae recorded 115, 80, 70, and 94 species at sites 1, 2, 3 and 4 respectively. The dominancy of Bacillariophyceae was recorded and represented as 90.8%, 80%, 70% and 76.6% at the studied site respectively, and followed by Cyanophyceae that represented as 16.5%, 9.6%, 9% and 12% at studied sites respectively. Chlorophyceae represented as 9.5%, 2%, 2.8% and 10% and followed by Euglenophyceae as 2.6%, 0.8%, 2% and 5.5% at studied sites respectively. While Pyrrophyceae observed only at sites 1 and 3as 2.6% and 0.7%, respectively.

The dominancy of diatoms observed in different Iraqi aquatic systems among other epipelic algae classes (Kadhim et al., 2013; Salman et al., 2013). That dominancy may be due to their ability to resist different environmental stresses such as deficiency of light and their ability to grow on different aquatic substrate due to their possessing of silicate cell wall (Leelahakrie and peerapornpisal, 2010; Moonsyn et al., 2009; Leghari et al., 2002).

The quantitative study showed temporal variation ($P \leq 0.05$) that may be related to different environmental factors, grazing, nutrients, and avialiabilty of a sutiable substrate (Poulickova et al., 2008). A peak of total number of epipelic algae noticed in March 2011 (fig 4), due the availability of the growth condition such as light and temperature, other studies also recorded the same increasing in this month (Kadhim et al., 2013; Salman et al.,

2013). Sze (1998) explained that tychoplankton will be less abundance in river surface during the reducing of water flow and attached to benthic habitat. The lowest total number of epipelic algae recorded in summer seasons, that may be due to dilution factors or high rate of grazing and disruption of the of substrate and some of epipelic algae carried into the plankton (Vilbaste, 2001). The increasing in the total number of epipelic algae synchronized with total number of diatoms during the study period (Hassan et al. 2007; Hassan et al. 2010).

Low Chlorophyll-a values of epipelic algae were noticed among the study period (fig 4) may be due to the dominance of diatoms groups on the other algal groups and also the epipelic algae which exists under 2mm of sediment not received adequate light (Moss, 1977; Onuoha et al., 2010). The results revealed that the chlorophyll-a and total number of epipelic algae was not identical according to the species composition of epipelic algae that dominate by diatoms (as the total number) but possess small amount of chlorophyll-a contents (Tippett, 1989), Moreover, the adhesion of algal dead cells on lenses paper during the trapping process may be another reason in the lack of compactable between values of chlorophyll-a and total number of algae, this finding agree with other studies on epipelic algae ,also this confirm the high values of Phaeophytin –a in this study, and the highest values of phaeophytin-a may be also due to many factors such as; benthos invertebrate prey, algal death and photolysis and bacterial decomposition (Borghini et al., 2010).

All the Shannon index values for the study area indicated moderate diversity according to Watanab et al (Chalar, 2009). The lower valve (1.11) recorded at site 4 and the higher value was 3.2 at site 1, while other sites (2 and 3) were 2.89 and 2.9 respectively. These results belonged to variability of environmental factors that affected the growth of epipelic algae, moreover the effect of substrate (sediment) on epipelic algae growth (Pringle, 1987; Muylaert et al., 2009).

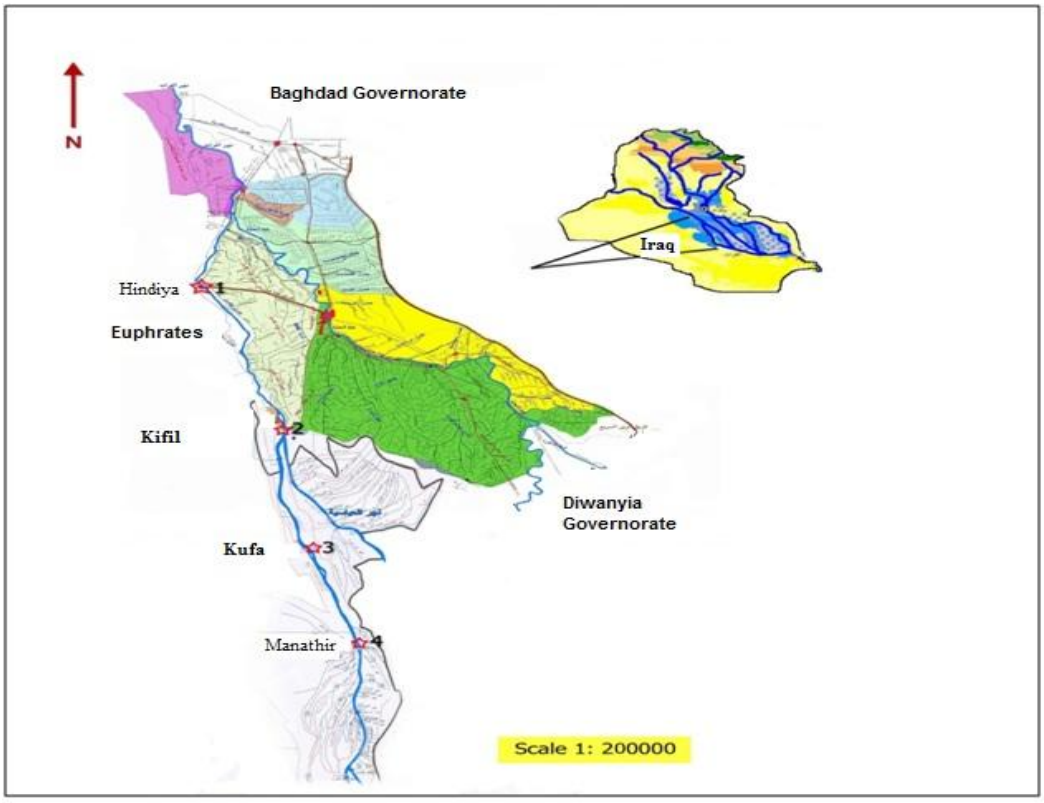

Fig1: Map of the study area

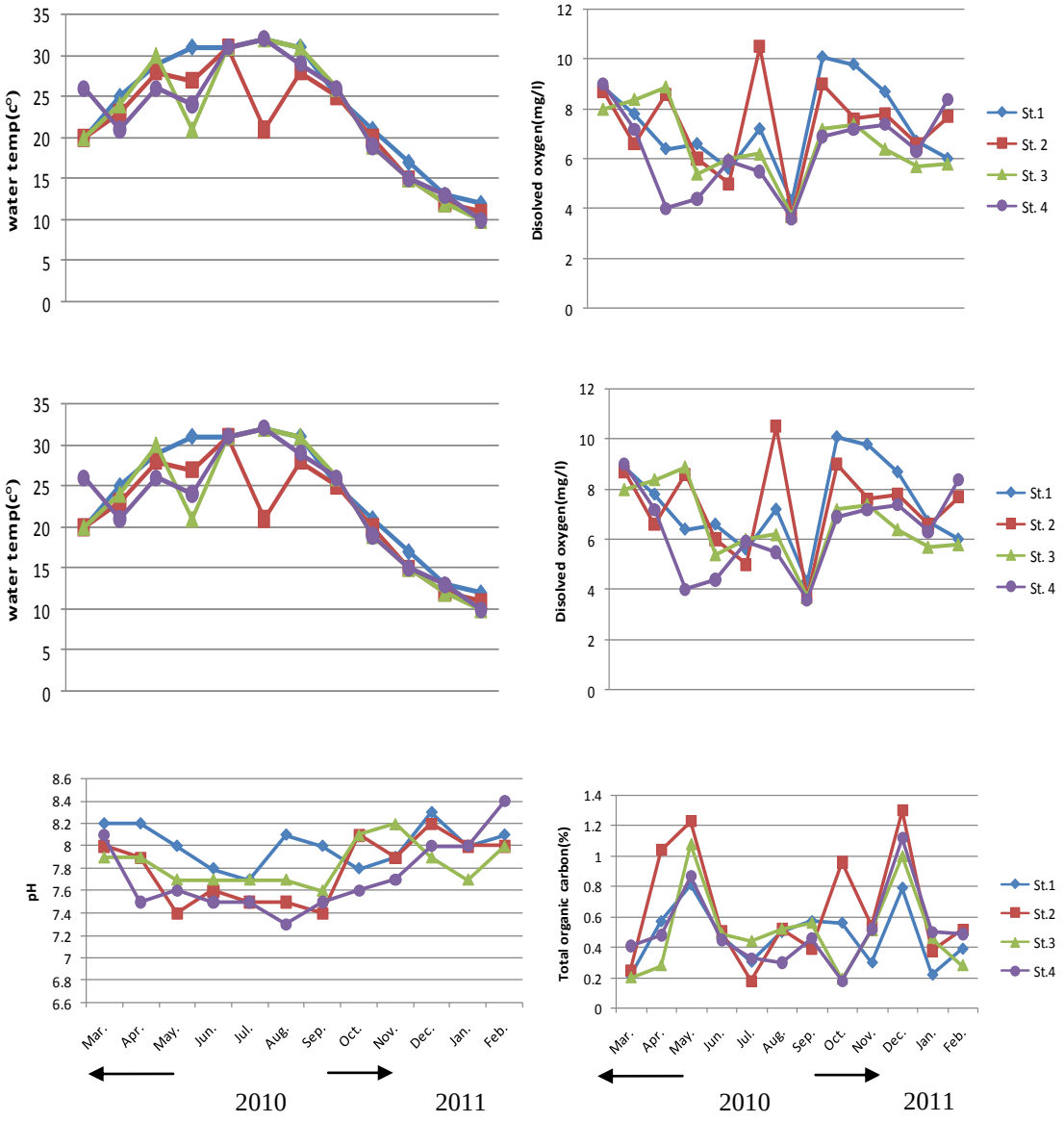

Fig2: Monthly variation of the physicochemical factors during the study period

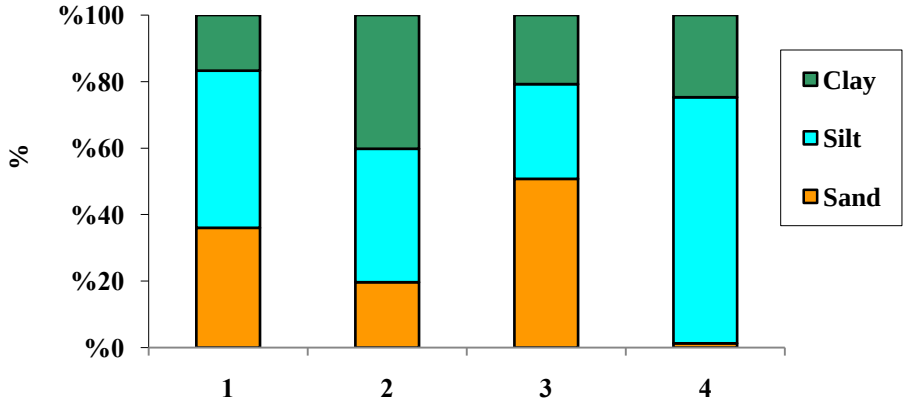

Fig3: The percentage of the components of sediment texture at the studied sites.

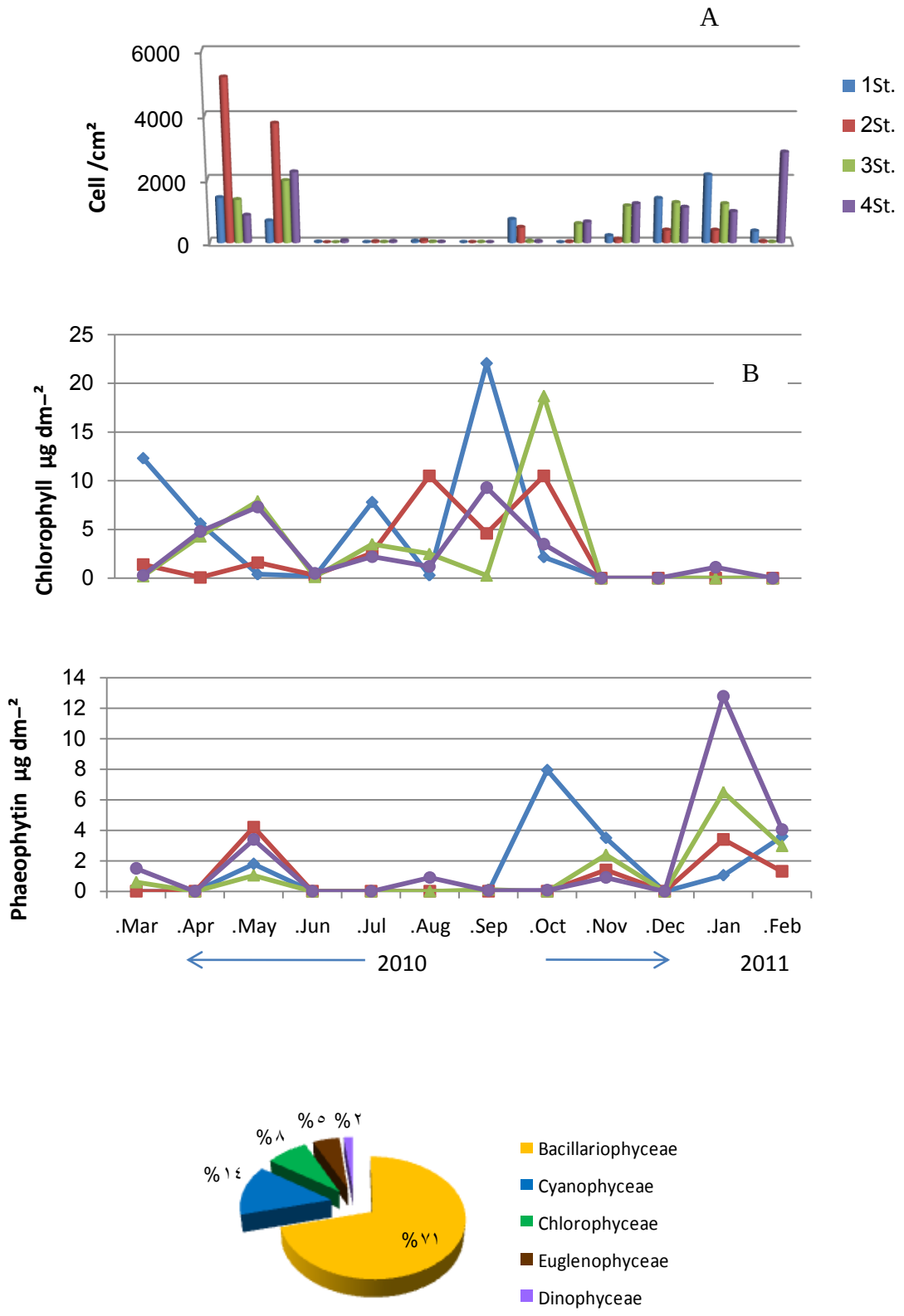

Fig 4: Monthly variation of the total number of epipelic algae(A), Chlorophylla-a(B), Phaeophytin-a (C) and Percentage of main groups of algae (D) during the study period.

Table1: Identified epipelic algae during the study period (Mar 2010-Feb 2011)
(+)= present (-) = absent

Taxa	Months Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
Cyanophycea												
Anabaena sp.	-	+	-	+	-	+	-	-	-	-	+	-
Arthrospira sp.	-	+	-	-	-	-	-	+	-	-	-	-
Calothrix sp.	-	-	-	-	-	-	+	-	-	-	-	-
Chroococcus turgidus (Ktz.)Naegeli	-	+	-	-	-	-	-	-	-	-	-	-
Merismopedia elegan A.Braun	-	+	-	-	-	-	-	-	-	-	-	-
M. glauca(Ehr.) Naegeli	+	-	-	-	-	-	-	-	-	-	-	-
Oscillatoria agardhii Gomont	-	-	-	-	-	-	-	+	-	-	-	-
O. amoena (Ktz.)	-	-	-	-	-	-	-	+	+	-	-	-
O. animelis Agardh	+	-	-	-	-	-	-	+	-	-	-	-
O. articulata Gardner	+	+	+	+	-	+	+	+	-	+	+	+
O. chalybea Mertens	+	-	-	-	-	-	-	-	-	-	-	-
O. granulatan Mertens	-	+	-	-	-	-	-	+	-	-	-	-
O. laete-virens (Crouan)Gomont	-	-	-	-	-	-	-	-	-	-	+	-
O.ornate(Ktz.) Gomont *f.planetonica* Elenkin	-	-	-	-	-	-	-	+	+	-	-	-
O. princeps Agardh	-	-	-	-	-	-	+	-	-	-	-	-
O. sancta (Ktz.) Gomont	+	+	+	-	-	+	+	+	+	+	+	+
O.subbervis Schmidle	+	-	+	-	-	+	-	-	+	+	+	-
O. subliformis Kutz	-	-	-	-	-	-	-	+	-	-	-	-
O. tenuis Agardh	-	-	-	-	+	-	+	-	-	-	-	-
O.terebriformis Agradh	-	-	-	-	-	+	-	+	-	-	-	-
O. sp.	-	-	-	-	-	-	+	-	-	-	+	-
Phormidium subfuscum Ktz.	-	-	+	-	-	-	-	-	-	-	-	-
P. sp.	-	-	-	-	-	-	+	-	-	-	-	-
Chlorophyceae												
Ankistrodesmus falcatus (Corda)	-	+	-	-	-	-	+	-	-	-	-	-
Chlamydomonas angulosa Dill	-	-	-	-	+	-	-	-	-	-	-	-
C. globosa Snow	+	-	+	+	+	-	-	+	+	-	-	+
Chlamydomonas sp.	-	-	-	-	-	+	-	+	+	-	-	-
Clorella volgaris Bejerinck	-	-	-	-	-	+	-	-	-	-	-	-
Closterium strigosum Berb.	-	+	-	-	-	-	-	-	-	+	-	-
Eudorina elegans Ehren.	-	-	-	+	-	-	-	-	-	-	-	-
Pediastrum simplex Meyen	-	-	-	-	-	-	-	-	-	-	+	
Scenedesmus armatus Chodat	+	-	-	-	-	-	-	-	-	-	-	-
S.bijuga (Turb.)Lagher	-	+	-	-	-	+	-	-	-	-	-	+
S.dimorphus (Turb.)Ktz..	-	+		-	-	-	-	-	-	-	-	-
S. quadricauda var westii	-	+	+	-	-	-	-	-	-	-	-	-
Selanastrum sp.	-	+	+	-	-	-	-	-	-	-	-	-
Tetraedron hastatum (Reisch)Hansg	-	-	-	-	-	-	-	-	-	+	+	-

Euglenophyceae												
Euglena acus Ehernberg	-	+	-	-	-	-	-	-	-	-	-	-
E. elongate Schewiakoff	-	-	-	-	-	-	-	-	+	-	-	-
E. gracilis Klebs	-	-	-	-	-	+	-	-	+	-	+	-
E. proxima Dangeread	-	-	-	-	-	-	-	-	-	-	+	-
E. spirogyra Ehernberg	-	-		-	-	-	-	-	+	-	-	-
Phacus caudatus Huebner	-	-	-	-	-	-	-	-	+	-	-	-
P sp.	-	-	+	-	-	-	-	-	-	-	-	-
Trachelomonas acanthostoma (Stoken) De Flander	-	-	-	-	-		-	+	-	-	-	-
Dinophyceae	-	-	-	-	-	-	-	-	-	-	-	-
Glenodinium pulvisculus (Ehr.)Stein	-	-	-	-	-	+	+	-	-	-	-	-
G. quadriden	-	-	-	-	-	-	-	-	+	-	-	-
G.sp.	-	-	-	-	-	-	-	+	-	-	-	-
Bacillariophyceae												
Order Centrales												
Coscinodiscus lacutirs	+	+	-	-	-	-	+	+	+	+	+	+
Cyclotella atomus Grunow	-	+	-	-	-	-	-	-	-	-	-	-
C.comta(Ehr.)Kuetzing	-	+	-	-	+	-	+	-	-	-	-	+
C.meneghiniana Kuetzing	+	+	+	+	+	+	+	+	+	+	+	+
C. ocellata Pantocsek	+	+	-	-	+	-	-	+	+	+	-	+
C.stelligera (Cl.Et.Gran)Van Heurck	-	-	-	-	+	-	-	-	-	-	-	-
Melosira granulate (Ehr.)Ralfs	+	+	+	-	+	-	+	+	+	+	+	+
M.italica(Ehr.)Kuetzing	-	-	-	-	-	-	+	-	-	-	-	-
Stephanodiscus astrea (Ehr.)Grun	+	+	-	-	+	-	-	+	+	-	-	+
Order Pennales												
Achnanthes flexella Ktz.	-	+	-	-	-	-	-	-	-	-	-	-
A. lanccolata(Breb.) Grunow	-	-	-	-	-	-	-	-	-	+	-	-
A.minutissima Kuetzing	-	-	-	-	-	-	-	-	+	-	-	-
A. saxonica Krasska	-	-	-		-	-	-	+	-	-	-	-
Amphora commutate Grunow	-	-	-	-	-	-	+	-	-	-	-	-
A. normannii Rab.	-	-	-	-	+	-	-	-	-	-	-	-
A.ovalis(Ktz.) Kuetzing	+	+	-	-	-	-	-	+	+	+	-	-
A. veneta Kuetzing	+	+	-	-	-	-	-	-	-	-	-	-
A sp.	-	-	-	+	-	-	-	-	-	-	-	-
Bacillaria paxillifer (Muell.)Hendey	+	-	-	-	-	-	+	-	-	+	+	+
Caloneis amphisbaena (Bory.)Cleve	+	-	-	-	-	-	-	-	+	-	-	-
C. ladogensis Cleve	-	-	-	-	+	-	-	-	-	+	+	+
C. permagna (Bail.) Cleve	-	+	-	-	+	-	-	-	-	+	+	+
Cocconeis pediculus Ehernberg	-	+	-	-	-	+	-	+	+	+	+	+
C. placentula Ehernberg	+	+	+	+	+	+	+	+	+	+	+	+
Cymatopleura solea	+	+		-	-	-	-	+	+	+	+	-

(Berb.)W.Smith												
Cymbella affinis Kuetzing	+	+	-	-	-	-	-	-	-	+	-	+
C. amphicephala Naegeli	-	-	-	-	+	-	-	-	-	-	-	-
C. cistula (Ehr.)Kirchn	+	-	-	-	-	-	-	+	-	-	-	-
C.cistula (Ehr.)Kirchn	-	+	-	-	-	-	-	-	-	-	+	-
C.cymbiformis (Ktz.)Van Heurck	-	+	-	-	-	-	+	-	-	+	+	-
C. delicatula Kutz.	-	-	-	-	-	-	-	-	+	-	-	-
C.gracilis (Ehrenberg) Kützing	-	+	-	-	-	-	+	-	-	-	+	-
C. leptoceros (Ehr.)Grunow	-	+	-	-	-	-	-	-	+	+	-	-
C.parva (W.Smith)Kitchn	-	+	-	-	+	-	-	-	-	-	-	-
C. tumida (Berb.) van Heurck	-	+	+	+	-	-	-	+	+	+	+	+
C. tumidula Grunow	-	+	-	-	-	-	-	-	-	-	-	-
C. turgid (Greg.)Cleve	-	+	-		-	-	-	-	+	+	-	-
C.. ventricosa Kuetzing	-	+	-	-	-	-	-	-	-	-	-	-
Diatoma hiemale (Roth.)Heiberg	+											+
D. vulgare Bory		+					+	+			+	+
Diploneis ovalis (Hilse)Cleve	+	+	-	-	-	+	-	-	+	-	-	+
D.puella (Schum) Cleve	-	-	-	-	-	-	-	-	-	-	+	-
D. smithii (Berb.)	-	+	-	-	-	-	-	-	-	-	-	-
Eutonia curvata Kutz.	+	-	-	-	-	-	-	-	-	-	-	-
Eutonia pectinalis(Ralfs) Rabenhorst	+	-	-	-	-	-	-	-	-	-	-	-
Fragilaria capucina Desmazieres	-	-	-	-	-	-	+	-	-	-	-	-
F. crotonensis Kitton	-	-	-	-	-	-	+	+	+	+	-	-
Gomphoneis olivaceum (Horne) P.Dawson ex Ross et Sims	+	-	+	-	-	-	-	+	+	+	+	-
Gomphonema angustatum (ktz.)Rabenhorst	+	+	+	-	-	-	-	-	-	-	-	+
G.constrictum Ehernberg	-	-	+	-	+	-	-	-	-	+	-	-
G.fanensis Maillard	-	-	+	-	-	-	-	-	+	+	-	-
G. gracilis Ehernberg	+	-	+	-	-	-	-	-	+	-	+	-
G. intricatum Kuetzing	-	-	-	-	-	-	+	-	-	-	-	-
G. lanceolatum Ehernberg	-	-	-	-	-	-	-	-	-	-	+	-
G. parvulum (ktz.) Kuetzing	-	-	-	-	-	+	-	-	+	-	-	-
Gyrosigma acuminatum (ktz.) Rabenhorst	+	-	-	+	+	+	-	+	-	+	+	+
G. peisonis (Gran.) Hustedt	+	-	-	-	-	-	-	-	-	-	-	-
Hantzschia amphioxys (Ehr.)Grunow	-	-	-	-	-	-	-	-	-	-	+	-
Mastogloia smithii Thw.Ex.W.Sm	-	+	-	-	+	-	-	+	+	+	+	+
Navicula anglica Ralfs	-	+	-	-	+	-	+	-	-	-	-	-
N.capitata (Ehr.)	-	-	-	-	-	+	-	-	-	-	-	-
N. caspidata Kutz.	-	-	-	-	+	-	-	-	-	-	-	-
N. cincta (Ehr.)	+	+	-	+	+	-	-	+	+	+	+	+
N. gibbula Cleve	-	+	-	-	-	-	-	-	-	+	-	-
N. gracilis (Ehr.)	-	+	-	-	-	-	-	+	-	-	-	-

N. halophila(Grun.) Cleve	+	-	-	-	-	-	-	-	-	-	-	-
N. lanceolata (Ag.) Kuetzing	+	-	-	+	-	-	+	-	+	+	+	-
N. nyassensis O. Muller	-	+	-	-	-	-	-	-	-	-	-	-
N. placenta (Ehr.)	-	-	+	-	-	-	-	-	-	-	-	-
N. pupula Kuetzing	-	+	-	-	-	-	-	-	-	-	-	-
N. radiosa Kuetzing	-	+	-	-	-	-	-	-	-	-	-	-
N. salinarum Grunow	-	+	-	-	-	-	-	-	-	-	-	-
N. viridula Kuetz.	-	-	-	-	-	-	-	+	-	-	-	-
Neidium affine (Ehr.)Pfitz	+	-	-	-	-	-	+	-	+	-	+	+
N.irdis (Ehr.) Cleve	-	+	-	-	-	-	-	-	-	-	-	-
Nitzschia acicularis(ktz.)W.Smith	-	-	-	-	-	-	-	-	-	-	-	+
N. amphibia Grunow	-	+	-	-	-	-	-	-	+	-	-	+
N. apiculata(Greg.) Grunow	+	+	-	-	-	-	-	-	-	-	-	-
N. clausii Hantzsch	-	-	-	-	-	-	-	+	-	-	-	-
N.commutata Grunow	-	+	-	-	-	-	-	-	-	-	-	-
N. dissipata(ktz.) Grunow	-	+	-	-	-	-	-	+	-	-	-	-
N. filiformis(W.Smith) Van Heurck	-	+	-	-	-	-	-	-	-	-	-	-
N. hantzschiana Rabenhorst	-	+	-	-	-	-	-	+	-	-	-	-
N. hungarica Grunow	+	+	+	-	+	-	+	+	+	+	+	+
N. intermedia Hantzsch ex Cleve et Gran	-	-	-	-	-	-	+	-	-	-	-	-
N.littoralis Grunow	-	-	-	-	-	-	+	-	-	-	-	-
N. lorenziana Grunow	-	-	-	-	-	-	-	+	+	-	-	-
N.obtuse W.Smith	-	-	-	-	-	-	+	+	+	-	-	-
N.palea (ktz.) W.Smith	+	+	+	-	-	-	+	+	+	+	+	+
N. parvulla W.Smith	-	-	-	-	-	-	-	-	-	-	-	-
N. recta Hantzsch ex Rabenh	-	-	+	-	-	-	-	-	-	-	-	-
N. sigma (ktz.) W.Smith	-	-	-	-	-	-	-	-	-	-	+	+
N. sigmoidea (Ehr.)W.Smith	+	+	+	-	-	-	+	+	+	+	+	+
N.stagnorum Rahb	+	-	-	-	-	-	-	-	-	-	-	-
N. tryblionella Hantzsch	-	-	-	-	-	-	-	-	+	-	-	-
N. vermicularis (Ktz.) Hantzsch	-	+	-	-	-	-	-	-	-	-	-	-
N.vitrea Norman	-	+	-	-	-	-	-	-	-	-	-	-
Pinnularia biceps Gregory	-	-	-	-	-	-	-	-	+	-	-	-
P. borealis Ehr.	+	-	-	-	-	-	-	-	-	-	-	-
P. subcapitata (Jan.)O.Mull.	-	-	-	-	-	-	-	-	-	+	-	-
P. viridis(Ntzsch.)	-	+	-	-	-	-	+	+	-	-	-	-
Pinnularia Sp.	-	+	-	-	-	-	-	-	-	-	-	-
Rhoicosphenia curvata(ktz.) Grunow	+	-	-	-	+	-	-	+	-	-	-	-
Rhopalodia gibberula(Ehr.) O.Muller	-	+	-	-	-	-	-	-	-	-	-	-
R. musculus kuetz	-	+	-	-	-	-	-	-	-	-	-	-
Stauroneis anceps Ehrenberg	-	-	-	-	-	-	+	-	-	-	-	-

Surirella elegans Ehr.	-	-	-	-	-	-	-	-	-	-	+	-
S. ovalis de Brebisson	+	+	-	-	-	-	-	-	-	-	-	+
S. ovata Ktz.	+	+	-	-	-	-	-	-	-	-	-	-
S. tenera Gregory	+	-	-	-	+	-	-	+	-	+	+	+
Synedra acus Kueting	-	-	-	-	-	-	-	-	-	+	-	+
S. capitata Ehrenberg	+	-	-	-	-	-	-	-	-	-	-	-
S. pulchella(Ralfs) Kuetzing	+	-	-	-	-	-	-	-	-	-	-	-
S. rumpens Kg.	-	-	-	-	-	-	-	-	-	-	+	+
S. ulna(Nitz.) Ehrenberg	+	+	-	-	+	+	+	+	-	+	+	+
S. ulna var. *oxyrynchus* (Ktz.)Van Heurck	-	-	-	-	-	-	-	+	-	-	+	-
Tryblionella levidensis	-	-	-	-	-	-	+	-	-	-	-	-

Conclusion

The results indicated that the variables of physical and chemical properties of water are expressed in the Epipelic algae fluctuation. Water quality was found to affect the composition of the community of Epipelic algae and therefore the species dynamic must be monitored. The results were showed moderate diversity according the Shannon index.

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