

A qualitative Study on Algae in Abdullah Abu-Nadjem Oasis, Al-Dewanyah,Iraq

R. K. Abed Alasady

Department of Biology,College of Education, University of Al-Qadissiya

Abstract

The present study was conducted on spring-fed (Abdullah Abu-Nadjem Oasis) west of Al-Dewanyah province, Iraq, during Winter 2007.

The results indicate that water quality was neutral tend to be slightly alkaline pH was 7.7 and 7.4 for station (1) and station (2) respectively. Total hardness value of water about 1520 and 1488 mg/l. for two stations respectively, This high values of hardness may be due to Calcium ions 397.5 and 395.5 mg/l. for two stations. According to Salinity values (1.58 - 2.22) ‰(ppt), water of oasis may be classified as brackish water, the oasis water was well aerated dissolved oxygen was 5.3 and 7.4 mg/l.

On the other hand about (58) algal taxa were recorded in this study Diatoms (Bacillariophyceae) were the dominant microalgae (58.6%), followed by blue greens (Cyanophyceae) (20.6%), While the Chlorophyceae and Charophyceae were the lower in occurrence. The dominant of Diatoms was recorded in most of Iraqi inland water bodies.,

Introduction

Oasis and Springs represent geographically isolated ecosystems and they have potential to contain both relict species (once widespread species that are now more limited in distribution) or endemic species (those whose distribution is limited to the habitat in which they evolved) [1]. Most of the neighboring springs provide uniform conditions and similar ecosystems [2]. Many papers focused on springs in north America reveal that many species of algae seemed to be endemic species in these springs and streams which derived from these springs e.g *Hyalella* spp. *Batracospermum carponivolucrum* and the diatoms *Gomphonema montezumense*, *Calonies* spp. and *Cyclotella pseudostelligera* [3]. Recently many scientific investigations deal with the distribution of algal flora in Iraq. [4]. Al Most of these studies focused on rivers like Tigris, Euphrates and Shatt al-Arab or lakes [5,6], Dams and reservoirs [7]. In addition to some investigations carried out in Kurdistan which related with algal flora of waterfalls, cold and hot springs [8]. In the middle and southern of Iraq, most of the studies concentrated on rivers and marshes, but not springs or oases except a unique study of Al-Musawii [9] on Shthatha (Ain Al-Tamer) which recorded 47 algal taxa. The present study came to follow this steps to investigate water quality and algal composition of Abdullah Abu Nadjem oasis at Ad-Dewaniyah province.

Study area :- Abdullah Abu Nadjem oasis situated in the western desert of Al-Dewaniyah province toward Al-Shinafiya shire which called Alkhasif district about 20 km. from Al-Shinafiya (31° 35 ' 33.50"N; 44° 33' 26.57" E), near the holy shrine of Mr. Abdullah ibn Alhassan of Al imam Ali bin Abi Talib (peace upon him) figure (1), thus it is called Abdullah Abu Nadjem oasis. It composed of two springs pouring forth water in continuous abundance, these springs overflow to make water body (lake) up to 200m long, this lake is sandy and silty bottom.

Materials and Methods

Two stations for study were selected, the first was at spring-fed, while the other about 800-1000 meters from the first site. Water samples were collected in 5 ltr. Polyethylene

containers for physico-chemical tests ,while phytoplankton were collected by 22mm mesh phytoplankton net ,collected samples were preserved by adding lugol's solution .Non diatomic algae were studied by preparing temporary films which were examined under high power X40 using compound Microscope (Kruss) and haemocytometer slide chamber [10].For demonstrating the frustules of diatoms ,the net samples treated with (30%) H₂O₂ for 24 hrs followed by several rinses in D.W then diatoms were mounted on cover slips by using Canada-balsam [2].Phytoplankton were identified depending on [11,12,13,14].

Physicochemical properties :Water temperature was measured by 0.1mm mercuric thermometer [15].pH was measured by using portable pH meter (HANNA)after buffering by using standard buffer solutions ,electrical conductivity was measured by E.C meter (μs/cm) .Dissolved Oxygen was obtained according to Azide modification of Winkler method(mg/l)[15].Salinity (‰)was calculated by the equation of Mackereth *et.al.*(1978).Total hardness was measured by titration the water samples Vs EDTA(0.01N) and using Erchrome black T as indicator [16].Calcium ions concentration was measured by using the methods of [15] ,while Magnesium ions concentration. was obtained by using the equation as below[15].

$$\begin{aligned} \text{Mg}^{+2} \text{ per liter} &= 12.16 * [\text{mEq hardness per liter} - \text{m Eq Ca}^{+2} \text{ per liter}] \\ \text{mEq hardness per liter} &= \text{mg hardness per liter} * 0.01998 \\ \text{mEq Ca}^{+2} \text{ per liter} &= \text{mg Ca}^{+2} \text{ per liter} * 0.0499 \end{aligned}$$

Results and Discussion

Water temperature was ranged between 19.9_21.1°C at station (1) and (2) respectively .pH was 7.7 for both stations ,this result agrees with many previous studies in the tend of Iraq inland water bodies to be slightly alkaline[4,5,6,7] . Electrical conductivity was ranged between 2968 and 3550 μs/cm for S(1) and S(2) respectively ,These values of conductivity reflected on Salinity which ranged between 1.58 and 2.22 ‰(ppt) .Both of the studied stations had well dissolved oxygen content which was over than (5)mg/l. (5.3and 7.4) mg/l for two stations .Water quality tend to be very hard according to total hardness values 1250 and 1488 mg/l This hardness due to high concentration of Ca⁺² (379.5 and 395.5)mg/l while Mg⁺² ion concentration ranged between(121.and 128.09) mg/l for St.(1) and St. (2) respectively .These results also agreed with many studies about the dominant of Calcium ions on Magnesium in Iraqi Waters [4,5,6,7].

Algal flora :

A total of 59 taxa of phytoplankton were identified (table).Bacillariophyceae was the dominant group (58.6 %) followed by Cyanophyceae (20.6 %) ,Chlorophyceae (17.4 %) and Charophyceae (3.4 %) figure(2) .The station (1) was more abundant in phytoplankton than station (2).On the other hand, submerged algae *Chara elegans* was dominant in St.(1) other than St.(2)another filamentous algae were found as algal mat on the surface of water ,this mat was composed from *Cldophora* spp.and *Spirogyra* spp. in addition to filamentous blue green algae .In the present study some of most rarely identified algae in Iraqi inland water bodies were recorded like(*Terpsinoe musica* and *Plagiotropies lipedoptera*) [4] plate (1). In addition to cyanophycean *Gomphospheria aponina* which were considered as halophytic alga .[8,19].In comparison with other local studies, the present study records about (57) algal taxa which was higher than Al-Musawi[9] who were recorded (47) taxa in Ain alTamer Oasis .Some of recorded algae consider as halophyte or brackish water algae e.g *T. musica* and *G.aponina* [17].From the mentioned results, we can conclude that water quality of Abdullah abuNadjem oasis is classified as hard well aerated brakish water according to international criteria [15] .

References

- 1- Hynes,H.B.N.(1970).The Ecology of Running Waters.Liverpool University press, Liverpool:555pp
- 2- Sherwood,A.R. and Sheath ,R.G. (1999).Seasonality of macroalgae and epilithic diatoms in spring-fed streams in Texas,USA.Hydrbiologia .390-82.
- 3-Vis,M.L.and R.G.Sheath (1996).Distribution and systematic of Batrachospermum (Batrachospermales:Rhodophyta)in North America.9.section Batrachospermum:description of five new species .phycologia 35:433-442.
- 4- Maulood,B.K.;R.A.M.Hadi;H.A.A.Saadalla;T.I.Kassim and A.A.Al-Lami.(1993).Checklist of algae in Iraq.Marina Mesopotamica,Supple.1:1-128.
- 5- Al-Handal,A.Y.(1989).Occurrence of some filamentous Algae in the river Shattal-Arab,Iraq.Marina Mesopotamia J.Mar.Sci.4 (1):67-81.
- 6- AL Lami , A. A.;Kassim,T.I. and Al Dylaymi,A.A. (1999) . A limnological study on Tigris and Euphrates rivers Iraq..Sci.J.of Atomic Energy Commission .1:83-98.
- 7- Kassim,T.I.;Al-Saadi,H.A.,and R,K.Farhan(1999).Spatial and Seasonal variations of phytoplankton in Qadisia Lake,Iraq. The Scientific Jour.of Iraqi Atomic Energy Commission .1:99-110.
- 8- Hinton, G.C.F and B.K. Maulood (1979).Freshwater Diatoms from Sulaimaniyah, Iraq.NOVA HEDWIGIA .BAND XXXI,1+2.
- 9-Al-Mousawi,A.H.A.(1994).Algological investigation in Shathatha Oasis(Ain AlTamer).Iraq.Basrah Jour. Of Science. 12 (1):1-8.
- 10- Martinez , M . R ; Chakicss , R . P . and Panta stico , J . B . (1975) . Note on direct phytoplankton counting technique using Haemocytometer Phil : Agric . 59 : 1 – 12.
- 11- Germain , H . (1981) . Flora des Diatome.es . Diatomphycees eall douces et saumatres du Massif Armoricion et des contrees voisines de Europe occidentale . Societe Nouvelle des Edition Boubee , Paris .
- 12-Morales,E.A.(2001).Fifth NAWQA Taxonomy Workshop on Harmonization of Algal Taxonomy. Patric Center for Environmental Reaserch.report No.02-09.June.
- 13-Desikachary T.V,(1959).Cyanophyta.New Delhi ,London Acad.Press,686 pp.
- 14- Prescott , G . W (1973) . Algea of the Western Great lakes Area , William C . Brown , Dubuque lawa.
- 15- APHA, American Public Health Association (1999) standard methods for the examination of water and waste water. 20th.ed.NewYork.
- 16- Lind,O.T.(1979).Handbook of Common methods in Limnology .C.V.Mosby Co.,St.louis .199pp.
- 17- El-Awamri,A.A.;Shaaban,A.M.;and Amal ,I. Saleh(2007).Floristic study on Benthic Diatoms of the ground water seepages at Kobri ElKobba .Cairo,(Egypt).Jour. of Appl .Science Reaserch3 (12):1809-1818

Table(1): Some Physico-chemical factors in Abdullah Abu Nadjem oasis

| Factor | S1 | S2 |
|--------------------------------|-------|--------|
| Water Temperature C° | 19.9 | 21.1 |
| pH | 7.7 | 7.74 |
| Electrical Conductivity(µs/cm) | 2968 | 3550 |
| Salinity(‰) | 1.58 | 2.22 |
| Dissolved oxygen (mg/l) | 5.3 | 7.4 |
| Total Hardness | 1520 | 1488 |
| Calcium (mg/l) | 397.5 | 395.5 |
| Magnesium(mg/l) | 121.5 | 128.09 |

S 1= Station 1

S2=Station 2.

Table(2):Algal taxa in study stations of Abdullah Abu Nadjem oasis durig study period(Winter 2007). (+):mean the presence of Species

| List of Taxa | الموقع | |
|---|--------|-----|
| | (1) | (2) |
| Cyanophyceae | | |
| <i>Anabaena flos-aquae</i> | | + |
| <i>Gomphosphaeria aponina</i> | + | + |
| <i>Lyngbya spp</i> | + | |
| <i>Merismopedia glauca</i> | | + |
| <i>M. elegans</i> | + | |
| <i>Microcystis aeruginosa</i> (Kuetz.) | + | + |
| <i>Oscillatoria curviceps</i> | + | |
| <i>Osc. amoena</i> | + | |
| <i>Osc. bornetii</i> | + | |
| <i>Osc .tenuis</i> | | + |
| <i>Oscillatoria sp.</i> | + | |
| <i>Spirulina major</i> | | + |
| Bacillarophyceae (Diatomophyceae) | | |
| Order : Centrales | | |
| <i>Aulacosiera granulata</i> | + | |
| <i>Cyclotella minghiniana</i> | + | + |
| <i>C. ocellata</i> | + | |
| <i>Terpsinoe muscia (Ehrenb)*</i> | + | + |
| Order Pennales | | |
| <i>Achnanthes affinis</i> | + | |
| <i>Ach. Longipes</i> | + | |
| <i>Amphiprora alata</i> | + | |
| <i>Bacillaria paxillifer</i> | + | + |
| <i>Calonies permagna</i> | + | + |
| <i>Campylodiscus clypeus</i> | + | |
| <i>C.noricus var. hibernica</i> | + | |
| <i>Cocconies placemtnla</i> | + | |
| <i>Cymbella parva</i> | + | |
| <i>C. Gracillis .</i> | + | + |
| <i>Fragilaria virscens</i> | + | + |
| <i>Gomphonema angustatum</i> | + | + |
| <i>G. constrictum</i> | + | |
| <i>Gyrosigma acuminatum</i> | + | + |
| <i>G. Spencerii</i> | + | |
| <i>Mastogloia smithii</i> | + | |
| <i>M. elliptica</i> | + | + |
| <i>Navicula cuspidate</i> | + | |
| <i>N. gregalia</i> | + | |

| | | |
|-----------------------------------|---|---|
| <i>N. placentula</i> | | + |
| <i>N. pseudohalophila</i> | + | |
| <i>Nitzschia palaea</i> | | + |
| <i>N. pusilla</i> | + | + |
| <i>N. fasciculata</i> | + | |
| <i>N. obitusa</i> | + | |
| <i>N. vermicularis</i> | + | + |
| <i>Pinnularia divergen</i> | + | + |
| <i>Rhopalria parallela</i> | + | |
| <i>Synedra ulna</i> | + | |
| <i>plagiotropies lepidptera</i> * | + | + |
| Chlorophyceae | | |
| <i>Cladophora</i> spp | + | + |
| <i>Closterium</i> spp | + | |
| <i>Mougeotia</i> spp. | + | |
| <i>Oedogonium</i> spp | + | + |
| <i>Pandorina morum</i> | | + |
| <i>Spirogyra aequinoctialis</i> | + | |
| <i>S. fullebornei</i> | + | |
| <i>S. gratiana</i> | + | |
| <i>Spirogyra</i> spp. | + | + |
| <i>Trochiscia reticularis</i> | + | |
| Charophyceae | | |
| <i>chara elegans</i> | + | |
| <i>Coleochaete conchata</i> ** | + | + |

* Rarely record algae in Iraqi water bodies

** Its properly first record in Iraq according to last checklist (Maulood *et.al*,1993).

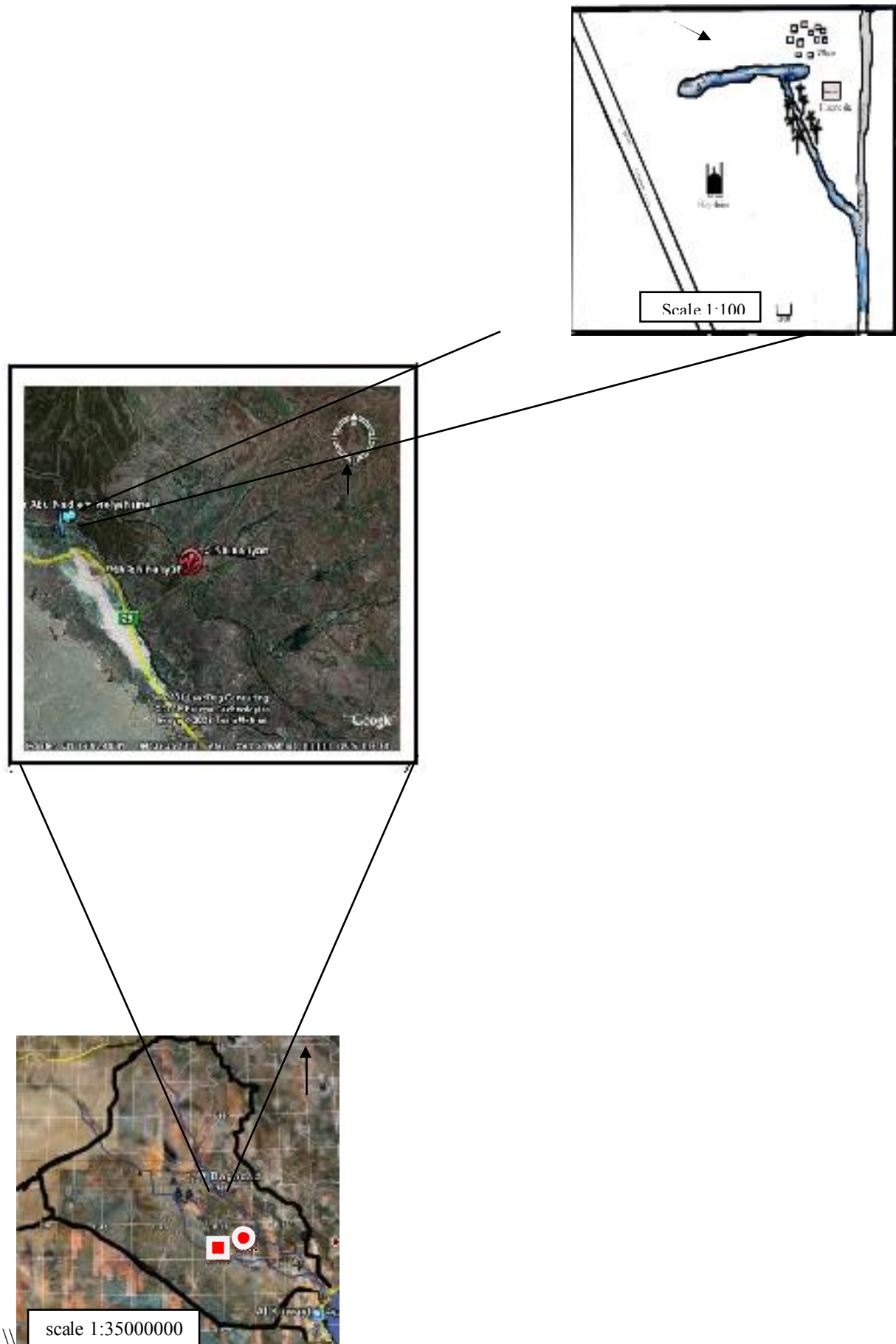
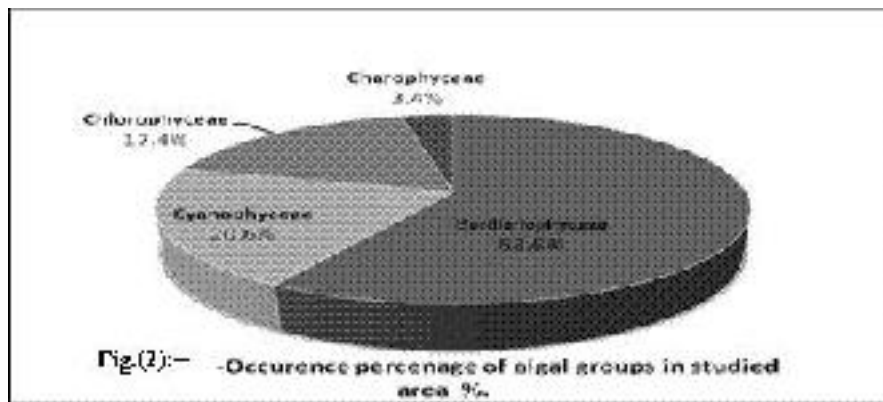


Fig.(1):-study area on Abdullah abu Nadjem Oasis near Al-Shinafiya shire



a-2



a-1



b-1



b-2



c-1



c-2



d-1



d-2

plate(1) :Some of recorded algae in Abdullah oasis (a1,2: *Terpsinoe muscia* (*Ehrenb*)valve view,(b1,2) lateral view .(c1,2): *Coleochaete conchata*(Charophyceae).(d1,2): *Gomphospheria aponina* (Cyanophyceae).

دراسة نوعية للطحالب في واحة عبد الله أبو نجم /الديوانية /العراق

رائد كاظم عبد الأسدي

قسم علوم الحياة، كلية التربية، جامعة القادسية

الخلاصة

أجريت الدراسة الحالية على العيون المائية (واحة عبد الله أبو نجم) الواقعة غرب مدينة الديوانية، العراق. في شتاء 2007. أشارت النتائج الى أن المياه كانت متعادلة ذي ميل طفيف للقاعدية (7.4, 7.7) pH المحطتين (1 و 2) على التوالي وأن المياه عسرة جداً 1520 و 1488 ملغم/لتر و قد تعزى العسرة الى غلبة أيونات الكالسيوم 397.5 و 395.5 ملغم/لتر. كما بينت أن المياه مويحة 1.58 و 2.22‰ (خزء بالألف) وأنها ذو محتوى أوكسيجيني كاف طبقاً للمواصفات الدولية. كما سجل في الدراسة الحالية مامجموعه (58) مرتبة تصنيفية من الطحالب، كانت السيادة فيها للدايتومات (الطحالب العصوية) اذ شكلت مانسبته (58.6%) تلتها الطحالب الخضر المزرقه (20.6%)، بينما كانت الطحالب الخضر والكارية هي الأقل تواجداً في هذه المياه. أن غلبة الدايتومات على بقية المجاميع يؤكد ماجاء في العديد من الدراسات على المسطحات المائية العراقية.

