

Environmental and diagnostic study of algae in irrigation Al-Alam project

دراسة بيئية وتشخيصية للطحالب في مشروع ري العلم

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Abstract

The current study was conducted to identify the algae present in the project of irrigation AL-Alam within the province of Salah al-Din and diagnosis and knowledge of the extent and the impact on environmental factors surrounding at four station. The first was Arab region of China within the perimeter of the project area while the last station was Awejelah area. The other stations lie in between the previous two stations. The ecological characteristics (physical, chemical and biological factors) where included during the study period started from November 2016 till June 2017. The study included measurements of some

physical factors as air and water temperature, Turbidity and electrical conductivity, as well as some chemical factors as pH, dissolved oxygen, biological oxygen demand, total alkalinity, salinity, and chloride. Plant nutrition as silicate, nitrite and phosphates were also included and the study covered the types of algae in the study area Diatoms formed the majority types of phytoplankton available at the station followed by green algae and blue-green algae and euglena and Chrysophyta finally comes the peridialalgae. And The results of the algae diagnosis showed 119 species of algae, which were divided into 6 populations divided into 7 species, 12 cultivars and 22 families comprising 54 species.

Keywords: aquatic environment, algae diagnosis, physical and chemical properties, djlah river

الخلاصة

تم إجراء الدراسة الحالية لمعرفة الطحالب المتواجدة في مشروع ري العلم ضمن محافظه صلاح الدين وتشخيصها ومعرفة مدى تأثيرها بالعوامل البيئية المحيطة بها. تم اختيار أربع محطات لإجراء الدراسة كانت أول محطة من منطقته عرب الصين ضمن محيط منطقته المشروع وانتهاء بمنطقته عويجيلة وتقع باقي المحطات بينها. تم دراسة العوامل البيئية الآتية (الفيزيائية والكيميائية والبيولوجية) خلال مدة الدراسة من شهر تشرين الثاني لعام (٢٠١٦) انتهاء بشهر حزيران لعام (٢٠١٧) شملت الدراسة قياس العوامل الآتية متمثلة بالعوامل الفيزيائية والكيميائية والمغذيات النباتية وهي درجة الحرارة للهواء والماء والكدرة وقابلية التوصيل الكهربائي والاس الهيدروجيني والملوحة والكلوريد والقاعدية والسليكا والنترت والفوسفات. كما تم إجراء دراسة نوعيه للطحالب في منطقته الدراسة حيث وجد ان الدايتومات هي النوع الشائع للطحالب المشخصة تلتها الطحالب الخضراء ومن ثم الطحالب الخضراء المزرقة و ثم الطحالب اليوغلينية وتليها الطحالب الذهبية وأخيرا الطحالب البيرية وبينت النتائج

إيجاد 119 نوعا من الطحالب في هذه الدراسة لجميع المحطات المنتخبة للدراسة حيث وجد أنها تعود إلى ٦ شعب من الطحالب موزعة على ٧ أصناف و12 رتبة و22 عائلة تضم 54 جنسا.

Introduction :

The term benthic algae refers to all types of algae that are adherent to or in association with surface layers such as sediments and rocks. [1] A term used to distinguish these benthic organisms that coexist in a diverse aquatic environment refers to organisms that are common or common to the substrates. The majority of the organisms that share the substrates in the aquatic environment (bacteria, invertebrates, fish, and subterranean organisms) (2) were also studied in River Avon(3) in Britain. This study indicated that the Bacillariophyceae is the common species also there was environmental factors that has an important impact in the presence of algae such as intensity and duration of light, temperature, levels of nutrients present, grazing (4).And Naharetal. (5) indicates that the variables present in the aquatic environment, such as sediment quality and salinity in the water column, affect the distribution of diatomate communities, and through a comparison with basal invertebrates found that diatoms are very sensitive to water chemistry, besides their short life circle. Kadhimetal.(6)refers that it is possible to use benthic algae as biological indicators for the purpose of assessing the quality of water for use in agriculture and others, and noted the absence of diatoms in some months of the study may be due to the fact that it became obsolete because of wind or water movement. The current study aims to

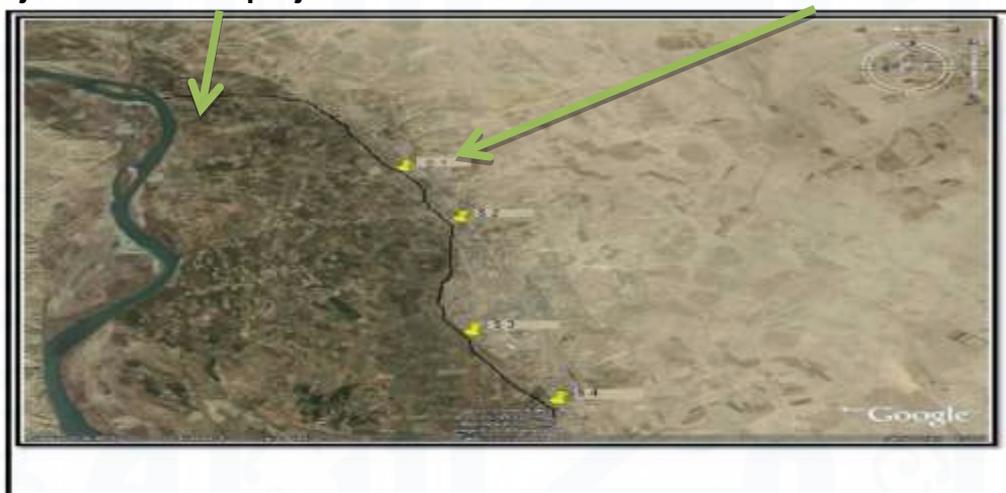
diagnose algae present In the project of irrigation Al-Alam of the impact of water pollution and change its physical and chemical properties during the 8 months of the study.

Materials and methods of work:

Samples of sediments and water were collected monthly from four sites in the irrigation Al-Alam project starting from November 2016 until June 2017 (Figure 1). The algae samples were collected using a tool with a sharp edge and depth ranging from 0.1 to 0.5 cm from the surface and placed in polyethylene bottles and added to the water a small quantity and closed and ordered the bottle well and placed in a dark place until return to the laboratory. The samples were examined within 48 hours. In the laboratory, the bottles were opened and placed in a well-lit place to be ready for examination[7]. The non-diatomical algae were identified using a normal microscope . Water samples were used in the study of some properties such as temperature, pH, acid, dissolved oxygen, nitrates, phosphates and silica. [8]. While diatomaceous algae was taken from the samples and placed in the middle of the glass slide and dried on a plate of temperature reached 70 degrees Celsius, and work was added by adding adiameter of concentrated nitric acid to clarify Diatomate structures and when dried, put a diameter of Canada balsam material on the lid of the glass slide and left for the next day. knew the studied algae species based on the following sources [9,10,11,12,13,14,15] .

Study Area:

The samples was taken from AL-Alam project with in the province of Salah al-Din.The project was established in 1985. And it's one of the irrigation projects that uses its water for the purpose of irrigating agricultural lands from Samra village in the north to the village of Aujaila in the south [16]. The study stations were selected for several reasons, including the few studies and the data related to this project. Four main stations were selected Arab alseen,alahdaljadeed ,alwaealthoryand Aujailah area Figure(1).

DjlahriverAl-Alamproject

figure(1):AL-Alam irrigation project map

Results and discussion:

In this study we found that bacillus algae is the most common among the algae that have been diagnosed. This may be due to its ability to reproduce and grow in different environmental conditions. As for the difference in numbers

and percentages of algae studied, this is due to the difference in the aquatic environment in which it is located or infected with different [17], in addition to having a solid silica husk [18]. This is one of the important species that plays an important role as an initial product in the aquatic ecosystem and is used as an indicator of environmental variables such as salinity, acidity and food richness [19]. The results of the algae diagnosis showed 119 species of algae, which were divided into 6 populations divided into 7 species, 12 cultivars and 22 families comprising 54 species as showed in table (2). The dominant diatoms species were *Cyclotella*, *Triceratium*, *Actinocyclus*, *Bacillaria*, *Gyrosigma*, *Surirella*, *Diatoma*, *Syndra*, *Tabellaria*, *Nitzschia*. And the dominant green algae species were *Chlamydomonas*, *Eudorina*, *Pandorina*, *Oedogonium*, *Closterium*, *Spirogyra*, and the blue-green algae species were *Rhabdonema*, *Microcystis*, *Oscillatoria*. *Spirulina* and *Euglena* species *Anisonema*, *Euglena*, *Trachelomonas*, *Phacus*. The Chrysophyta species diagnosed in the stations were *Dinobryon*, *Ophiocytium*, and the peridial algae have one species: *Peridinium*. As shown in table (1) below which showed the diagnosed algae in the study area. The percentage of *Bacillus* algae was 56.29% of the total percentages of the studied algae, followed by the green algae by 25.96% and the *Euglena* algae by 6.4% followed by the blue-green algae by 6.74% and the golden algae by 3.66% and the peridial algae by 0.92%. While the species of blue-green algae 9.19 and the *Euglena* species accounted for 8.06% of the total, The *Bacillus* algae species were 52.22% of the total number of studied species. The total

number of cultured species was 54, while the green algae reached 22.06% and accounted for 5.83% of the golden algae species. Finally, the peridian algae which reached 2.61% as showed in table(2).

Table(1) Diagnosed algae	St.1	St.2	St.3	St.4
Kingdom: Monera				
Division : Cyanophycophyta				
Class: Cyanophycophyceae				
Order: Chroococales				
Family: Chroococaceae				
Genus: <i>Merismopediatenuissima</i>	*	*		*
Genus: <i>Rhabdonemaadriaticum</i>	*		*	*
Genus: <i>Microcystisaerugenosa</i>		*	*	*
Order: Oscillatoriales				
Family: Oscillatoriaceae				
Genus: <i>Oscillatorialimosa</i>	*	*	*	
Genus: <i>Oscillatoria Formosa</i>	*	*	*	
Genus: <i>Oscillatoriasubbrevis</i>	*		*	*
Genus: <i>Spirulinalaxa</i>		*	*	*
Kingdom: Protista				
Division: Chlorophycophyta				
Class : Chlorophycophyceae				

Order: Volvocales				
Family: Chlamydomonaceae				
Genus: <i>Chlamydomonas sp.</i>	*	*		*
Family: Volvocaceae				
Genus: <i>Eudorina sp.</i>	*		*	*
Genus: <i>Pandorina sp.</i>	*	*	*	
Order: Chlorococcales				
Family: Scenedesmiaceae				
Genus: <i>Scenedesmusquadricandavarmaximus</i>		*	*	*
Genus: <i>Scenedesmusacuminatus</i>	*		*	
Genus: <i>Scenedesmus sp.</i>	*			*
Family: Dictosphaeriaceae				
Genus: <i>Pediastrumgranulatum</i>		*		*
Genus: <i>Pediastrumpertusum</i>	*	*	*	*
Genus: <i>Pediastrum simplex</i>	*	*		
Genus: <i>Pediastrum simplex varduodenarium</i>		*	*	
Genus: <i>Pediastrumboryanum</i>	*		*	*
Genus: <i>Pediastrumangulostan</i>	*			*
Order: Ulotrichales				
Family: Ulothricaceae				

Genus: <i>Ulothrixsubtilissima</i>		*	*	*
Genus: <i>Ulothrixvaribilis</i>	*		*	*
Genus: <i>Ulothrixspp.</i>	*	*		*

Family: Microsporaceae				
Genus: <i>Microspora sp.</i>	*	*		*
Order: Oedogoniales				
Family: Oedogoniaceae				
Genus: <i>Oedogonium sp.</i>	*	*	*	*
Order: Zygnematales				
Family: Desmidiaceae				
Genus : <i>Closteriumacerosum</i>		*	*	
Genus : <i>Closteriumlittorale</i>	*	*	*	*
Genus : <i>Cosmariumochthodes</i>	*	*		*
Genus : <i>Cosmariumformulosum</i>	*	*		*
Genus : <i>Cosmariumportianum</i>		*	*	*
Genus : <i>Cosmarium spp.</i>	*		*	
Family: Zygnemiataceae				
Genus: <i>Mougota sp.</i>	*	*	*	*
Genus: <i>spirogyra dubia</i>	*	*	*	

Genus: <i>spirogyra neglectata</i>	*		*	*
Genus: <i>spirogyra nitida</i>		*	*	
Genus: <i>spirogyra sp.</i>		*	*	*
Division: Chrysophycophyta Class: Chrysophycophyceae Order: Chrysomonadales Family: Ochromonadaceae				
Genus: <i>Dinobryonsertularia</i>	*			
Genus: <i>Dinobryondivergens</i>		*	*	
Class: Xanthophycophyceae Order: Heterococcalies Family: Characiopsidaceae				
Genus: <i>Ophiocytiummaius</i>	*	*		*
Division: Euglenophycophyta Class: Euglenophycophyceae Order: Euglenales Family: Euglenaceae				
Genus: <i>Anisonema sp.</i>	*		*	
Genus: <i>Euglena gracilis</i>	*		*	*

Genus: <i>Euglenasanguinea</i>		*	*	*
Genus: <i>Euglena sp.</i>	*	*	*	*
Genus: <i>Phacus sp.</i>	*	*		
Genus: <i>Trachelomonashispida</i>		*	*	
Genus: <i>Trachelomonaseuchlora</i>	*			
Genus: <i>Trachelomonasvolvocina</i>		*		*
Genus : <i>Trachelomonas sp.</i>	*	*	*	
Division: Bacillariophycophyta Class: Bacillariophycophyceae Order: Centrales Family: Thalassiosiraceae				
Genus: <i>Cyclotellacomensis</i>	*	*	*	
Genus: <i>Cyclotellamenghinian</i>	*	*	*	*
Genus: <i>Cyclotellaocellata</i>		*		*
Genus: <i>Cyclotella sp.</i>			*	*
Genus: <i>Coscinodiscusovalis</i>	*		*	*
Genus: <i>Coscinodiscus ssp.</i>	*	*	*	
Genus: <i>Triceratiumamoenum</i>		*		*

Genus: <i>Actinocyclusoctonarius</i>		*	*	*
Genus: <i>Actinocyclus sp.</i>	*	*	*	
Genus : <i>Actinoptychus sp.</i>	*	*	*	
Family: Melosiraceae				
Genus: <i>Melosira undulate</i>	*	*	*	
Genus: <i>Melosiravarians</i>	*		*	*
Genus: <i>Melosiraspp.</i>			*	*
Family: Cymbellaceae				
Genus: <i>Amphora marina</i>	*	*		
Genus: <i>Amphora bioculata</i>		*	*	*
Genus: <i>Amphora sp.</i>		*	*	
Genus: <i>Amphicapa sp.</i>	*		*	*
Genus: <i>Aulacoseirasubarctica</i>	*	*	*	*
Genus: <i>Aulacoseirainslandica</i>		*	*	*
Genus: <i>Cymbellasturii</i>	*	*	*	*

Genus: <i>Cymbellatumidula</i>	*		*	
Genus: <i>Cymbellacistula</i>	*			*
Genus: <i>Cymbellaaffinis</i>		*	*	
Genus: <i>Cymbellaventricosa</i>		*	*	*
Genus: <i>Cymbella sp.</i>	*	*	*	
Genus: <i>Gomphonemaventricosm</i>	*	*	*	*
Genus: <i>Gomphonema sp.</i>	*		*	
Genus: <i>Bacillariapaxillifer</i>		*		
Family: Navicullaceae				
Genus: <i>Caloneis amphisbaena var. subsalina</i>	*		*	
Genus: <i>Diploniespulla</i>		*	*	
Genus: <i>Gyrosigma hippocampus</i>		*	*	*
Genus: <i>Gyrosigmaacuminatum</i>	*	*		*
Genus: <i>Gyrosigma spp.</i>	*	*	*	
Genus: <i>Mastogloia ovum</i>		*		

			*	*
Genus: <i>Naviculahallophila</i>	*	*		
Genus: <i>Naviculacryptocephala</i>		*	*	*
Genus: <i>Navicularhyncocephala</i>	*	*		
Genus: <i>Naviculatripunctata</i>		*	*	
Genus: <i>Naviculaelginensis</i>	*		*	
Genus: <i>Naviculalaceolat</i>			*	*
Genus: <i>Naviculacapitata</i>	*	*		*

Genus: <i>Navicula spp.</i>	*			*
Genus: <i>Pinnulariaviridis</i>	*	*	*	*
Genus: <i>Pinnularia sp.</i>		*		
Genus: <i>Rhoicospheniacurvata</i>	*		*	
Family: Surirellaceae				
Genus: <i>Cymatopleuraelliptica</i>	*	*		
Genus: <i>Cymatopleurasolea</i>		*		
Genus: <i>Surirellalineaeis</i>	*	*	*	*
Genus: <i>Surirellarobusta</i>	*		*	*
Genus: <i>Surirella spp.</i>			*	*

Family: Fragilariaceae				
Genus: <i>Diatomavulgare</i>	*	*	*	*
Genus: <i>Fragilariacrotonesis</i>	*		*	
Genus: <i>Fragilariacapucina</i>		*	*	*
Genus: <i>Fragilaria sp.</i>	*	*	*	*
Genus: <i>Fragilariaopsis sp.</i>			*	*
Genus: <i>Meridioncirculare</i> var. <i>constrium</i>	*	*		
Genus: <i>Asterionellaformosa</i>	*	*	*	
Genus: <i>Asterionella sp.</i>	*			
Genus: <i>Syndracapitata</i>		*	*	*
Genus: <i>Syndra ulna</i>	*	*	*	*
Genus: <i>Syndra ulna</i> var. <i>contracta</i>	*	*	*	
Genus: <i>Syndrabacillaris</i>			*	*
Genus: <i>Syndra spp.</i>	*	*		*
Genus: <i>Neosynedra sp.</i>		*	*	*
Genus: <i>Tabellariafenestrata</i>		*		
Genus: <i>Tabellariaflocculosa</i>		*	*	
Genus: <i>Tabellaria sp.</i>	*	*		*
Family: Nitizhiaceae				
Genus: <i>Nitizchiavermicularia</i>		*	*	*

Genus: Nitizchiasigmoidea	*	*	*	
Genus: <i>Nitizchia sp.</i>	*	*		
Genus: <i>Rhopalodiagibba</i>	*	*	*	*
Division: Pyrophyphyta				
Class: Dinophycophyceae				
Order: Peridinales				
Family: Peridiniaceae				
Genus: <i>Peridinium spp.</i>	*		*	

Sections of algae	Classes	The ratio %	Order	The ratio %	Family	The ratio %	Genus	The ratio %	Kind	The ratio%
Cyanophycophyta	1	٥٧.١٣	2	.١٠ ٢٥	2	٥٣.٨	5	١٩.٩	7	٧٤.٦
Chlorophycophyta	1	.28٥1	5	43.75	9	.3١4	12	٥٦.٢2	28	6٩.٥2
Chrysophycophyta	2	٢٨28.	٢	.75٧1	٢	٦٩11.	2	.83٥	٣	6٦.٣
Euglenophycophyta	1	14.28	1	.25٧	1	.84٤	4	8.06	٩	.4٦
Bacillariophycophyta	1	.28١١	١	.5٣1	٧	.76٢٩	30	.22٥٢	71	56.29
Pyrophyphyta	1	.28٧1	1	.5٧	1	3.84	1	.61٢	1	٩٢0.
Totall	7		12		22		54		119	

Table (2) Sections of the registered algae and the number of varieties, grades, families, species and species and their percentages during the study

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