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# Investigation and Determination of Further Algae Species in Aquatic Area Of Samawah Province

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**Abstract:**
The great environmental importance of algae is formed of so many basis of food chains. This study aims to reveal about certain properties for further of algae in Sawa Lake. The study was the first of its kind on the waters of Sawa Lake, about the algae and its affected by the Physical and chemical properties of Sawa Lake water. Water samples were collected during winter and spring in 2017 from four sites around Sawa Lake. Algae samples were collected from the surface and then the qualitative and quantitative study of the algae found in the water was conducted. The results showed that diatoms or bacilli were predominant, followed by green and blue algae, and recorded a new type of algae which not previously recorded in Iraq (New Record). In conclusion the current study shows that algal growth is increasing in the spring season due to the increase in the activity of analyzers in this season.

**Kewords:** Sawa lake, Algae, chemical and physical properties, Iraq.

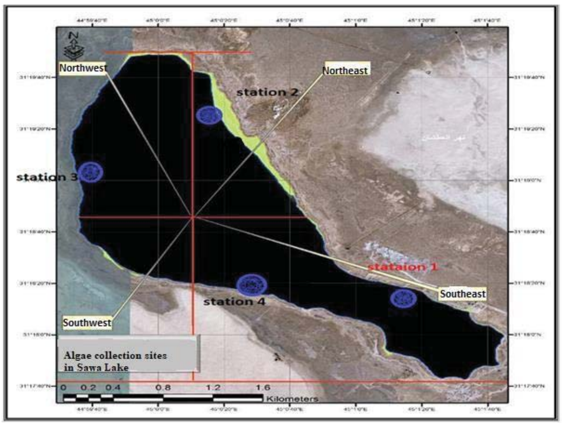
**Introduction:**

Algae are a various group of aquatic organisms that have the ability to conduct photosynthesis [1]. Algae are affected by the physical and chemical properties of water due to the amount of pollutants present in the water [2]. Algae can be defined as a thalocytes (plants lacking roots, stems and leaves) that are characterized by chlorophyll as a major dye of photosynthesis and lack the cover of sterile cells around their reproductive organs. This definition includes a number of plant forms that are not necessarily in close association with, for example, blue-green cyanobacteria that are closer in their evolution to the bacteria than the rest of the algae [3]. Dissolved oxygen is an important factor for the breathing of plant and animal aquatic organisms that has an important role in the metabolic processes of all living organisms [4]. It is a determining factor for the growth of many aquatic organisms [5]. There are many factors that control the rise of dissolved oxygen in water, such as photosynthesis and temperature. High temperatures reduce the concentration of dissolved oxygen in the water, and bacteria consume dissolved oxygen to dissolve organic matter [6]. In addition, nitrogen is a key element in algal growth. Also, it has an important role in cell division and certain metabolic functions such as building fatty acids and proteins in algal cells [7]. Nitrogen is found in the nature in several non- organic forms, including $NO^{-3}$, $NO^{-2}$ and $NH^{+4}$, as well as in organic forms such as algae and high-end aquatic plants [4]. Also, Phosphorus is an important element in the environment, as it is a determinant of the survival of the biological cycle in the nature because phosphorus is an important life component in the energy transmission devices in the living cells. In the event of a decrease in this element, it reduces the initial productivity [8].

Materials and Methods

Water samples were collected during winter and spring in 2017 from four sites in Sawa Lake (map 1). The physical and chemical properties of the lake water were included. Also, the algae samples were collected from the surface by using the means of a 45 micron algae collection network. These samples were placed in 25 $cm^3$ bottles and then 10 $cm^3$ distilled water with 4-5 drops of Lugols iodine Solution was added as a preservative from melting 15 gm of Iodine in
200 $cm^3$ of distilled water, then adding 20 gm of potassium iodide and 20 $cm^3$ of ice acetic acid were added. After that, the solution was left for several days before using [9]. The qualitative and quantitative study of the algae in the water was measured.

The number of non-diatomic algae cells were calculating one or more drops of the sample were applied after shaking well on the surface of each of the two slices of the counting slice and then placed the slide cover for a few minutes to settle the cells [10]. The final product is expressed by the number of cells in 1$cm^2$ of water sample in the field using the conversion coefficient as follows:
Number of cells calculated in 1 $cm^2$ = number of cells calculated in one cross-section ×
conversion factor of the concentrated sample
Conversion factor = number of sectors in 1$cm^3$ of concentrated sample × sample concentration factor
Number of cross-sections in 1 $cm^3$ of concentrated sample =1000 $mm^3$
Concentrated sample size in one transverse sector 1$mm^3$.
Original sample size in the cross-section $mm^3$ = Area $mm^2$ × 0.1mm (Depth of the lobby)
The blue-green algae were calculated as one unit, while each cell of algae, green, and other algae one unit [11]. The micro transect method was used to calculate the number of diatomic algae cells by the preparation of the permanent slices [12].




**Map (1) Algae collection sites in Sawa Lake**

**Results and Discussion:**

1. Physical and Chemical Properties of Sawa Lake water.

1.1 In the current study the air and water temperature values showed clear seasonal changes, which reached the lowest values in winter as shown in Fig. (1). This is due to the nature of Iraqi climate, which is characterized by a large temperature difference according to the seasons of the year [13].

30
20 **winter spring**
10
Site 1 site 2 site 3 site 4

**Mean water temperature**

**Examined site**

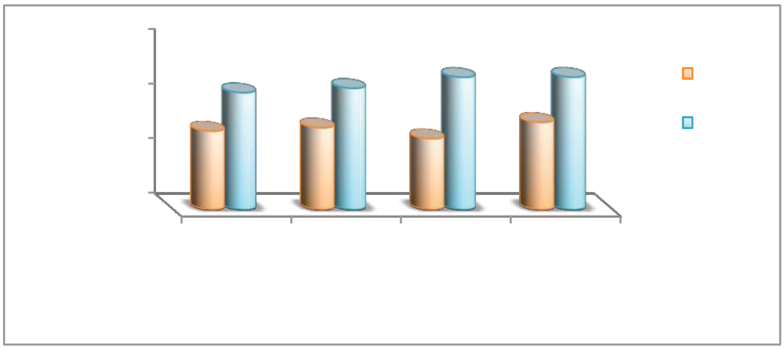


**Figure (1). Shows the temperature of Sawa Lake water**

1.2 pH: Rising of water levels, increase discharge rate and increase rainfall has led to lower pH values [14].

1.3 Electrical conductivity and salinity: the present study indicates that the salinity and conductivity values recorded in the spring are low, this possibly because of the high water levels in that period, as they reduce salts. The highest salinity and conductivity values during the winter may be caused by a large amounts of soil on the banks of the lake during the rainy season. These soils may be loaded with salts and thus affect the values of the electrical conductivity [15].

1.4 Dissolved Oxygen: the results of measuring dissolved oxygen showed seasonal variation, with the highest winter rates of 13.4 mg /l. This may be due to the fact that cold water has a greater ability to dissolve larger amounts of gases, such as oxygen compared to hot water [4]. The lowest concentration of dissolved oxygen in spring (2) may be due to higher temperatures leading to increased activity of microorganisms in organic matter decomposition, may be to increased oxygen consumption [16].

10
**Winter**
5 **Mean D.O. value** **spring**
0
Site 1 site 2 site 3 site 4

**Examined site**

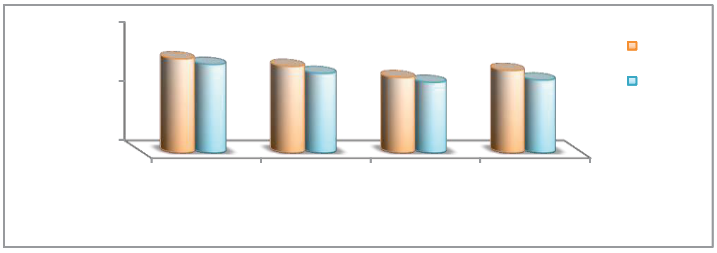


**Figure (2) Shows the dissolued oxygen values of samples during in Saw Lale water**

2- Plant Nutrients: seasonal and situational variations of total nitrogen values were recorded due to temperature variations and decomposition Figure (3).

2
**Winter** **Mean NO2 value** **spring**
**1**

**0**
Site 1 site 2 site 3 site 4

**Examined site**

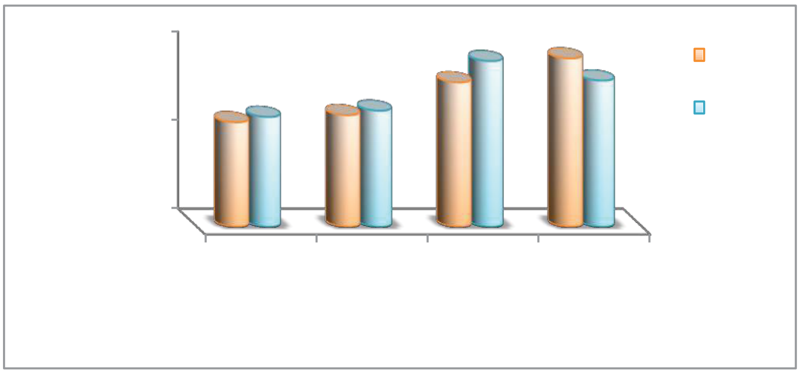


**Figure (3). Shows the values of nitrates during the two seasons in Sawa Lake**

3- Phosphorus: the results showed that total phosphorus concentrations decreased during the spring season in Sawa Lake and may be due to increased phosphate and nutrient uptake by phytoplankton resulting in less concentrations of the phytoplankton (Figure 4).

3
**Winter**
**2**

**spring**
1

0
Site 1 site 2 site 3 site 4
**Examined site**

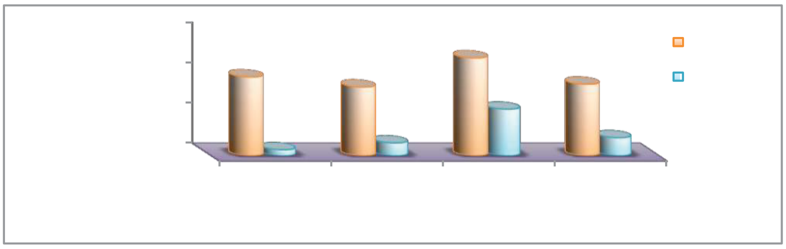


**Figure (4). Shows the values of phosphorus during the two seasons in Sawa Lake**

3- Phytoplankton: species are belonging to the bacterial algae which have predominance compare with other species of algae in various study sites. This is due to the ability of bactericidal algae to grow and reproduce in a wide range of environmental changes such as temperature, light intensity, plant nutrients and the rapid changes in chemical and biological factors [17]. As well as, their ability to grow in different types of aquatic environments [18]. The class of blue green algae came second only to the diatom category in this study, and the predominance of this variety on the green algae species is consistent with many studies in the water bodies [19]. Followed by blue-green algae (Fig. 5).

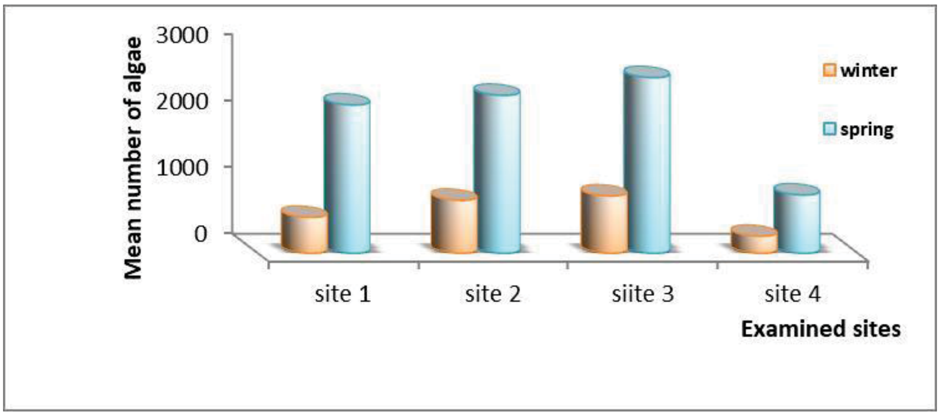



**Figure (5). Shows the algae ratios in Sawa Lake**

In conclusion the current study shows that algal growth is increasing in the spring season due to the increase in the activity of analyzers in this season, which analyze the complex organic compounds into simple compounds (Table 1).

**Table (1) shows the types of phytoplankton in Lake Sawa during the period of study (+exists) / (_ does not exist)**

| TAXA | Station 1 | Station 2 | Station 3 | Station 4 |
|---|---|---|---|---|
| **Cyanophyceae** | | | | |
| *Chroococcidiopsis indica (New record)* | - | - | + | - |
| *Oscillatoria anguina* **(Bory) Gomont** | - | - | + | + |
| *Spirulina laxissima* **G. S. West** | - | - | + | - |
| **Euglenophyceae** | | | | |
| *Phacus* sp. | - | + | + | - |
| **Dinophyceae** | | | | |
| *Ceratum* sp. | - | + | + | + |
| *Peridinium* sp. | + | - | + | - |
| **Bacillariophyceae** | | | | |
| **Centrales** | | | | |
| *Aulacoseira ambigua* **O.Muller** | + | + | + | + |
| *Coscinodiscus lacustrs* **Grunow** | + | - | + | + |
| *Cyclotella comta* (Ehr.) **Kuetzing** | + | + | + | - |
| *Stephanodiscus astrea* (Ehr.) **Gran.** | + | - | - | - |
| **Pennales** | | | | |
| *Achnanthes affinis* **Grunow** | + | + | - | + |
| *Amphora normanni* **Rab.** | + | - | - | - |
| *Anomoeneis vitrea* (Grum.)**Ross** | - | + | - | + |
| Bacillaria paxilifer (Muell.) **Hendey** | + | - | - | + |
| Caloneis permagana (Bail. ) **Cleve** | - | + | - | + |
| Cocconeis diminuta **Pantocsek** | + | + | - | + |
| Denticula elegans **Kutz.** | + | - | - | - |
| Diatoma elongatum (lyngb) **Agardh** | + | + | + | + |

| | | | | |
|---|---|---|---|---|
| | | | | |
| Fragilaria brevistriata **Grounw** | + | + | - | - |
| Gomphonema olivacea (Lyngbye) Dawson **Ehrenberg** | + | - | - | + |
| Navicula americana **(Ehr.)** | + | - | - | + |
| Pinnularia appendiculata **(Ag.)** **Cleve** | - | - | + | - |
| Rhoicosphenia curvata **(Ktz.) Grunow)** | - | - | + | - |
| **Chlorophyceae** | | | | |
| Chlamydomonas sp | - | + | + | - |
| Chlorella ellipsoidea **Gerneck** | + | - | - | - |
| Scenedesmus abundans **(Kirch.)** Chodat | + | - | - | - |
| S. bijuga **(Turp.) Lagerheim** | - | - | + | - |
| S.quadricauda **(Turp.) de Brebisson** | - | + | + | - |
| Spirogyra crassa **Kuetzing** | + | - | + | - |
| Tetraedron minimum (**A. Branum)** Hansgirg | + | + | + | + |

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