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Species composition and seasonal variation of phytoplankton in Himreen reservoir, middle of Iraq

Abbas Murtadeh Ismail
Diyala University,College of Education, Biology Department

Abstract:

The Phytoplanktons of Himreen reservoir were studied during the period Feb. 1996 to Jan. 1997. A total of 98 algal species were identified, dominated by diatoms (69 species), followed by green algae (15 species), blue green algae (10 species) and the other taxa (4 species).

Diatoms were the most abundant group, followed by green and blue green algae and the dominant species were *Navicula cryptocephala, Nitzschia palee, Cymbella affinis,* and *Fragillaria ulna.* The number of species revealed clear differences and irregular seasonal variations at different stations of the study area.

Introduction:

There are more than 66 water regulation projects in Iraq include dams, impoundments, reservoirs, flood regulation barrages (Saddalla, 1998)[1]. Himreen reservoir is one of the largest lentic aquatic system in Iraq.
Only two ecological investigations have been published on this reservoir [1,2]. The reservoir received its water mainly from Diyala river which is the main and the earliest tributaries of river Tigris. It is considered one of major irrigation projects in Iraq. The present investigation was attempted to give further information on the phytoplanktons of Himreen reservoir qualitatively and quantitively, as well as their seasonal variations.

Study Area:

Himreen reservoir started operation since 1982, it is located about 40 km north east part of Diyala governorate, with about 374km^2 storage area with maximum depth of 35m, at about 53m above sea level[3]. The reservoir is subjected of sever water level fluctuation leading a short and long term effect on the available organisms. Two stations were selected for monthly sampling within the reservoir (Fig. 1).

Materials and Methods:

Monthly surface water samples were collected during the period from February 1999 to January 2000 from two selected stations in Himreen reservoir (Fig. 1). At each station a Hydro-Bios plankton net of 20µm mesh size which was towed just beneath water surface about 15 minutes for qualitative study. Sedementation technique was followed for quantitative study [4], as cited by Kassim, et. al. (1999)[5].

Diatoms were cleaned by using hot nitric acid and counted by microtransect method [6], whereas the non-diatoms algae were counted by haemacytometer chamber and the species identification was followed references [7-10].

Results and discussion:

A total of 98 algal texa was identified in Himreen reservoir during the study period. Out of the total species the diotoms was dominated (71.42%) followed by green algae (15.3%), blue green algae (10.2%), and the others (4.08%), results verpals that 50 sps. Are common among the two stations (table 1). The number of cholorophycean species exceed that of cyanophycean (table 2), this gives an indication that the water is clean which was reported earlier during examination of water characters[1]. The species richness in the studied area is less than that in Qadissia lake[5] and Habbaniya lake[11]. Diatoms was the most dominant group in lakes all Iraqi, such as Dokan lake[12], Razzazah lake[13], Qadissia lake[5] as well as marshes area[14] and Al-Saadi et. al.[15]. Only 4 sps. of Euglenophycea as well as pyrrhophyceae were identified in the studied area. Some of the identified species in the present study are originated mainly from benthic forms.

Similarly several species of phytoplankton in Iraqi lakes illustrated that, such as Razazzah lake[16]. Few genera in the studied area were represented by several species such as *Nitzschia* (16 sps.), *Cymbella* (6 sps.) and *Navicula* (8 sps.) table (2). Similarly these genera were also found in several species in Qadissia lake[5] and Habbaniya lake[11], in the mean time few species appeared in more than 8 months such as *Cymbella affinis*, *Nitzschia palae, Fragillaria ulna,* and *Navicula cryptocephala*. The total cell number of phytoplankton was 250.9×10^3 and 300.4×10^3 cells/ℓ in sts.1 and 2 respestively and dominated by diatoms also in both stations. On the other hand, the cell number was more in st.2 also along the studied period (Fig. 2). The dominancy of diatoms in the cell count was recorded in the studied lakes and marshes which indicated above. Results reveals that the algal bloom was observed in the Spring and Autumn seasons (Fig. 3).

Spring is shown to be the season of the higher growth and diversity, this result is similar to other Iraqi inland waters[5,11,12]. As indicated above the species composition and density were higher at st.2 which may be explained due to the variation in some related environment factors which need more future research in the investigated area.

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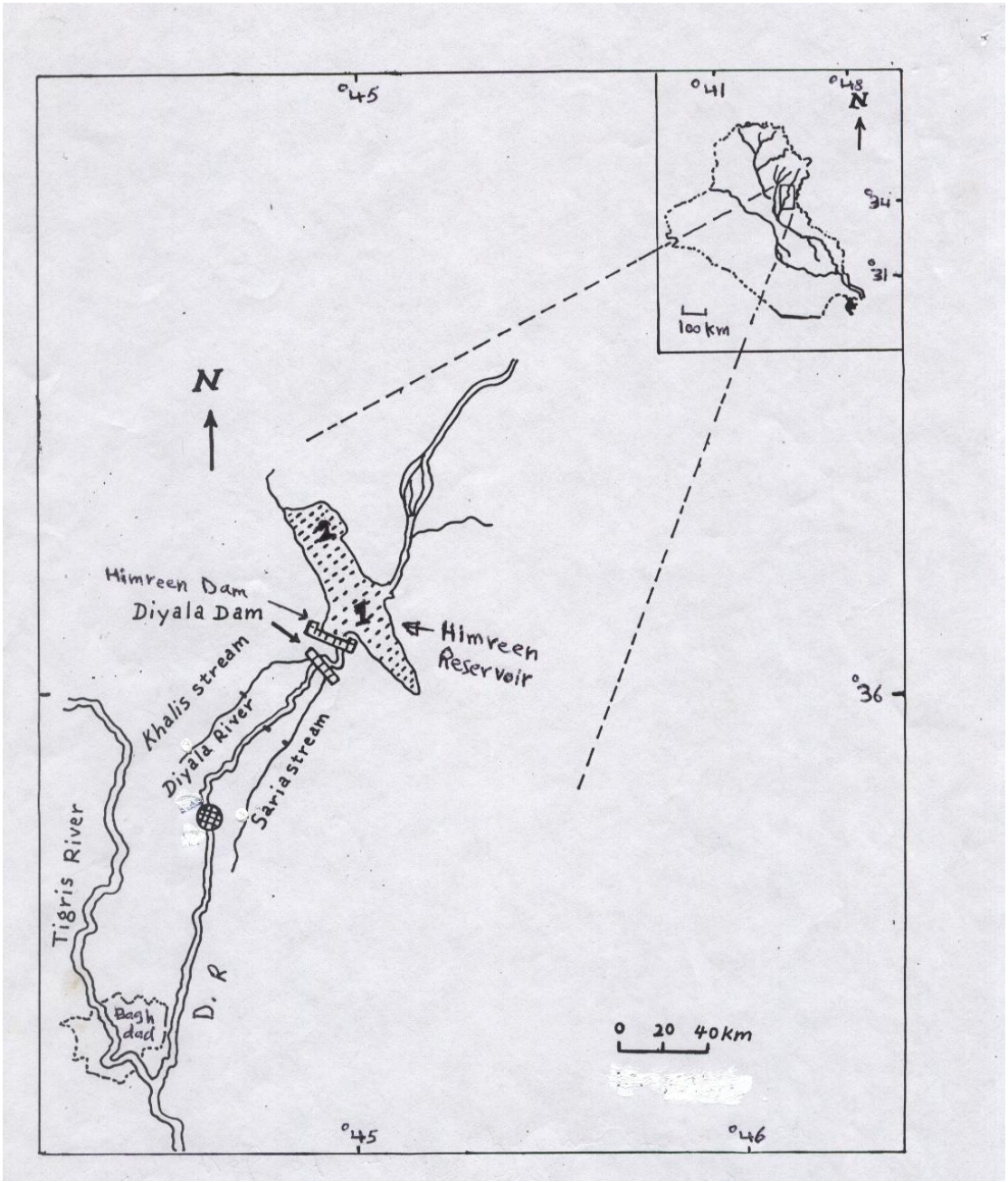

45°
41°
48°
N
34°
31°
100 km
N
Himreen Dam
Diyala Dam
Himreen Reservoir
Khalis stream
Diyala River
Saria stream
Tigris River
D. R
Bagh dad
0 20 40km
36°
45°
46°

Table 1: List of algal taxa, total count (%) and appearance refers to number of months that the species was identified in studied stations.

Taxa	st.1	st.2	% cell Nu.	App.
CYANOPHYCEAE				
Anabaena sp.	+	+	0.79	3
Chroococcus minor (Kuetz.) Naegel:	+	+	0.69	3
Chroococcus sp.	-	+	0.20	2
Merismopedia elegans A. Br.	+	+	0.35	4
Merismopedia glauca (Ehr.) Naeg.	-	+	0.53	1
Microcystis aeroginosa Kuetz.	+	+	0.34	2
Microcystis sp.	+	+	0.16	1
Oscillatoria tenuis C.A.Agardh	+	+	0.81	5
Oscillatoria sp.	+	-	0.12	2
Spirulina sp.	+	+	0.3	2
EUGLENOPHYCEAE				
Euglena sp.	+	+	0.22	3
Phacus sp.	+	-	0.09	1
PYRRHOPHYCEAE				
Peridinium cinctum (Mell) Ehr.	+	+	0.11	2
Peridinium sp.	-	+	0.05	2
CHLOROPHYCEAE				
Ankistrodesmus sp.	+	+	0.44	3
Chlamydomonas sp.	+	+	0.51	4
Chlorella vulgaris Beyerinek	-	+	0.12	2
Closterium sp.	-	+	0.19	3
Coelastrum reticulatum (Dang.) Sen.	+	+	0.24	4
Coelastrum sp.	-	+	0.10	2
Cosmarium sp.	+	+	0.07	1
Oedogonium sp.	+	+	0.66	3
Pediastrum duplex Lager.	+	+	0.77	6
Pediastrum simplex (Meyen) Lemm.	+	-	0.41	3
Pediastrum sp.	+	+	0.11	1

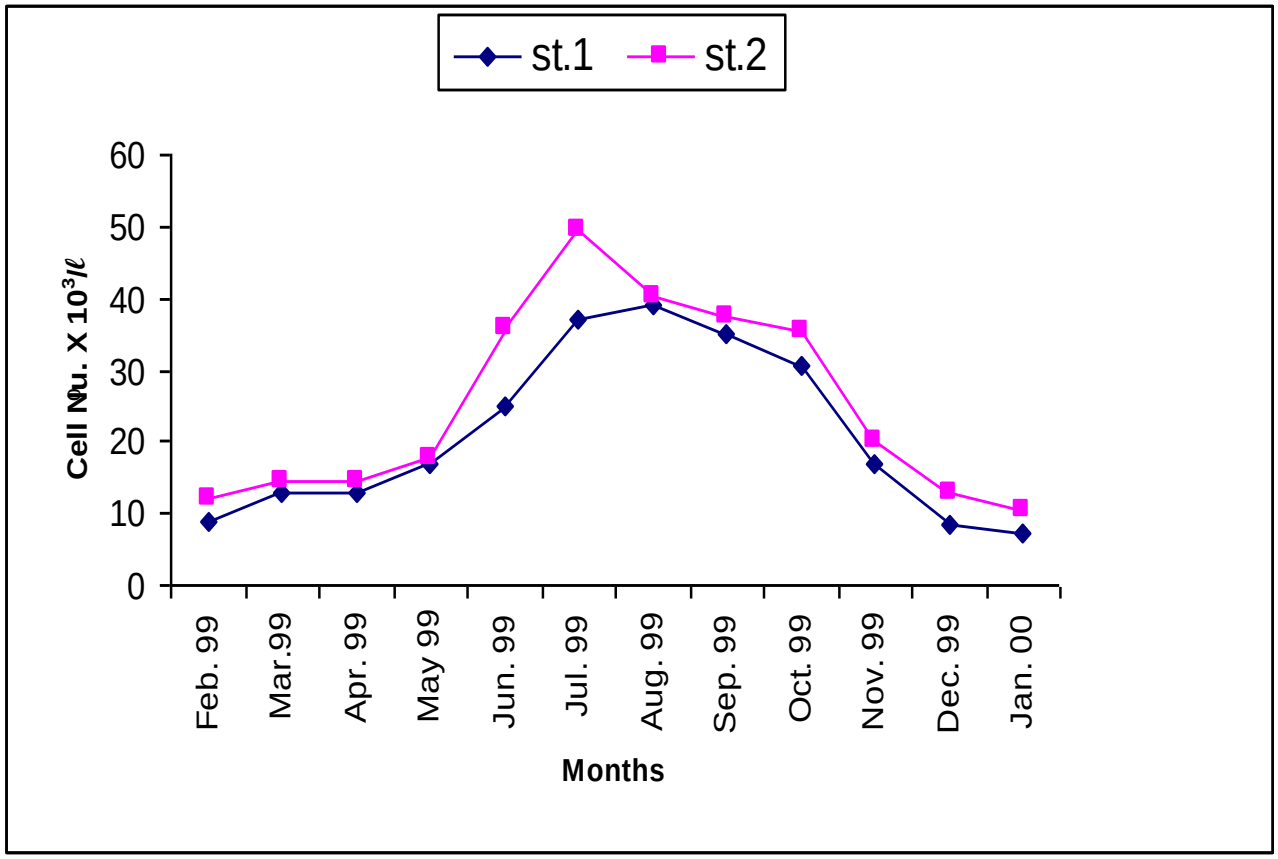
Scenedesmus bijuga	+	+	0.55	4
Spirogyra sp.	+	+	0.33	3
Tetradaeron minimum	+	-	0.21	2
Tetradaeron sp.	+	+	0.56	3
BACILLARIOPHYCEAE				
"centrals"				
Aulacosiera granulate (Ehr.) Simo.	+	+	2.55	6
Coscinodiscus lacustris Grun.	-	+	0.33	5
Cyclotella kuetzingiana Thw.	-	+	0.41	4
Cyclotella meneghiniana Kuetz.	+	+	1.22	6
Cyclotella ocellata Panto.	+	+	3.01	6
Cyclotella stelligera Cl. El.	-	+	6.11	5
Cyclotella sp.	+	-	1.15	2
"pennales"				
Achnanthes minutissima Kuetz.	+	+	9.32	7
Amphiprora alata Kuetz.	-	+	3.7	3
Amphora ovalis Kuetz.	-	+	1.66	2
Amphora veneta Kuetz.	+	-	0.44	1
Amphora sp.	+	-	1.00	2
Anomoeneis exilis (Kuetz.) Cl.	+	+	3.14	4
Bacillaria paxillifer (Mull.) Hend.	+	+	3.3	4
Caloneis sp.	-	+	0.09	1
Cymatoplura solea de Br.	+	+	0.35	2
Cymbella affinis Kuetz.	+	+	10.65	8
Cymbella amphicephala Grun.	+	+	2.19	3
Cymbella microcephala Grun.	+	-	1.36	3
Cymbella pusilla Grun.	-	+	1.05	2
Cymbella rentricosa Kuetz.	-	+	0.17	1
Cymbella sp.	+	+	1.77	4
Diatoma elongatum (Lyng.) Agard	+	+	0.40	2
Diatoma vulgar Bory.	+	+	0.26	4
Diploneis ovalis Hislc.	+	-	0.41	3
Diploneis sp.	-	+	0.11	2
Fragillaria acus Kuetz.	+	-	0.24	2
Fragillaria ulna (Nitz.) Ehr.	+	+	6.66	9

Fragillaria sp.	+	-	0.66	2
Gomphonema angustatum (Kuetz.) Rab.	+	+	4.1	5
Gomphonema sp.	-	+	0.09	2
Gyrosigma acuminatum (Kuetz.) Rab.	+	+	0.56	5
Gyrosigma spencerii (W. Smith) Cl.	-	+	0.38	4
Gyrosigma sp.	+	+	0.28	3
Hantizschia amphioxus (Ehr.) Grun.	+	+	3.3	5
Mastigloia smithii Thw.	-	+	0.46	3
Mastigloia sp.	+	+	0.3	2
Navicula anglica Ralf.	+	-	0.29	2
Navicula cryptocephala	+	+	6.8	8
Navicula cuspidata Kuetz.	+	-	1.12	4
Navicula gracilis Ehr.	-	+	1.3	2
Navicula pusilla W. Smith	-	+	0.93	2
Navicula radiosa Kuetz.	+	-	0.30	4
Navicula tuscula (Ehr.) Grun.	+	+	1.11	5
Navicula sp.	+	-	2.3	6
Nitzschia acicularis (Ehr.) W. Smith	+	+	0.55	5
Nitzschia amphibia Grun.	-	+	0.86	4
Nitzschia angustata (W. Sm.) Grun.	+	+	0.66	4
Nitzschia apiculata (Greg) Grun	-	+	0.53	3
Nitzschia dissipata (Kuetz.) Grun	+	+	0.23	4
Nitzschia fasiculata Grun.	+	+	0.73	6
Nitzschia frustulum Kuetz.	+	+	0.81	5
Nitzschia longissima (Breb.) Ralf.	-	+	1.8	4
Nitzschia lorenziana Grun.	+	+	0.31	3
Nitzschia microcephala Grun.	-	+	0.16	2
Nitzschia obtusa W. Smith	+	-	0.21	3
Nitzschia Palae (Kuetz.) W. Smith	+	+	11.8	11
Nitzschia sigma (Kuetz.) W. Smith	-	+	0.12	2
Nitzschia sigmoidae (Ehr.) W. Smith	-	+	0.09	2
Nitzschia tryblionella Hantz.	+	-	0.36	1
Nitzschia sp.	+	+	2.1	3
Pinnularia sp.	-	+	0.07	1
Rhoicosphaenia curvata (Kuetz.) Grun.	+	+	0.81	4
Stauronesis sp.	+	-	0.02	1
Surirella angustata Kuetz.	+	+	0.24	2

Surirella ovalis de Breb.	+	+	1.33	3
Surirella ovata Kuetz.	-	+	0.56	2
Surirella sp.	-	+	0.21	3
Tabellaria sp.	+	+	0.07	1

Table 2: Number of identified species and genera of different algal classes in the studied stations
G.= genera Sp.=species

Algal groups	St.1		St.2	
	G.	Sp.	G.	Sp.
Cyanophyceae	6	8	6	9
Euglenophyceae	2	2	1	1
Pyrrhophyceae	1	1	2	2
Chlorophyceae	7	13	10	13
Bacillariophyceae	21	46	24	54
Total Number	37	70	43	79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st.2
Cell Nu. X 10³/ℓ
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40
30
20
10
0
Feb. 99
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Apr. 99
May 99
Jun. 99
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Aug. 99
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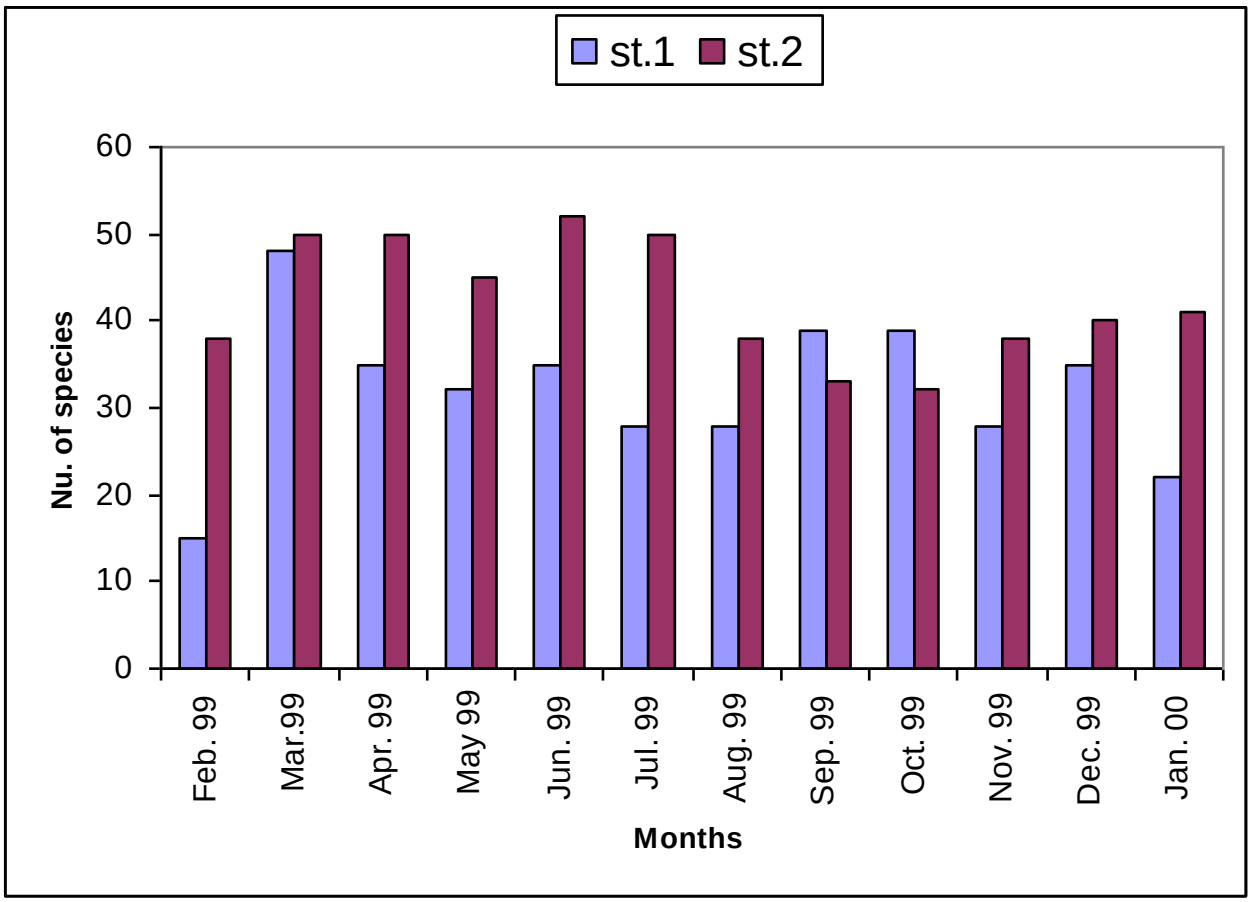
st.1
st.2
Nu. of species
60
50
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Feb. 99
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Months