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Diversity of fresh water algae in some side of Green Mountain

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Diversity of fresh water algae in some side of Green Mountain

Abstract

The present study was carried out during spring 2016 , The water samples have been collected from nine locations at green mountain in east Libya. Twenty nine genera of algae were identified from all site of sample ; 7 genera(7 species) belong to blue-green algae;13 genera(14 species) to Chlorophyta ; 9 genera(9 species) to diatoms. The species encountered in high frequency of occurrence was *Chlorella vulgaris* (chlorophyta) .However Scenedesmus acuminatus, Chlamydomonas *rehindtii* (chlorophyta), *Phormidum* sp (cyanophyta) ,*Diatoma* sp(diatoms) were moderate frequency while *Chloroccum humicola*, *Odogonum* sp, *Pandorina* sp and *Nitzichia palea* were low frequency .the blue-green algae represented by *Ananbaena circinalis*, *Gelocapsa* sp, Microcystis sp, Oscillatoria sp,*Rivularia* sp(chlorophyta) represented by *Pediastrum* sp, *Spirogyra*, *Ulothrix*, *Zygnema*, *Zygonium*,(diatoms) represented by *Fragellaria* sp, *Hanizichia* sp, *Melosira* sp, *Pinularia lata*. *Surirella* sp, *Synedra* sp were rare frequency.

Key words:- Algae, abundance, dominance. Blue-green, diatom, green algae.

Introduction

Algae (Algae) is a set of cryptogram plants Althaloseh, too numerous mixed installation, the simplest is a single cell, while the bulk of them multi-cell, consisting of more than 22 thousand mostly of a real nucleus Eukaryotic organisms type and living algae in fresh and salt water and soil (Vantkatarman , 1969; Anagnostidis and Komárek, 1988).

Subdivisions built algae on the types of pigments in them and also on other vital qualities and which types of carbohydrates stored products, and components of the cell wall as well as the types of the whip, if any. The advantage of algae its proximity to the pigment chlorophyll and other pigments so they are self-feeding (Autotrophs) any you build carbohydrates from carbon dioxide CO2), water and energy from the sun with the help of chlorophyll pigments assistance, which conducts photosynthesis (Photosynthesis) and Adam et al. 1990) Bold, 1973).

And the importance of algae can each are listed in the following areas:

Biological Importance .The importance of bio-algae in it represents the first link in the food chain and the environment provide the algae with oxygen.

Medical Importance important uses such as algae alga *Chlorella* in the extraction of an antibiotic called chlorellin (Issa, 1999) as it extracted from the alga Laminaria substances called Balalginat (Algeins) used in dentistry.

Industrial importance Industrial Importance extracted from some red algae Ktahlb Geildium material agar agar, which are used in the food industry circles used in laboratories around prolific Almikrubiolchih and medical.

Algae as food Edible Forms a lot of the world's population uses algae as food Including alga *Spirulina* alga *Chlorella.*

There are several factors that affect the distribution of algae in open water is the most important of these factors and natural illumination intensity as some algae found in the surface layer up to 5 meters down and called this region (Photic-zone) and in this region there are algae and plant know Balhaimat (Phytoplankton) and these need to ventilation and lighting down there Euglinophyta algae that prefer less Lighting third layer is where there are algae are caught on the bottom (Aphotic-zone), factor other influential is the temperature where he found that green algae prefer a temperature of 10-15m ◦ algae Bacillus prefer a degree of 15-20 M◦ while the blue-green algae prevail in temperatures of 25-35 M◦, also affects No. pH (PH) on the distribution of algae as the most algae prefer PH 6-7, but some algae the acidic prefer and some prefer the center basement.

Chemical factors also play an important role in the distribution of algae, a nutrient group present in the aquatic environment of algae that live in fresh water Fresh Water Algae For example, the element carbon need algae in the form of CO2 as it is in the process of photosynthesis, and this applies to most algae, but some can be used organic carbon, and nitrogen is essential for all metabolic processes element of algae and algae can take nitrogen in various as nitrate and nitrite or in the form of ammonia and the blue-green algae the ability to nitrogen fixation . Ranging from the amount of nitrogen in the green algae 5/6 to 5/8 of the dry weight, generally, most algae live in the surface waters where nitrogen ratio ranging from 0.3-8.7 mg / l.

The phosphorus component of the essential nutrients for algae ranges appropriate focus for growth of 9.8 to 8.17 mg / l The lack of this element leads to a lack of compounds containing it, such as ATP, NADP and this affects cell division, calcium is an absolute element in the growth of algae, but many of algae you do not need to this element and its importance due to being included in the installation of the central plate and regulate the entry and exit of ions.

Silicon is important for the growth of diatoms is an absolute element for its entry in the cell wall installation, as you need algae iron because it plays a role in the transfer of electrons and chelating of toxic compounds within the cell, but the growth is ideal for algae to be the availability of micronutrients represented in Mn, Zn, Bo, Ga and others.

Materials and Methods

Description of the study sites

The present study was achieved during spring 2016 , The water samples has been collected from nine locations at green mountain in east Libya, sample (1) The first sample: Take this sample from Beer Zenady, sample (2) A cave beside Beer Zenady,(3) from Grenada ,sample (4) stream at the entrance of the ancient Cyrene , sample (5) Basin at the entrance of the ancient Cyrene ,sample (6) open reservoir at the ancient Cyrene, sample (7) spring of Apollo ,sample (8) taken from the road between Cyrene and Al beida ,(9) taken from Labrak.

Identification of Algae

Bring samples to the laboratory in plastic Gallons 5 liter during 4 hours and perform deposition sampling process Sedimentation by putting it in the laboratories listed capacity of 1 liter and left for three days until the precipitate and then pull the upper part of the sample until the volume up to 50 ml, reservation samples in flasks conical for the purpose of examination and counting agriculture, and deposition is part of the samples by adding material Lugol's Iodine and consists of 1 gram of Iodine and 2 grams of Potassium Iodide in order to differentiate between algae that store starch and those that do not store it as it is done within the taxonomic characteristics and will be the definition of algae action segments from each sample and examined the optical microscope (Light Microscope) and will adopt a scientific basis in the classification, which Althallus form and nature of the cell wall and dyes and flagella and the nature saver food in addition to the volume of moss cell-volume and on these grounds were divided algae to the ranks, ranks, families, genera and the types of using special keys to the definition of algae and fresh water listed in the references (Vankatarman, 1969; Hortbagi, 1973; Lee, 1980; Pentecost, 1984). And then calculate the percentage of appearance of moss Occurrence Remarks during the seasons of the study is the proportion of algae divided into:

- algae prevalent Abundance represents a ratio of 75% to 100%.
- algae frequent Dominate represents the ratio of 50% to 74%.
- few algae appearing Low represents a ratio of 25% to 49%.
- algae rare Rare and represents the ratio of 1% to 24%.

Isolation and Cultivation of Algae

The use of three Media for the development of algae (Table 1), namely:

Rippka and Herdman (1993) and this medium was used to isolate the blue-green algae Chu, 1942)) [Chu 10] was used to isolate green algae

[Bolds Basal Medium] (Bischoff and Bold, 1963) was used to isolate Bacillus algae or green algae yellowed these components harden when you add 15 grams of agar per liter and sterilized by the sterilizer model .Osprey70L Unit-Program Autoclave J 8051Jdot Installation of the food used in the study circles

A- Rippka and Hardman (1993)

$NaNO_3$ 1.5G/L, $K_2HPO_4$0.04g/l, $MgSO_4.7H_2O$ 0.075g/l, $CaCl_2.2H_2O$ 0.036g/l, Citric acid 0.006g/l, Ferric ammonium citrate 0.006 g/l, EDTA (disodium-salt) 0.001g/l, Na_2CO_3 0.02 g/l, Micronutrient solution 1ml, Distilled water One liter.

B- Chu 10 (Chu 1942): $Ca(NO_3)_2$ 0.04g/l, K_2HPO_4, 0.01g/l,$MgSO_4.7H_2O$ 0.025g/l , $Na_2CO_3$0.02g/l, $Na_2SiO_3.5H_2O$ 0.025g/l, $FeCl_3$0.0008g/l .

C-Bolds Medium: $NaNO_3$

10g/l,$CaCl_2.2H_2O$ 1g/l, $MgSO_4.7H_2O$ 3g/l, $K_2HPO_4$3g/l, $KH_2PO_4$7g/l, NaCl 1g/l.

To 490 ml distilled water, add 10 ml of each stock solution and 1 ml of each of the stock trace-element solution which prepared as follows:

1- 50g EDTA and 31g KOH dissolved in 1 liter of acidified water (or 50g Na_2EDTA).
2- 4.98g $FeSO_4.7H_2O$ dissolved in 1 liter of acidified water (1ml conc. H_2SO_4 in 1 liter of distilled water).
3- 11.42g H_3BO_3 dissolved in 1 liter of distilled water.
4- 8.82g $ZnSO_4.7H_2O$; 1.44g $MnCl_2.4H_2O$; 1.57g $CuSO_4.5H_2O$ and 0.49g Co $(NO_3)_2.6H_2O$ were dissolved in one liter of distilled water.

The cultivation of algae has to take 1 ml of the sample and grown in Petri dishes (Petri-dishes) contain three types of food circles previously mentioned in a sterile place beside the flame and shall move the dishes in a circular motion to ensure the spread of the sample and placed in a growth chamber Growth Chamber . This is the cultivation of three replicates of each sample at room temperature and under 25 M◦ lighting 4000LUX appreciation was connected LX101LUXMeter and form 4b illustrates some of the pure isolates.

After the algae growth has been the work schedules for each of the defining promise of algae and knowledge divided and isolated the algae into the following sections:

- Cyanophyta blue-green algae
- Chlorophyta green algae
- Euglenophyta algae
- Bacillariophyta algae Bacillus
- Dinophyta Dinophlagelate algae.

Results

The study showed that green algae were more visible in representative samples of the study areas, followed by algae Bacillus were the least visible blue-green algae and green algae showed great diversity represents thirteen genera of algae followed algae Bacillus represented in nine races algal was the least versatile blue green algae table (1) . Calculates the ratio of sovereignty in the areas of representative samples of the study was the green alga *Chlorella* was abundance while the green algae, *Scenedesmus*, *Chlamydomonas* and Diatom of the genus *diatoma* were dominance.

while the green algae Chloroccum, Odogonum, Pandorina and Diatom Nitzichia showed

few appearances, The blue-green algae *Ananbaena*, *Gelocapsa*, *Microcystis*, *Mirimopedia*, *Oscillatoria* and the green algae *Ankistrodesmus*, *Closterium* , *pediastrum* ,*Spirogyra*,*Ulothrix*, *Zygnema*, *Zygonium* . and Diatoms represented in *Fragellaria*,*Hanizichia*,*Melosira*,*Navicula*,*Pinularia*,*Surirella*,*Synedra* Classified as rare appearance algae in representative samples of the study areas, as shown in the table (2)

Table (1) distribution of algae in three groups in the samples

Algal taxa	S 1	S 2	S3	S4	S5	S6	S7	S8	S9
Cyanophyta									
Ananbaena circinalis									
gelocapsa	-	-	-	-	-	+	-	+	-
Microcystis holsatica	-	-	-	-	+	-	-	+	-
Mirimopedia	-	+	-	-	-	+	-	-	-
Oscillatoria tenuis									
Phormidum favosum	+	-	+	+	-	+	+	-	-
Rivularia sp	-	-	-	+	-	-	-	-	+
Mirimopedia gluca	-	+	-	-	-	+	-	-	-
Chlorophyta									
Ankistrodesmus falcatus	-	-	-	-	-	+	-	-	+
A monoraphide	-	-	-	-	-	+	-	-	-
Chlorella vulgaris	+	+	-	-	+	+	+	+	+
Chloroccum humicola	-	-	-	+	-	+	+	-	+
Chlamydomons rehindtii	+	+	-	+	-	-	+	-	+
Closterium sp	-	-	-	+	-	-	-	-	+
Odogonum sp	-	-	-	+	-	+	+	+	-
Pandorina sp	-	-	-	+	-	+	-	-	+
Pediastrum sp	-	-	-	-	+	-	-	+	+
Scenedesmus acuminatus	-	+	-	-	+	+	+	-	+
Spirogyra sp	+	-	-	-	-	-	-	-	+
Ulothrix sp	-	-	-	-	+	-	-	-	+
Zygnema sp	-	-	-	-	-	-	-	-	+
Zygonium sp	-	-	-	-	-	-	-	-	+
Diatoms									
Diatoma sp	+	-	+	+	-	-	+	-	+
Fragellaria sp	+	-	-	-	-	-	+	-	-
Hanizichia sp	-	-	-	-	-	-	-	-	+
Melosira sp	+	-	-	-	-	-	-	-	-
Navicula lanceolata	-	-	-	-	-	-	-	-	+
Nitzichia palea	-	-	-	-	-	+	-	+	+

Pinularia lata	+	-	-	-	-	-	-	+	+
Surirella	-	-	-	-	-	-	-	-	+
Synedra	+	-	-	-	-	-	+	-	-
Stephanodiscus	-	-	-	-	-	-	-	-	+

Table (2) Occurrence remarks (O.R) of algal genera in water samples

Genera	**Time of appearance**	**Percentage**	**O.R**
Cyanophyta			
Ananbaena circinalis	1	11.1%	**R**
Gelocapsa sp	2	22.2	**R**
Microcystis holsatica	2	22.2	**R**
Mirimopedia gluca	22.2	22.2	**R**
Oscillatoria tenuis	2	22.2	**R**
Phormidum favosum	5	55.6	**D**
Rivularia	1	11.1	**R**
Chlorophyta			
Ankistrodesmus falcatus	2	22.2	**R**
A. monoraphide	1	11.1	**R**
Chlorella vulgaris	7	77.8	**A**
Chloroccum humicola	4	44.4	**L**
Chlamydomonas rehindtii	5	55.6	**D**
Closterium sp	2	22.2	**R**
Odogonum sp	4	44.4	**L**
Pandorina sp	3	33.3	**L**
Pediastrum sp	1	11.1	**R**
Scenedesmus acuminatus	5	55.6	**D**
Spirogyra	2	22.2	**R**
Ulothrix	2	22.2	**R**
Zygnema	1	11.1	**R**
Zygonium	1	11.1	**R**
Diatoms			
Diatoma	5	55.6	**D**

Fragellaria	2	22.2	**R**
Hanizichia	1	11.1	**R**
Melosira	1	11.1	**R**
Navicula lanceolata	1	11.1	**R**
Nitzichia palea	3	33.3	**L**
Pinularia lata	2	22.2	**R**
Stephanodiscus sp	1	11.1	**R**
Surirella sp	1	11.1	**R**
Synedra sp	2	22.2	**R**

Discussion

Twenty nine genera of algae were identified from all site of sample ; 7 genera(7 species) belong to blue-green algae;13 genera(14 species) to Chlorophyta ; 9 genera(9 species) to diatoms. The species encountered in high frequency of occurrence was *Chlorella vulgaris* (chlorophyta) .However Scenedesmus acuminatus, Chlamydomonas *rehindtii* (chlorophyta), *Phormidum* sp (cyanophyta) ,*Diatoma* sp(diatoms) were moderate frequency while *Chloroccum humicola*, *Odogonum* sp, *Pandorina* sp and *Nitzichia palea* were low frequency .the blue-green algae represented by *Ananbaena circinalis*, *Gelocapsa* sp, Microcystis sp, Oscillatoria sp,*Rivularia* sp(chlorophyta) represented by *Pediastrum* sp, *Spirogyra*, *Ulothrix*, *Zygnema*, *Zygonium*,(diatoms) represented by *Fragellaria* sp, *Hanizichia* sp, *Melosira* sp, *Pinularia lata*. *Surirella* sp, *Synedra* sp were rare frequency. Perhaps this indicates that the presence of a few nutrients and thus the degree of purity of the water in the selected areas of study in this research and a high-temperature in the spring which leads to increased chemical and physical factors this in turn leads to increased diversity of diatoms and green algae. We are agree with the results obtained by Davis. (1964) and Diaz Pardo (1998) they found Thermal behaviour was found to influence both physical and chemical features A high concentration of nitrates and phosphates occurred at the beginning of the stratification period and decreased toward late stratification. During the overturn period these nutrients increased. These dynamics affected the phytoplankton assemblage because bacillariophyceans and chlorophyceans were dominant in early stratification. in addition to found both Andersonand Rippey(1994) that diatom and geochemical responses to reduced nutrient loading were followed in a small, monomictic eutrophic lake in Northern Ireland. On the other hand, instead of the little representation of a group blue-green algae on the degree of purity of good water because it is considered an indication of the presence of organic materials (El Ayouty .etal(1999).

Conclusion

this study investigated the natural diversity of algae in some side of green mountain and observed the biggest diversity in the study area was green algae followed by diatom then the blue-green algae. Findings of this research study will assist to do another research on this subject including use the algae as indicator of pollution of water.

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