Phytoplanktonic biomass as an indicator of certain Physico-chemical characters of El Rayah El Tawfiky delta Nile, Egypt

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Abstract:

El Rayah El Tawfiky is one of the main sources of water supply for 3 governments in the Nile delta, Egypt. The investigation was carried out on the relationship between some physico-chemical parameters and phytoplankton biomass of El Rayah El Tawfiky in the Nile delta, Egypt. Water and phytoplankton samples were collected seasonally from five stations along El Rayah El Tawfiky (from Kafr Moeys in Banha city to Aga in El-Mansoura city) for one year (from October 2018 to September 2019). The highest water temperature was recorded in the spring season, whereas the lowest degree was recorded in the winter season. The pH values of water in El Rayah El Tawfiky at all stations ranged from slightly alkaline to alkaline. There was a wide range in the degree of turbidity during the seasons. There was a relative increase in the nitrite, nitrate, and Orthophosphate contents during the winter. The detected phytoplankton community consisted of 132 species of five systematic algal divisions (Chlorophyta, Bacillariophyta, Cyanophyta, Pyrrophyta, and Euglenophyta). Qualitatively, Chlorophyta was the dominant division followed by Bacillariophyta, Cyanophyta, Euglenophyta, and Pyrrophyta. On the other hand, the quantitative study showed that Bacillariophyta was the most dominant division, followed by Chlorophyta, Pyrrophyta, and Euglenophyta. The highest biomass was recorded during the winter, this may be related to the presence of excess nutrients especially orthophosphate, nitrate, and nitrite during this season. Additionally, the lowest biomass was recorded during the spring; this may be attributed to the presence of small amounts of nutrients and an increase in water turbidity. Moreover, the current study revealed that there were different relationships between total phytoplankton biomass and physico-chemical parameters. Phytoplankton biomass had a positive relationship with nitrite, and orthophosphate meanwhile a negative relationship with temperature. Moreover, there was a very strong positive relationship between nitrate and Cyanophyta and also a very strong positive correlation between Euglenophyta and ammonia concentrations. Phytoplankton biomass is regarded as an easy and useful indicator means to assess the quality of freshwater ecosystems.

Keywords: Phytoplankton, Biomass, Bioindicator, Physico-chemical analysis, El Rayah El Tawfiky.

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Introduction

Water is the most important natural source of life. One of the most important needs of society is secure water resources **(Uduman *et al*., 2010),** and providing safe drinking water is very important to reduce the incidence of water transmissible diseases **(Shehata *et al*., 2008)**. In Egypt, the Nile River is considered the main source of freshwater. At El Qanater city, the Nile River bifurcates into two main branches (Damietta and Rosetta branches) and four Rayahs (El Rayah El Tawfiky, El Rayah El Monoufy, El Rayah EL Behery, and El Rayah El Nasery) **(Abeer, 2016)**.

The biological indicator is the use of living organisms to determine the presence, amounts, changes in, and effects of physical, chemical, and biotic factors in the environment**.** A combination of biological studies and physico-chemical data for assessing water quality is more informative than using physico-chemical data alone (**El-Naggar *et al*., 2002**). Organisms such as (bacteria, fungi, zooplankton, and microalgae or phytoplankton) are frequently used to study the severity of ecosystem changes (**Gaston, 2000; Marques, 2001**). One of the most important features of phytoplankton (algae) is that it can be used as a good indicator of the quality of water as they reflect the average ecological condition of the water body (**Badr El-Din *et al*., 2015)**. The free-floating behavior of phytoplankton gave the chance for the community composition to change in response to environmental conditions **(Hare *et al*., 2007)**. These variations depend mainly on the type and nature of the water area itself as well as the runoff of minerals and chemicals from agricultural soils. Moreover, the physico-chemical properties and nutrient status of the water play an important role in the production of phytoplankton, which is essential in maintaining productive aquatic organisms **(Kumar and Sahu, 2012)**. Algae are ideally suited for water quality assessment because they have rapid reproduction rates and very short life cycles that make them good indicators of short-term impacts. As primary producers, algae are most directly affected by physical and chemical factors. Algal assemblages are sensitive to some pollutants and they readily accumulate pollutants, algal metabolism is also sensitive to the variation of environmental and natural disturbances. They are easily cultured in the laboratory and sampling is easy, inexpensive, and creates minimal impact on resident biota. (**Stevenson and Lowe, 1986; Rott, 1991; Round, 1991; McCormick and Cairns, 1994; Van Dam *et al.*, 1994)**.

Measurement of algal biomass is common in many river studies and may be especially important in studies that address nutrient enrichment or toxicity. High nutrient concentrations can affect water users when the nutrients produce dense growths of algae, this affects the quality of water in terms of health and aesthetics **(Eaton *et al.*, 2005).** Many studies had been carried out on the Nile River, and its branches. Most of these studies are concerned with the state of the water quality such as **Abdel-Hameid *et al.* (1992), Abdel-Aziz (2005), Mansour *et al.* (2005), and El Bouraie *et al.* (2011).** Additionally, many studies dealt with the relationship between freshwater algal biomass and the physico-chemical characteristics of different water resources in Egypt **(Deyab *et al.*, 2019; Mohamed *et al.*, 2020)**. However, no previous works were concerned with the algal biomass of El Rayah El Tawfiky and its relation to other ecological parameters. This work aimed to use phytoplankton biomass as biological indicators through matching between quantitative analysis of phytoplankton in water and the results of the physico-chemical parameter analyzed.

Materials and Methods

1- Study area

El Rayah El Tawfiky was investigated in this study which starts from Damietta branch at EL- Kanater station and extends parallel to the Damietta branch until Mansoura city, its average depth is 2-3 m and irrigates 970,000 faddans (3 governments). The study area extends about 65 Km which includes five stations that were selected to represent El Rayah El Tawfiky **(Table 1 and Figure 1)**.

Table 1. Longitudes and Latitudes of the studied stations of El-Rayah El- Tawfiky.

Stations	Name	Position	Distance from El Qanater
1	Kafr Moeys-Banha	N=30°48´848" E=31°21´572"	35 Km
2	kafr shokr city	N=30°55´193" E=31°26´948"	45 Km
3	Mit El Az village	N=30°61´196" E=31°27´621"	55 Km
4	Mit Ghamr city Dakahila under Mit Ghamr bridge.	N=30°71´683" E=31°27´078"	70 Km
5	Aga El-Mansoura	N=30°93´092" E=31°28´792"	100 Km

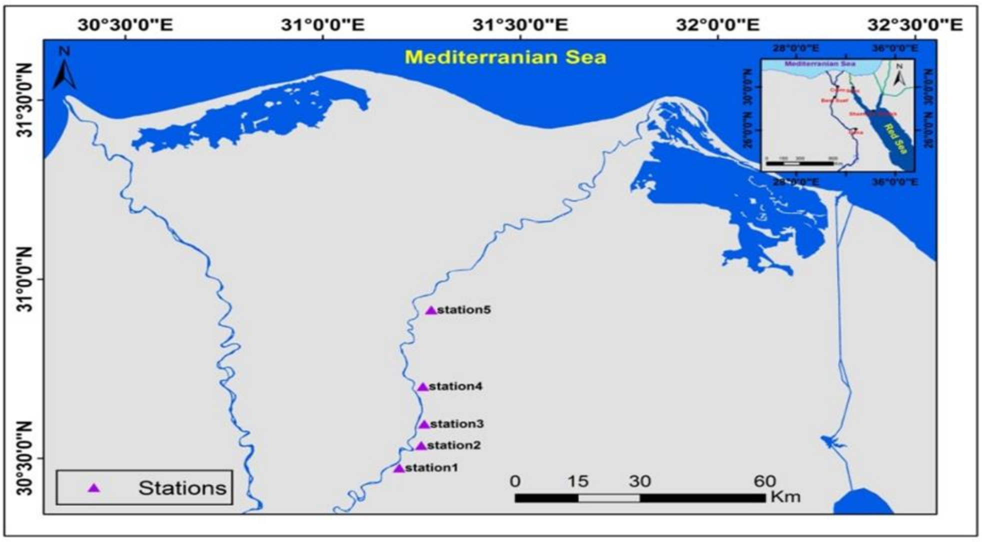

Figure 1. Map showing the studied stations of El Rayah El Tawfiky

2- Water sampling

Seasonally, water and phytoplankton samples were collected from the previously mentioned stations **(Table 1)** for one year from October 2018 to September 2019. Water samples were collected using plastic bottles, then preserved and transferred immediately to the lab to estimate their Physico-chemical characteristics.

3- Determination of the Physico-chemical characteristics of water samples

During sampling, water temperature, hydrogen ion concentration (pH), and total dissolved salts (TDS) were determined in the field using HANNA waterproof pH/EC/TDS temperature meter HI991301. Dissolved oxygen concentration (DO) was detected by using a dissolved oxygen meter (YK-22DO). In addition, turbidity was detected by a turbidity meter (EZTCH TU-2016). While other parameters were estimated in the laboratory. Sodium, potassium, calcium, magnesium, chloride, and sulphate were determined according to **Chapman and Pratt (1978).** According to the methods adopted by **Rainwater and Thatcher (1960)** and the methods described by **Fishman and Friedman (1985)**, orthophosphate was determined colorimetrically by phosphomolybdate method using UV/Visible spectrophotometer, nitrite was determined by sulphanilamide and NED (1-naphthyl-ethylene diamineihydrochloride) method, nitrate was determined by the modification of cadmium reduction method, Silica as (SiO_2) is determined colorimetrically by molybdate method using UV/Visible spectrophotometer at wavelength 700 or 880 nm. Ammonia was determined using Nessler reagent and disodium Ethylenediaminetetraacetic acid (Na_2EDTA) solution.

4- Phytoplankton (Micro-algae) sampling

According to **Sourina (1981),** Phytoplankton or micro-algae were collected by filtering water samples in a 20 Mm mesh plankton net.

5- Counting of phytoplankton

According to **Sourina (1981),** after shaking 400 ml, an aliquot was withdrawn by a pipette and loaded into a Max Levy counting chamber haemocytometer, to count the number of algal taxa in each station or each sample. All haemocytometer area was counted, and the results were expressed as the number of individuals per liter.

Results

1- Physico-chemical parameters of water

Regarding the physico-chemical parameters of water, samples are shown in **Tables (2, 3, and 4)**. The highest water temperature was recorded in the spring season, whereas the lowest degree was recorded in the winter season. The pH values of water in El Rayah El Tawfiky at all stations ranged from slightly alkaline to alkaline (7.7-8). There was a wide range in the degree of turbidity during the seasons, the lowest values were recorded during the winter (0.71, 0.71, 0.87, 0.44, and 0.39 ppm respectively) and the highest ones (30, 37, 9.6, 29, and 15.3 ppm respectively) were recorded in the spring season. The current data of dissolved oxygen concentrations ranged (from 3 to 8.5 mg/L). The greatest values were detected in the autumn and the lowest ones were recorded during the summer season. The result of cations and anions showed seasonal and regional variations. Generally, the highest values were recorded in the autumn season and the lowest values were recorded in the summer season.

Table 2. Values of Temperature (T), pH, Total dissolved salts (TDS), Turbidity and Dissolved Oxygen (DO) of El Rayah El Tawfiky in the five stations

Stations	Station 1				Station 2				Station 3				Station 4				Station 5			
Parameters	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer
T (°C)	27	16.7	30	31	26.3	17.1	31.3	28.6	24.5	17.7	31.6	27	23.4	18.7	31.5	27.4	24.	18.3	31.5	30.6
pH	7.7	7.9	8.3	7.8	8	7.9	7.9	7.9	7.8	8	7.9	8	7.9	8.2	7.9	7.9	8	8.1	8	8
TDS (ppm)	0.72	0.04	0.02	0.02	0.28	0.35	0.02	0.02	0.74	0.03	0.02	0.02	0.6	0.04	0.02	0.02	0.26	0.03	0.02	0.03
Turbidity (NTU)	14.5	0.71	30	8.2	0.28	0.71	37	5	12.8	0.87	9.6	2.2	6.03	0.44	29	5.9	4.3	0.39	15.3	5.7
DO (ppm)	8	4.5	4	3.5	8.5	6	3.5	5	8.5	5	3.5	4.5	6	7	4.5	3.5	6	3	5	4

Table 3. Concentrations of cations and anions in the studied stations

Stations	Station 1				Station 2				Station 3				Station 4				Station 5			
Cation and anion (ppm)	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer
Na	3	19	49.5	9.2	29.	22	14.2	10.7	128	20.5	14	11.9	110	17	6.2	12.1	26	13	28.7	8.3
K	81	5	24.5	19.3	13	3.5	7.2	19.1	31.5	3.5	4.5	23.5	25	3	2.2	20.5	6	1.5	5.7	14.7
Ca	22.5	15.5	27	34.8	28.5	15	3.2	39	119	9.5	17.5	35.2	130	13.5	16.7	39.4	15	12	19.2	38.6
Mg	8.4	8	4.3	8.5	10.8	9.7	8.9	6.03	34.2	6.1	4.9	11.2	24.1	10.2	5.3	7	12.7	7.9	11.3	5.6
Cl	95	70	125	40	80	50	30	40	90	12.5	30	10.5	200	20	7.5	15	50	23	40	15
SO_4	30.1	27	47.1	22	26	53	19.6	21.4	94	298	16.2	23.1	85.5	105	11.6	20.4	41.8	27.7	19.8	22.8

Table 4. Macronutrients concentrations of El Rayah El Tawfekey in the five stations

Stations	Station 1				Station 2				Station 3				Station 4				Station 5			
Macro-nutrients (ppm)	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer
Nitrite	0.088	0.32	0.007	0.034	0.03	0.21	0.008	0.03	0.042	0.132	0.002	0.031	0.09	0.13	0.015	0.04	0.07	0.1	0.001	0.04
Nitrate	0.76	1.23	0.8	0.6	0.14	0.25	00.2	0.1	0.52	0.7	0.2	0.215	0.5	0.32	0.72	0.012	0.7	2.5	1.5	1.52
Orthohosphate	0.9	7.5	0.157	0.306	0.7	1.23	0.15	0.3	0.8	1.16	0.15	0.32	0.9	1.17	0.16	0.3	0.9	1.15	0.17	0.3
Ammonia	0.004	0.001	0.006	0.007	0.00	0.001	0.009	0.008	0.004	0.003	0.007	0.007	0.009	0.001	0.01	0.03	0.003	0.0005	0.005	0.007
Silica	11.8	1.97	12.5	18	8.17	0.06	10	9.9	6.25	1.1	13.3	8.9	0.35	0.12	0.47	2.56	8.22	1.2	6.5	12.6

The seasonal variations of nitrite and nitrate showed that there was a relative increase in the nitrite and nitrate contents during the winter and achieved its lowest values in the spring season, the highest values of nitrate were recorded during the spring season. Orthophosphate had the highest concentration compared to other macronutrients and it achieved the greatest values in the winter season (7.5, 1.23, 1.16, 1.17, and 1.15 respectively). The concentration of ammonia in the spring and summer seasons had the highest values. It was noticed that the concentrations of silica in hot seasons (spring and summer) were the highest compared to other seasons.

2- Phytoplankton qualitative analysis

Results showed that algae collected from the studied five stations **(Figure 2)** were represented by 132 algal taxa belonging to five algal divisions.

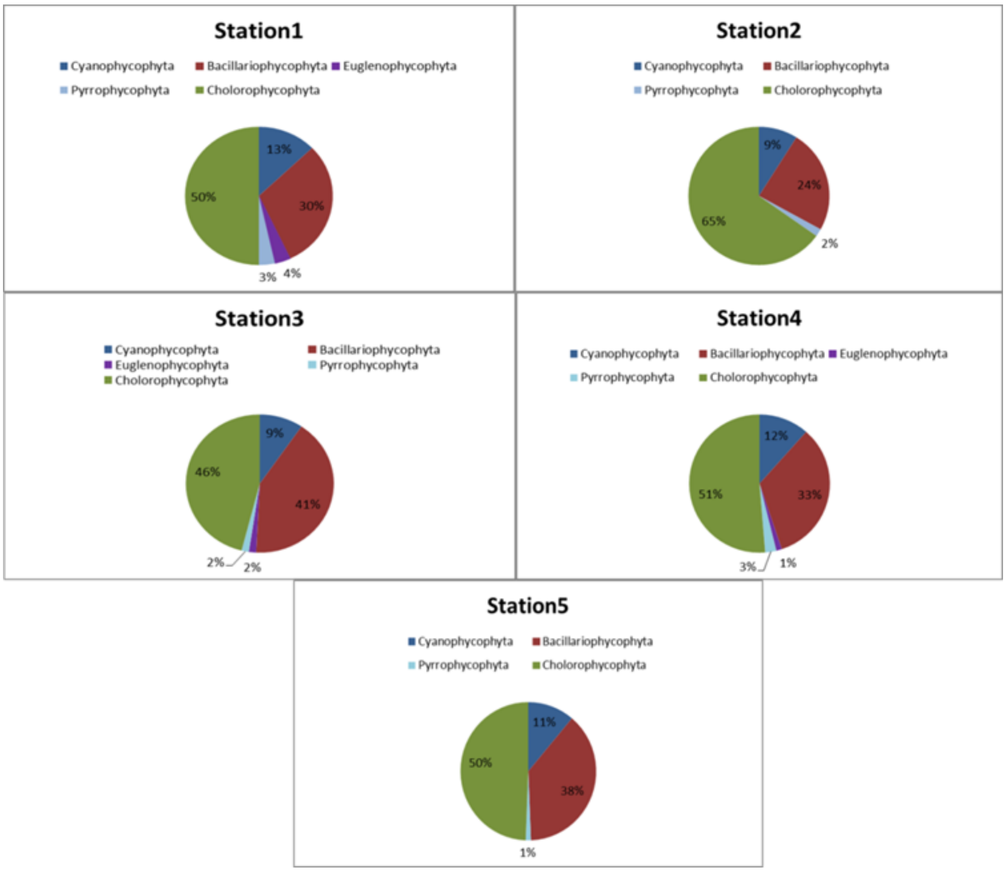

Figure 2. Percentages of the different algal divisions in the studied station

Chlorophyta was the dominant division, followed by Bacillariophyta, Cyanophyta, Pyrrophyta and Euglenophyta. Chlorophyta represented by 64 taxa belongs to 19 genera, Bacillariophyta with 43 taxa belongs to 15 genera, and Cyanophyta with 17 taxa belongs to 7 genera. The other 2 divisions (Pyrrophyta and Euglenophyta) are present only in some seasons at some stations during the study.

3- Phytoplankton quantitative analysis

Quantitatively, the demonstrated data in **Tables (5, 6, 7, 8, and 9)** showed that the phytoplankton biomass (total counts) of El Rayah El Tawfiky was significantly higher during the winter season in all five studied stations (239.38, 15.96, 32.43, 10.959, and 26.75 x10^5 individuals /L respectively). Diatoms contributed to the highest biomass during this season, especially the high growth of *Synedra ulna var. danica*, *Cyclotella ocellata*, *Melosira granulate*, and *Synedra ultermoehlie* followed by green algae and blue-green algae. Whereas the least biomass was found in the spring season, especially the number of Bacillariophyta. On the other hand, Pyrrophyta and Euglenophyta showed the lowest biomass during all seasons. Additionally, station 1 had the highest phytoplankton biomass compared to other investigated stations **(Table 5).**

Table 5. Seasonal variations in the total number of individuals of different algal divisions in the phytoplankton of El Rayah El Tawfiky in station 1(*10^5 /L)

	Seasons			
Algal divisions	**Autumn**	**Winter**	**Spring**	**Summer**
Cyacophyta	0.8032	1.032	1.367	0.674
Bacillariophyta	43.01	74.32	14.25	17.67
Pyrrophyta	0.05	0.03	0.1	0
Euglenophyta	0.15	0	0	0
Cholorophyta	6.9	16.4	8.2	6.9
Total	**50.91**	**239.38**	**23.91**	**25.17**

Table 6. Seasonal variations in the total number of individuals of different algal divisions in the phytoplankton of El Rayah El Tawfiky in station 2(*105 /L)

	Seasons			
Algal divisions	**Autumn**	**Winter**	**Spring**	**Summer**
Cyanophyta	0.249	0.34	0.215	0.099
Bacillariophyta	9.163	12.92	2.616	6.63
Pyrrophyta	0.100	0.060	0.0025	0
Euglenophyta	0	0	0	0
Cholorophyta	1.45	2.64	1.62	2.99
Total	**10.962**	**15.96**	**4.453**	**6.066**

Table 7. Seasonal variations in the total number of individuals of different algal divisions in the phytoplankton of El Rayah El Tawfiky in station 3(*105 /L)

	Seasons			
Algal divisions	**Autumn**	**Winter**	**Spring**	**Summer**
Cyanophyta	0.45	0.73	0.12	0.25
Bacillariophyta	12.833	26.7	3.67	5
Pyrrophyta	0.123	0	0	0
Euglenophyta	0	0	0	0.005
Cholorophyta	3.13	5	3.23	3.2
Total	**16.536**	**32.43**	**7.02**	**8.455**

Table 8. Seasonal variations in the total number of individuals of different algal divisions in the phytoplankton of El Rayah El Tawfiky in station 4(*105 /L)

	Seasons			
Algal divisions	**Autumn**	**Winter**	**Spring**	**Summer**
Cyanophyta	0.4	0.242	0.803	0.075
Bacillariophyta	4.94	9.017	2.241	3.8
Pyrrophyta	0	0	0	0.067
Euglenophyta	0	0	0	0.0333
Cholorophyta	2.05	1.7	1.6	1.99
Total	**7.39**	**10.959**	**4.644**	**5.965**

Table 9. Seasonal variations in the total number of individuals of different algal divisions in the phytoplankton of El Rayah El Tawfiky in station 5(*105 /L)

	Seasons			
Algal divisions	**Autumn**	**Winter**	**Spring**	**Summer**
Cyanophyta	1.1	2.9	0.392	2.45
Bacillariophyta	7.023	18.75	3.69	3.22
Pyrrophyta	0	0	0	0.050
Euglenophyta	0	0	0	0
Cholorophyta	3.1	5.1	1.664	4.7
Total	**11.223**	**26.75**	**5.746**	**10.42**

4- Correlation between water physico-chemical parameters and total algal biomass

Concerning the correlation between the total number of individuals/L and physico-chemical parameters of the studied area **(Table 10).** The recorded results showed that there was a moderate negative relationship between temperature with total algal biomass and the total number of Bacillariophyta (r = -0.61 and -0.65 respectively). Nitrite had a strong positive correlation with total algal biomass and the total number of Bacillariophyta (r = 0.76 and 0.74 respectively). Nitrate had a very strong relationship with Cyanophyta (r = 0.85). Total algal biomass, the total number of Bacillariophyta, and the total number of Chlorophyta were very strongly positively correlated with orthophosphate concentrations (r=0.97, 0.87, and 0.80 respectively). Euglenophyta had a very strong positive correlation with ammonia concentrations (r=0.81).

Table 10. Correlation coefficient values (r) between algal biomass and some physicochemical parameters of the studied area

	Total algal biomass	Cyanophyta	Bacillariophyta	Chlorophyta	Pyrrophyta	Euglenophyta
T	**-0.61**	-0.16	**-0.65**	-0.3	-0.07	0.1
pH	-0.14	0.30	-0.26	-0.07	-0.08	-0.23
TDS	-0.03	-0.14	0.17	-0.08	0.42	0.07
Turbidity	-0.20	-0.07	-0.2	-0.11	-0.22	-0.05
DO	-0.20	-0.28	-0.26	-0.38	0.07	0.42
Sodium	-0.06	-0.13	-0.02	-0.08	0.33	-0.12
Potassium	0.00	-0.08	0.27	0.14	0.04	0.43
Calcium	-0.15	-0.15	-0.15	-0.16	0.3	0.02
Magnesium	-0.09	-0.20	-0.07	-0.21	0.46	-0.12
Chloride	0.13	-0.07	0.2	0.17	0.05	-0.11
Sulphate	-0.01	-0.06	0.03	-0.01	-0.04	-0.15
Nitrite	**0.76**	0.14	**0.74**	**0.6**	-0.04	-0.09
Nitrate	0.29	**0.85**	0.31	0.38	-0.28	-0.24
Orthophosphate	**0.97**	0.13	**0.87**	**0.8**	-0.08	-0.1
Ammonia	-0.25	-0.31	-0.32	-0.29	0.28	**0.81**
Silica	-0.17	0.02	-0.09	0.12	-0.04	-0.06

Discussion

Microscopic examination and counting of phytoplankton species are regarded as useful measurements in studying freshwater ecosystems **(El-Otify, 2015)**. The qualitative study of El Rayah El Tawfiky showed that Chlorophyta was the dominant division, followed by Bacillariophyta, Cyanophyta, Pyrrophyta, and Euglenophyta. These results agree with many studies conducted on the Nile

River by **Elewa *et al.* (2009), and Shehata *et al.* (2008),** who stated that most of the recorded phytoplankton of the Nile River was dominated mainly by Bacillariophyta and Chlorophyta genera, while Pyrrophyta and Euglenophyta were presented as rare forms. Quantitatively, the algal flora of El Rayah El Tawfiky showed remarkable variation in phytoplankton numbers between different seasons. In all stations, the highest algal biomass was recorded in the winter due to the flourished high biomasses of diatoms. This agrees with previously reported studies which concluded that the winter season is the best period for diatoms to grow **(Wetzel, 2001).**

In our study, there were different relationships between total phytoplankton biomass and some physico-chemical parameters. A negative correlation between the total number of algal biomass and the total number of diatoms with temperature was observed in the correlation matrix (r= -0.61 and -0.65 respectively). This agrees with **Wetzel (2001)** who showed that low water temperature can cause the blooming of phytoplanktonic diatoms. In addition to **EL Manawy and Amin (2004)**, reported that temperature is inversely proportional to algal biomass. The demonstrated result showed there is a negative correlation between algal biomass and turbidity. The turbidity maybe not be caused by phytoplankton biomass and other factors influencing the turbidity such as colloidal and extremely fine dispersions **(Shrinivasa, 2000)**. When turbidity is low, more light can penetrate through the water column which creates optimal conditions for algal growth. This may explain the low productivity of algal biomass in the spring season. **Mathis and Myers (1970)** found that the lowest photosynthetic efficiency occurred during more turbid conditions. Nutrient salts (NO_2, NO_3, and PO_4) play an important role in the productivity of the aquatic ecosystems supporting the food chain for phytoplankton **(Abdo, 2004).** The current data showed a strong positive relationship between total numbers of cyanophytes (individual/L) with nitrate concentrations (r= 0.8). In the same context, **Herrero *et al.* (2001), and Ritchie *et al.* (2001)** concluded that freshwater cyanobacteria grow well in presence of high concentrations of nitrate. In the case of orthophosphate, a very strong positive correlation was found between concentrations of orthophosphate and phytoplankton biomass in this study (r=0.9). This agrees with **Deyab *et al.* (2019)** who reported that there was a positive correlation between the biomass of most phytoplankton groups and orthophosphate content in water. Results also showed significant strong positive correlations between numbers of Euglenophyta and ammonia content in water (r=0.8) which agrees with **Chellappa *et al*. (2009)**. Therefore, phytoplankton biomass is regarded as an easy and useful indicator means to assess the quality of the freshwater ecosystem.

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الكتلة الحيوية للعوالق النباتية كمؤشر حيوى لبعض الخواص الفيزيائية والكيميائية للرياح التوفيقى دلتا النيل ، مصر

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يعتبر الرياح التوفيقى واحد من اهم المصادر الرئيسية للمياة العذبة فى دلتا النيل بمصر. تم اجراء الدراسة حول العلاقة بين بعض الخواص الفيزيو-كميائية للمياة والكتلة الحيوية للعوالق النباتية للرياح التوفيقى. تم تجميع عينات من المياة والعوالق النباتية من خمس محطات على طول الرياح التوفيقى (من كفر مواس بمدينة بنها الى اجا فى مدينة المنصورة) خلال عام. تم الكشف عن 132 نوعًا تنتمى الى خمسة اقسام من الطحالب (الطحالب الخضراء، الطحالب العصوية، الطحالب الزرقاء المخضرة، الطحالب البيروفيتية، و الطحالب اليوجلينية). من الناحية النوعية، كانت الطحالب الخضراء الاكثر انتشارًا يليها الطحالب العصوية و الطحالب البيروفيتية و الطحالب اليوجلينية. من ناحية اخرى أظهرت الدراسة الكمية ان الطحالب العصوية كانت الاكثر انتشارًا تليها الطحالب الخضراء. تم تسجيل اعلى كتلة حيوية للعوالق النباتية فى فصل الشتاء، على الجانب الاخر تم تسجيل اقل كتلة حيوية فى فصل الربيع. كشفت الدراسة ان هناك علاقات مختلفة بين الكتلة الحيوية للعوالق النباتية وبعض الخصائص الفيزيو-كميائية للمياة. كان للكتلة الحيوية للعوالق النباتية علاقة ايجابية مع كلاً من النيتريت والفوسفات وعلاقة سلبية مع درجة حرارة المياة. كان هناك علاقة ايجابية قوية بين الطحالب الخضراء المزرقة والنترات وايضا علاقة ايجابية قوية بين الامونيا والطحالب اليوجلينية. تهدف الدراسة انه من خلال العد المجهرى للعوالق الطحلبية واقسامها المختلفة يمكن معرفة جودة المياة وهى وسيلة غير مكلفة وسهل التعامل معها . من الضرورى التحكم فى التخلص من الملوثات الصناعية والزراعية وتطبيق طرق المكافحة البيولوجية للمحافظة على مياة نهر النيل.