

"SEASONAL VARIATIONS OF PHYTOPLANKTON IN SOME MARSH AREAS IN SOUTHERN IRAQ"

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Abstract

A qualitative and quantitative studies on phytoplankton in southern part of al-Hammar marsh were made during 1985. Monthly sampling from two selected stations were collected. 103 species belong to 52 genera were identified, dominated by Bacillanophyceae (67%) followed by chlorophyceae (17.5%). Most of the species are of benthic origin and only few are true plankton. The total count of cells showed bimodal pattern with a large peak during autumn and a small one during spring in both stations. Diatoms and green algae were also dominated in total count, also, with a significant correlation with the total cell count of the phytoplankton. Few species showed high number during the study period like Cyclotella atomus, Chaetoceros spp., Rhodomanas lacustris var. nannoplanktonica and Cocconeis placentula.

التغيرات الفصلية للهائمات النباتية في بعض مناطق الاهوار في جنوب العراق

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إسلامة

اجريت دراسة نوعية وكمية للهائمات النباتية في الجزء الجنوبي من هور الحمار خلال عام ١٩٨٥. جمعت عينات شهرية من محطتين مختاريتين. تم تسجيل (١٠٣) نوع تابعة الى (٥٢) جنس، وكان المتغلب فيها صنف العصويات (٦٧٪) يتبعها انطحالب الخضراء (١٧,٥٪). معظم الأنواع كانت ذات أصل قاعي و فقط عدد قليل منها هي من الهائمات الحقيقية. وأظهر العدد الكلي للحلمايا نمودج ثنائي النمط بدرجة كبيرة خلال الخريف وصغيرة خلال الربيع في كلا المحطتين. وكان الصنفين اعلاء متميزين كذلك في عدد الحلمايا وبملاقة معنوية مع العدد الكلي للحلمايا. وظهرت بعض الأنواع نواجد عالي خلال فترة الدراسة منها Cyclotella atomus و Chaetoceros Spp و Rhodomanas lacustris var nannoplanktonica و Cocconeis placentula.

Introduction

A clear attention was given last few years on the ecological studies of phytoplankton on several marshes, southern Iraq, including lake Baghdad [1], al-Hammar marsh [2], rice fields [3,4], Tigris marshes [5], and at different regions [6]. Only few data were reported on qualitative and quantitative studies on phytoplankton [7,8].

The present investigation deals with the seasonal variation of phytoplankton species qualitatively and quantitatively for the first time in the studied marsh. The limnological data of this area were already given [9].

Study area:

Two stations were selected in the southern part of al-Hammar marsh (Fig.1). This area is affected by the tide of the Arab gulf through Shatt al-Arab estuary. Station (1) represents an open, shallow water (25-90cm in October and June respectively). The light penetrated to the bottom. The aquatic macrophytes exist in higher amount than the other station with a dense growth in spring. A thick layer

of Cladophora spp. was found during winter and spring.

Station (2) located at the southern part of the first station, with a depth of more than 5m, represents a semi-isolated area surrounded by a dam made 15 years ago. It is surrounded by agricultural fields with more boat activities as well as the presence of fishing nets. Cladophora was found in thick layer during late winter and June.

Materials and Methods:

Monthly water samples were collected from the two stations during 1985, using phytoplankton net (Hydro-Bios), of 20µ mesh size, and fixed with 40% formalin. Kromic acid was used to dissolve the organic materials and clear up to skeleton of the diatom cells. Diatoms were identified and confirmed by several references [10,11,12,13,14,15,16]. The identification of the species other than diatoms were confirmed by several references [18,19,20].

For the quantitative study, the water samples were collected from about 10cm below the water

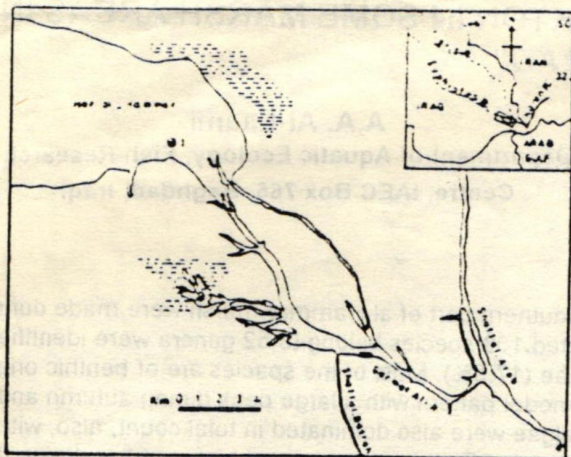


Fig 1 Map of the studied area. The insert shows the locations of the studied stations 1, the open and 2, the semi-isolated marsh area in al-Hammar marsh.

surface avoiding the floating materials. Total account of phytoplankton was calculated by precipitation method using Lugol solution [21].

Results and Discussion

Qualitative study:

103 species belong to 54 genera were identified in the study area (Table 1). Bacillariophyceae was the dominant class (67%), followed by Chlorophyceae (17.5%) Cynaophyceae (7.8%), Euglenophyceae and Dinophyceae (2.9% each), and Cryptophyceae (1.9%), (Table 2). Several works indicated also the dominancy of the diatoms in other aquatic ecosystem in southern Iraq [1,6,7].

86 species belong to 49 genera were identified in St.1, where as only 61 species belong to 34 genera in St.2 (Table 2). These differences may be due to the effect of some ecological characters, such as the dense growth of aquatic plants in St.1 (submerged and Floating), which support the growth of many epiphytic algal species. Since the light reaches the bottom at St.1, it also play a role in increasing the growth of different species, as it is well known. These species (epiphytic and epipelic) for different reasons were removed from the plant and the bottom lead to the increase in count of phytoplankton species.

In this study only few species were true phytoplankton, included: *Bacillaria paxillifer*, *Cyclotella* spp., *Chroococcus* sp., *Cryptomonas* sp., *Euglena* spp., *Rhodomanus lacustris* var. *nannoplanktonica* and *Scenedesmus* spp., Whereas the others are of benthic origin (epiphytic and epipelic). This supports the idea arised by Talling [22] about the importance of the benthic origin of the phytoplankton exist in southern Iraq waters. Similar cases were found in different marsh areas [1,2,5,6,23], as well as in shallow lakes elsewhere [14,24].

Quantitative study:

The total count of phytoplankton were dominated by diatoms in general at both stations, still some differences were observed as illustrated in (Table 1).

The cell count of Cryptophyceae were noticeable during winter and higher during autumn (Fig.2).

Table (1): The existance of the identified phytoplankton species in a percentage average value, of the twelve monthes during 1985, from the total cell count at the two studied stations in al-Hammar marsh.

Species	Station	
	1	2
CYANOPHYCEAE		
Charococcus sp.	0.07	----
Cylindrospermum stagnale (Kuetz.) Bomet et Flahault	0.27	----
Gomphosphaeria sp.	2.11	0.13
Merismopedia glauca (Ehr.) Naegli	0.12	0.01
M.trolleri Bachmann.	0.01	-----
Microcystis sp.	1.60	-----
Oscillatoria irrogua Kuetzing	0.07	-----
Spirulina major Kuetzing	0.01	-----
BACILLARIOPHYCEAE (Centrales):		
Chaetoceros spp.	3.96	20.77
Cyclotella atomus Hustedt	10.38	11.49
C. meneghiniana Kuetzing	1.13	1.45
C.striata (Kuetz.) Grunow	0.19	-----
BACILLARIOPHYCEAE (Pennales):		
Achnanthes lanceolata var.rostrata Hustedt	0.08	----
A. minutissima Kuetzing	2.93	0.42
Amphora spp.	0.21	0.17
Anomoeoneis sphaerophora (Ehr.) pfitzer	0.09	----
Bacillaria paxillifer (Muller) Hendey	0.28	0.04
Campylodiscus clypeus Ehrenberg	0.01	----

<i>Cocconeis placentula</i> var. <i>euglypta</i> (Ehr.) cleve	4.42	1 60
<i>C. placentula</i> var. <i>lineata</i> (Ehr.) cleve	0.08	-----
<i>Cymatopleura elliptica</i> (Berb.) W.Smith	0.01	-----
<i>Cymbella microcephala</i> Grunow	0.14	0.02
<i>Cymbella</i> spp.	0.17	0.02
<i>Denticula rainierenensis</i> Sovereign	-----	0.11
<i>Diatoma elongatum</i> (Lyngb) Agardh	-----	0.02
<i>D. tenue</i> var. <i>elongatum</i> Lyngbye	-----	0.11
<i>Diploneis pseudovalis</i> Hustedt	0.10	0.02
<i>Epithemia sorex</i> Kuetzing	0.19	-----
<i>E. zebra</i> (Ehr.) Kuetzing	0.01	-----
<i>Fragilaria brevistriata</i> var. <i>inflata</i> (pant.) Hustedt	0.09	0.04
<i>F. pinnata</i> Ehrenberg	0.19	-----
<i>F. capucina</i> Desmazieres	0.40	0.10
<i>Fragilaria</i> spp.	-----	0.04
<i>Gyrosigma acuminatum</i> (Kuetz.) Rabh.	0.01	-----
<i>G. ballicum</i> (Ehr.) Rabh.	0.01	-----
<i>G. peisonis</i> (Grum.) Hustedt	-----	0.02
<i>Mastogloia braunii</i> Grunow	0.08	-----
<i>M. elliptica</i> var. <i>dansei</i> (Thwa.) cleve	0.29	0.04
<i>M. pumilla</i> (grun.) cleve	-----	0.09
<i>M. smithii</i> Thwaites	0.01	-----
<i>Navicula cryptocephala</i> fo. <i>minuta</i> Boy-p.	0.18	0.04
<i>N. graciloides</i> A.mayer	-----	0.14
<i>N. inflata</i> (Donk.) cleve	0.09	-----
<i>N. oblonga</i> Kuetzing	0.08	-----
<i>N. parva</i> (Menegh.) cleve	0.36	0.23
<i>N. spicula</i> (Hick.) cleve	-----	0.01
<i>Navicula</i> spp.	0.19	0.17
<i>Nitzschia acicularis</i> W.Smith	-	0.06
<i>N. amphibia</i> Grunow	0.01	-----
<i>N. apiculata</i> (Greg.) Grunow	0.01	0.06
<i>N. filiformis</i> (W.Sm.) Hustedt	-----	0.08
<i>N. fonticola</i> Grunow	0.11	0.44
<i>N. frustulum</i> var. <i>perminuta</i> Grunow erw. V. H.	0.08	0.27
<i>N. frustulum</i> var. <i>perpusilla</i> (Rab.) Grunow	0.08	0.27
<i>N. gracilis</i> Hantzsch	0.09	-----
<i>N. granulata</i> Grunow	0.01	0.04
<i>N. hungarica</i> Grunow	0.17	-----
<i>N. hustediana</i> Salah	0.18	0.25
<i>N. Kuetzingiana</i> Hilse	-----	0.73
<i>N. longissima</i> (Bre'b.) Ralfs	0.19	0.10
<i>N. microcephala</i> Grunow	0.64	0.19
<i>N. palea</i> (Kuetz.) W.Smith	0.18	0.37
<i>N. punctata</i> var. <i>coarctata</i> Grunow	0.03	0.28
<i>N. sigma</i> (Kuetz.) W.smith	0.03	-----
<i>N. sigmoidea</i> (Ehr.) W.Smith	0.01	-----
<i>Nitzschia</i> spp.	0.58	0.39
<i>Pleurosigma delicatulum</i> W.Smith	0.01	-----
<i>Rhoicosphenia curvata</i> (Kuetz.) Grunow	0.01	-----
<i>Rhopalodia gibba</i> (Ehr.) O.Mueller	0.01	0.01
<i>Suirella capronii</i> Brebisson	0.01	-----
<i>Synedra acus</i> var. <i>radians</i> (Kuetz.) Hustedt	-----	0.06
<i>S. affinis</i> var. <i>fasciculata</i> (Kuetz.) Grunow	-----	0.01
<i>S. fasciculata</i> (Ag.) Kuetzing	0.38	-----
<i>S. pulchella</i> Kuetzing	0.01	-----
<i>S. ulna</i> (Nitzsch.) Ehrenberg	0.19	-----
<i>S. ulna</i> var. <i>biceps</i> (Kuetz.) Van Schoenfldt	0.09	0.11
<i>Synedra</i> spp.	0.09	0.18

DINOPHYCEAE :

<i>Glenodinium</i> sp.	-----	0.01
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Gymnodinium sp.	0.20	0.54
Peridinium pusillum (Penard) Lemmermann	3.49	4.8
CRYPTOPHYCEAE :		
Cryptomonas sp.	0.59	0.08
Rhodomonas lacustris var. nannoplanktonica	16.19	22.12
EUGLENOPHYCEAE :		
Euglena spp.	2.86	3.46
Phacus spp.	0.66	0.14
Tracheomonas pulcherrima var. minor Playfair	0.38	-----
CHLOROPHYCEAE :		
Chlamydomonas spp.	0.38	0.16
Cladophora fracta var. normalis Rabenhorst ex Heering	0.01	0.01
Closterium spp.	0.29	-----
Coccol green	36.87	26.31
Cosmarium spp.	0.01	0.01
Crucigenia tetrapedia (Kirch.) West & West	0.15	0.20
Eudorina elegans Ehrenberg	0.01	-----
Mougeotia elegantula Wittrock	0.01	0.01
Oedogonium sp.	0.48	-----
Pandora morum (Muell.) Bory	0.01	0.01
Scenedesmus armatus var. chodatii G.M. Smith	0.01	-----
S. bijuga (Turp.) Lagerheim	0.48	-----
S. dimorphus (Turp.) Kuetzing	-----	0.01
S. quadricauda (Turp.) de Brebisson	1.28	0.06
Spirogyra inflata (Vauch.) Kuetzing	0.28	-----
Tetraecron minimum (A.Braun) Hansgirg	0.19	0.29
T. muticum (A.Braun) Hansgirg	0.66	0.34
Volvox sp.		

Table 2): Number of species, genera, the total and percentage of existence of the identified phytoplankton groups at the two studied stations in al-Hammar marsh during the twelve months of 1985.

Groups	St.1		St2		Total	
	Species	Genera	Species	Genera	Species	%
Bacillariophyceae	55	22	40	15	69	67.0
Centrales	4	2	3	2	4	3.9
Pennales	51	20	41	13	65	63.1
Chlorophyceae	16	13	12	10	18	17.5
Cynophyceae	8	7	2	2	8	7.8
Euglenophyceae	3	3	2	2	3	2.9
Dinophyceae	2	2	3	3	3	2.9
Cryptophyceae	2	2	2	2	2	1.9
Total	86	49	61	34	103	100%

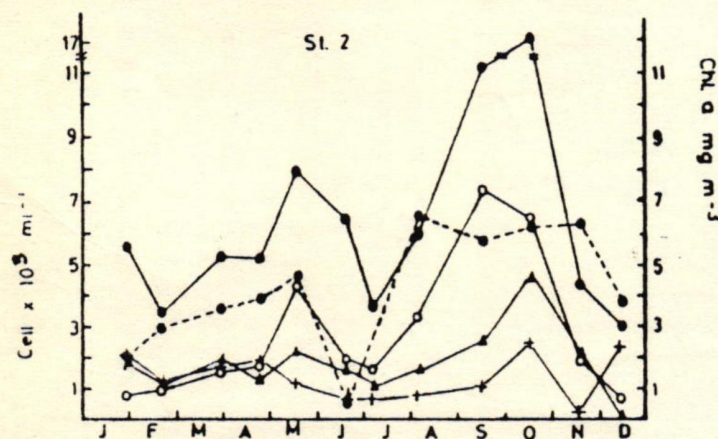
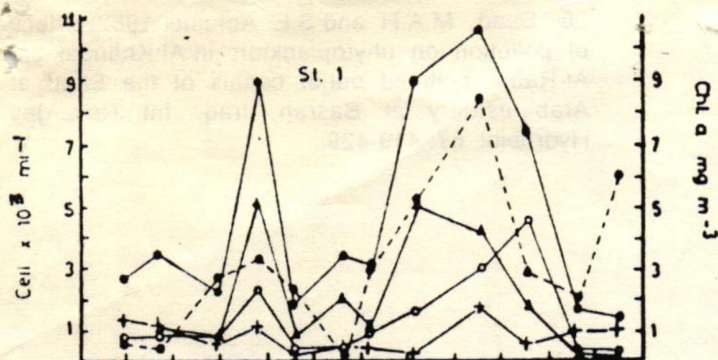


Fig.2 Cell count of total phytoplankton \bullet — \bullet , Bacillariophyceae \circ — \circ , Chlorophyceae \blacktriangle — \blacktriangle and Cryptophyceae \leftarrow — \leftarrow . Chlorophyll content \bullet — \bullet also indicated at the two studied stations in al-Hammam marsh.

Whereas the count of blue green cells was not so important for the total phytoplankton cells. The seasonal variation of this class indicated a noticeable existence during summer and early autumn. Similar existence were reported by several studies along with high temperature and organic material decomposition [25,26].

Dinophyceae and Euglenophyceae did not show any importance in the total cell count. Similar conclusion was given on other marsh areas near by [7].

Few species, other than coccoid green, showed high existence during most of study period, and formed high percentage of the total cell count. The following are the most important four species (Table 1):

1. *Cyclotella atomus*: 10.3% and 11.5% from the total cell count in St.1 and St.2 respectively, with Higher noticeable count during autumn and lower in winter.

2. *Chaetoceros* spp.: 4% and 20.8% from the total cell count in St1, and St.2 respectively, but not found in January, February and March.

3. *Rhodomanas lacustris* var. *nannoplanktonica*: 16.2% and 22.1% from the total cell count in St.1 and St.2 respectively, with fluctuated seasonal variation.

4. *Cocconeis placentula* var. *euglypta*: existed all the time in both stations, but less than above species.

Acknowledgenets:

The authors would like to thank Prof. Dr. B.K. Maulood for reading the manuscript. This work was supported by University of basrah, College of Science and Marine Science Centre. Special thanks to Dr. R.A. Hadi for identification and scientific support.

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