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PHYTOPLANKTON SPECIES COMPOSITION AND SOME PHYSICAL-CHEMICAL PARAMETERS OF NEWLY MAN MADE CANAL (EL-SALAM CANAL), EGYPT.

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Abstract

One of the giant projects that are presently adopted by the government is that of the reclamation of desert land in Sinai as a trial to make use of each drop of wasted desert water. Towards that goal the water that is being continuously drained into the Mediterranean has been consumed in the construction of a new man made canal El-Salam canal. It has been mixed with 50% of agricultural drainage water through some of the drains that streams into Manzalah canal as Hadous and Serw drains. The main concept for constructing such a canal is to carry fresh water to arid lands in Sinai. Yet such projects may have both positive as well as negative sequels.

The present study has been conducted to measure some physical parameters as water temperature and transparency, depth of water and electric conductivity. All parameters were found to increase towards the west. This is primarily due to the influence of mixing with agricultural drainage water. Some chemical parameters (dissolved oxygen; nitrites; nitrates; ammonia; inorganic phosphorus) were also measured where most of them showed significant increase in concentration.

One hundred and fifteen phytoplankton species were studied. Chlorophyceae were the most abundant followed by Bacillariophyceae, Euglenophyceae, Cyanophyceae, Dinophyceae &Chrysophyceae, respectively. The highest density for phytoplankton recorded was during the spring season. In addition, chlorophyll a was investigated as an indication of the biomass. There is an inverse proportional relation was found between chlorophyll a and transparency. Statistical analysis was undertaken to clarify the relation between biomass and phytoplankton with the physical and chemical parameters.

Key Words: Phytoplankton - El-Salam Canal – Diversity index – Trophic State Index

Introduction

The North Sinai Agricultural Development proposed by the Egyptian Government imagines the reclamation of an estimated 400,000 feddan of desert situated along the Mediterranean coast of Sinai. This project depends mainly on El-Salam Canal. El-Salam Canal transports the Nile water from Damietta Branch near Faraskour towards northern Sinai. It runs through the southern coast of Lake Manzalah and cross under Suez Canal, near Port Said City. About half of El-Salam water's comes from the Nile River (2110 million m^3 $year^{-1}$) and the rest is from he reused drainage water of El-Serw and Hadous Drains (2050 million m^3 year-1) (Sabae & Abdel-Satar, 2001).

Few studies were carried on El-Salam Canal. El-Attar (2000) reported the changes of some physico-chemical characters and phytoplankton structure of El-Salam Canal in the west region of Suez Canal. The variability in water quality of El-Salam Canal and the distribution of some trace metals as well as the role of bacteria on nitrogen cycle were studied by Sabae & Abdel-Satar, (2001).

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The recent literature depend mostly on the articles reported on Damietta Branch as a source of El-Salam Canal. Water quality and phytoplankton communities of Damietta Branch were investigated by Shabban-Dessouki & Baka (1985 a & b) and Abdel-Hamid *et al.*, (1992). According to the Trophic Status Index (TSIchi) they reported high eutrophication of more than 70 in this branch of the Nile River. The changes of production, distribution, periodicity, pigmentation (Chlorophyll), and species diversity of phytoplankton standing crop and TSIchi in the Damietta estuary were studied by Shabban-Dessouki, *et al.*, (1994). The monitoring of algal flora existing in water of El-Mansoriyah Canal, El-Mansoura was studied by Shabban-Dessouki (1995). Abd-El-Kareem (1999) and El-Bassat (2002) provide some information about some biological components of the ecosystem in Damietta Branch. El-Bassat (2002) concluded that, Damietta Branch of the Nile is an eutrophic productive water body, which needs a plan to improve its conditions.

Thomas *et al.*, (2000) described the response of phytoplanktonic communities to the gradient of agricultural drainage in the Yakima River basin, Washington. Piirsoo (2001) reported that, phytoplankton research contributes to evaluation of water quality associated with the impact of human activities and the ecological factors. Seasonal and spatial differences in the taxonomic structure of phytoplankton assemblages were carried out by Paul, *et al.*, (2002) to detect community level responses to change in nutrient and some of physical factors.

The objectives of this study are to assess different phytoplankton communities and their fluctuation in relation to some physical and chemical factors. Using different biostatistical analysis to figure out the effect of some ecological parameters on phytoplankton biodiversity in the investigated area.

Material & Methods

Sampling Program

Subsurface water samples were collected from each sampling site during fall, winter 1999 and spring 2000 by using Polyvinyl Chloride Van Dorn Sampler. The sampling program of El-Salam Canal included 5 sites, covering the area from the mouth of the canal at Faraskour barrage to over 63 Km of its length toward Suez Canal (Fig. 1). These stations are:

Site 1	: at the mouth of El-Salam Canal at Faraskour Barrage
Site 2	: after 20 Km from Faraskour Barrage in front of El-Serw Drain.
Site 3	: after 43 Km from Faraskour Barrage at the entrance of El-Mataryia City.
Site 4	: after 53 Km from Faraskour Barrage.
Site 5	: after 63 Km from the beginning of the canal at Hadous Drain

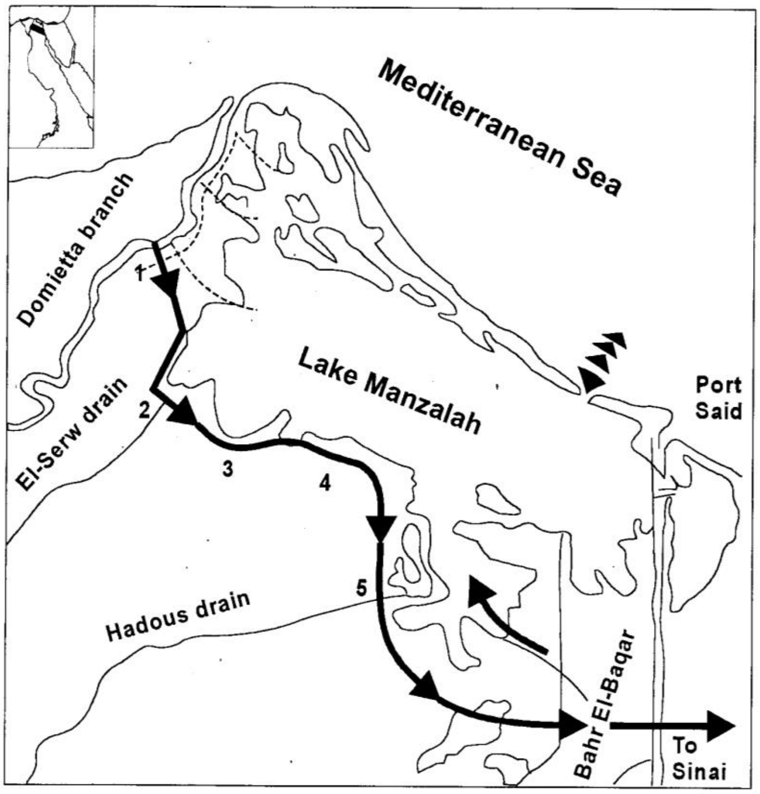

Fig. 1: Map Showing sampling sites of El-Salam Canal.

Field Observations

Water temperature (°C) and conductivity (μS cm-1) were measured by Conductivity meter model S.C.T.33 YSI. The depth (cm) of the canal was recorded and transparency (cm) was measured by Secchi-disc (25 cm diameter). pH was recorded by a portable pH meter (Orion Research Ion Analyzer 399A) and air temperature by a thermometer (0-100 °C) with 0.1°C accuracy..

Laboratory Analysis

The chemical parameters (Dissolved Oxygen, NO_2-N, NO_3-N, NH_3-N, PO_4-P and SIO_3-Si) were analyzed according to methods described in APHA (1985). Dissolved Organic Nitrogen (DIN) / PO_4-P were calculated.

Biological Parameters

Phytoplankton samples were collected from the sub-surface of the selected sites and preserved immediately. After settling of samples using Lugol's Iodine, phytoplankton and the species composition was identified to species level or higher taxa by Utermöhl (1958). Phytoplankton counts for all phytoplanktonic groups, except Cyanophyceae, were expressed as number of cells per ml. The filamentous and colonial forms of blue-green algae have been expressed as number of units per ml, where each unit equal 100 μm length (in case of filamentous form) or diameter (in case of colonial form). The samples were examined by using inverted microscope Hydro-Bios Type at magnification of X600 & X1500. Identification was carried out according to: Hendey (1964), Perscott (1978), Seaburg, *et al.*, (1979), Grimes & Rushforth (1982), Garcia-Baptista, (1993), Silva & Pienaar (2000) and Ling & Tyler (2000). The density of phytoplankton population enumerated using the sedimentation technique as described by Lund *et al.*, (1958).

Chlorophyll a was estimated spectrophotometrically from samples (1000 ml) collected on Whatman GF/C. Pigments were extracted in 90% Acetone over night in the dark at 4 °C. Chlorophyll a was calculated according to Parsons and Strickland (1965). Trophic State Index (TSI_{chl}.) was calculated from Chlorophyll a value according to Carlson (1977) and Schultz (1985).

Statistical Analysis

The diversity index was calculated by the relationships between species and individuals in the ecosystem according to Shannon and Weaver, 1963. Species richness of phytoplankton communities at the sampling stations was calculated according to Margalef's equation (1968). Preliminary analysis of the data was by matrix correlation analysis. Subsequently, The statistical analyses were carried out using Multivariate Species Analysis (MVSP) Package Ver. 3.01 © provided by Kovach (1999), Kovach Computer Service United King Dom and PRIMER 5 for Windows 2001, Plymouth Routines In Multivariate Ecological Research (PRIMER-E Ltd). I carried out Canonical Corresponding Analysis (CCA, Ter Braak, 1986 and 1987) of the different phytoplanktonic groups with the available physico-chemical parameters.

Results

Physical and Chemical Aspect

Results of some physical and chemical characteristics of El-Salam Canal are shown in table 1. Higher water temperature was recorded during spring season (29.90 °C) at Site 3. The amplitude of water temperature of 12.3 °C. Secchi disc transparency decreased eastward from site 1 till Site 5. Results of pH values lie in alkaline side (Table 1). The pH reading was 7.05 during fall season while the maximum pH value was observed during spring. The highest electrical conductivity (1496 $\mu\ cm^{-1}$) was recorded during fall season at site 5, and the lowest value was obtained at site 1. The average dissolved oxygen (5.77 $mg\ l^{-1}$) generally gave an indication of seasonal trends as shown in (Fig. 2 a). Dissolved oxygen fluctuated between 4.60 $mg\ l^{-1}$ in site 2 during fall and 7.20 $mg\ l^{-1}$ at the same site 4 during winter.

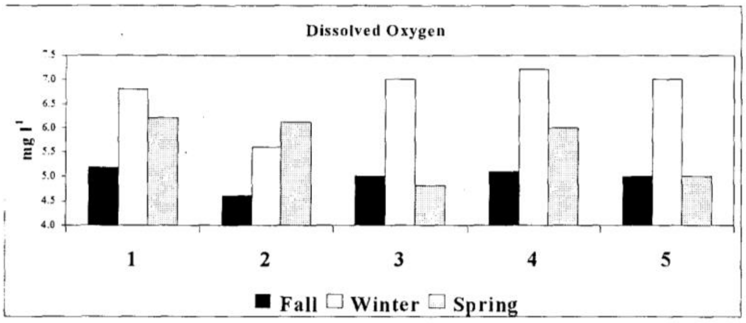

Fig. (2, a): Fluctuation of dissolved oxygen (mg l^{-1}) during the period of investigation (1999 – 2000)

Table (1): Variations of some physical & chemical parameters at El-Salam Canal during the period 1999 - 2000.

Season & Sites		Temperature (°C)	Depth (cm)	Transparency (cm)	pH	Conductivity (EC µ S cm^{-1})
Fall	Site 1	24.6	300	100	7.27	620
	Site 2	24.4	265	60	7.06	1240
	Site 3	23.2	200	45	7.06	990
	Site 4	22.8	300	55	7.05	1210
	Site 5	24.2	250	30	7.05	1496
Winter	Site 1	19.6	300	105	7.28	528
	Site 2	19.7	225	59	7.21	857
	Site 3	18.3	150	50	7.46	868
	Site 4	17.6	350	45	7.18	825
	Site 5	19.2	230	25	7.18	776
Spring	Site 1	25	300	75	7.96	400
	Site 2	28.6	250	52.5	7.91	560
	Site 3	29.9	200	35	7.94	620
	Site 4	27.5	400	40	7.93	730
	Site 5	28.4	200	20	7.91	1010

Nitrite and Nitrate were graphically represented in Fig. (2, b). Nitrite concentrations showed an irregular pattern of seasonal variation during the study period. The maximum values of Nitrite (NO_2-N) were recorded at site 5 during fall. While, Nitrate fluctuated between 5.71 µg l^{-1} at site 1 during fall and 119.42 µg l^{-1} at site 4 during winter. There was a noticeable decrease in Nitrate value during spring. Ammonia concentration gradually increased from Site 1 till Site 5, with values ranged between 620 µg l^{-1} at Site 1 during fall and 5273 µg l^{-1} at Site 4 during winter (Fig. 2, c). The seasonal variations of orthophosphate were in the range 145.23 – 406.12 µ l^{-1} at Site 1 during winter and Site 5 during spring, respectively (Fig. 2. d). During the present study, fall and spring had low values of dissolved organic nitrogen:orthophosphosphate (DIN:P) ratio comparing with that of winter season (Fig. 2, e). The minimum reactive silicate value (0.81 mg l^{-1}) was recorded at Site 1 during spring, while the maximum value (12.79 mgl^{-1}) was recorded at Site 5 during fall (Fig. 2, f).

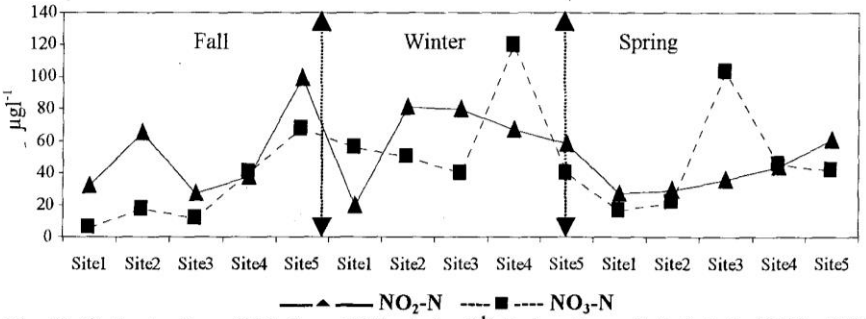

Fig. (2, b): fluctuation of Nitrite and Nitrate (μg l^{-1}) during the period of study (1999 – 2000).

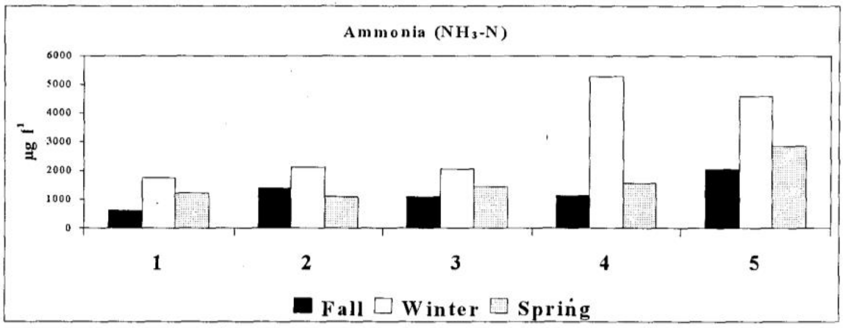

Fig. (2, c): fluctuation of Ammonia (NH_3-N μg l^{-1}) during the period of study (1999 – 2000).

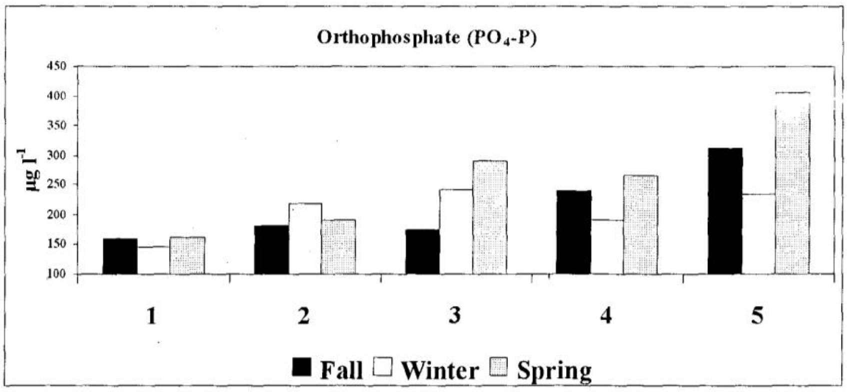

Fig. (2, d): fluctuation of phosphorus (PO_4-P μg l^{-1}) during the period of study (1999 – 2000).

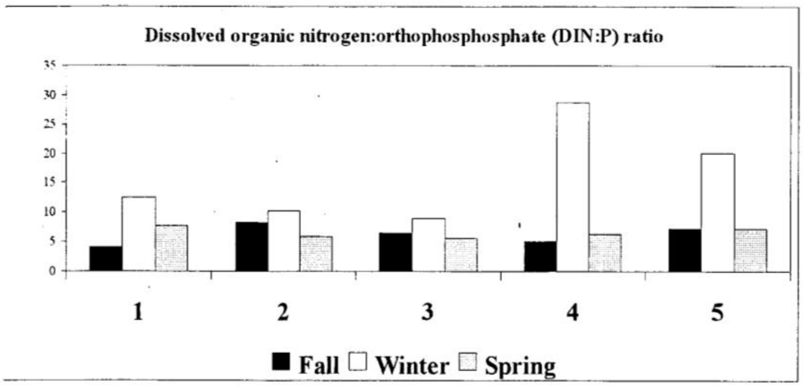

Fig. (2, e): fluctuation of dissolved organic nitrogen:orthophosphate (DIN:P) ratio during the period of study (1999 – 2000).

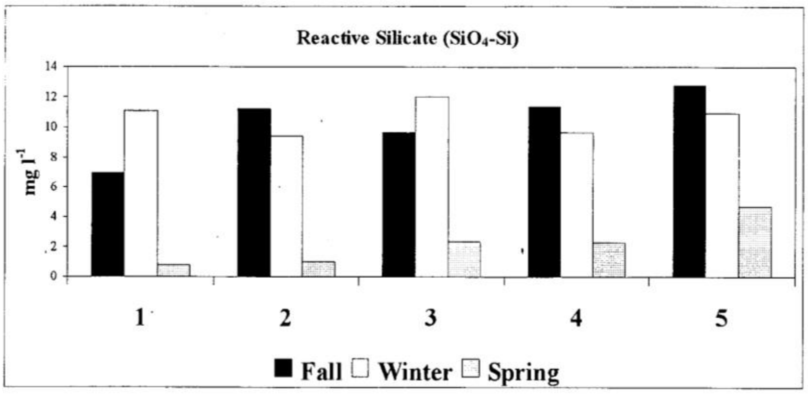

Fig. (2, f): fluctuation of reactive silicate (mg l^{-1}) during the period of study (1999 – 2000).

Phytoplankton biomass represented by Chlorophyll a during fall and spring revealed a gradual increase from east to west except at site 4 (Fig. 3). Their concentrations ranged between 7.01 µg l^{-1} in winter at site 1 to 212.50 µg l^{-1} in spring at site 5.

A total of 115 taxa of the phytoplanktonic species were identified during the study period (Table 2). At all sites 44 species belong to Chlorophyceae, 39 species to Bacillariophyceae, 24 species to Cyanophyceae, 4 species to Euglenophyceae, 2 species to Dinophyceae and 2 species to Chrysophyceae.

Table 2: List of species recorded during the investigation period (1999 – 2000).

Chlorophyceae	*Cyclotella kutzingiana* Fricke
Actinastrum hantzschii Lagerhimia	*Cyclotella meneghiniana* Kütz.
Ankistrodesmus convolutus Corda	*Cyclotella ocellata* Pantocsek.
Ankistrodesmus falcatus (Corda) Ralfs	*Cymbella affinis* Kütz.
Ankistrodesmus spiralis (Turner) Lemm.	*Cymbella tumida* (Brebisson) Van Heurck
Chodatella ciliate (lagerheimia) Chodat	*Cymbella turgidla* Grun.
Chlamydomonas ehrenbergii	*Cymbella ventricosa* Kütz.
Chlorella vulgaris Beyerink	*Diploneis elleptica* (Kütz.) Cleve.
Closterium sp. Nitz.	*Fragilaria construens* (Ehr.) Grunow
Coelastrum microporum Naeg.	*Gomphonema acuminatum* Ehr.
Coelastrum reticulatum (Dangeard) Senn	*Gomphonema olivaceum* (Lyngb) Kütz.
Coelastrum sphaericum Naeg.	*Melosira granulata* (Ehr.) Ralfs
Cruciginia quadrata Morren	*Melosira granulata var. angustissima* Müller
Cruciginia rectangularis (A. Braun) Gray	*Melosira varians* C.A. Agardh
Cruciginia tetrapedia (Kirch.) W. & G.S. West	*Navicula cryptocephala* Kütz.
Dictyosphaerium ehrenbergianum Naeg.	*Navicula cuspidata* Kütz.
Dictyosphaerium pulchellum Wood	*Navicula exigua* (Gregory) Müller
Eudorina sp Ehr.	*Navicula gastrum* Ehr.
Golenkinia radiata	*Navicula hungarica*
Kirchneriella obesa (W. West) Schmidle	*Navicula mutica* (Ehr.) Hustedt
Micractinum pusillum Fresenius	*Nitzschia acicularis* W. Smith
Oocystis borge Snowi	*Nitzschia hungarica* Grunow
Oocystis lacustris Chodat	*Nitzschia palea* (Kütz) W. Smith
Oocystis parva W. & G.S. West	*Nitzschia amphibia* Grunow
Pandorina morum (Müller) Bory	*Pleurosigma macrum* W. Smith
Pediastrium clathratum	*Surirella ovata* Kütz.
Pediastrium duplex Meyen	*Surirella robusta* var. *splindida* (Ehr) Van Heurck
Pediastrium simplex (Meyen) Lemmermann	*Synedra acus* Kütz.
Pediastrium tetras (Ehrenberg) Ralfs	*Synedra ulna* (Nitz.) Her.
Pediastrum boryanum (Turp.) Meneghini	
Scendesmus dimorphus (Turp) Kütz.	**Cyanophyceae**
Scendesmus obliquus (Turp) Kütz.	*Anabena consticta* (Szafer) Geitler
Scenedesmus acuminatus (Lagerheimia) Chodat	*Anabaena variabilis* Kütz
Scenedesmus bicaudatus Dedusenko	*Aphanothece microscopica* Naeg. (After West)
Scenedesmus longispina	*Chrococcus turgidus*
Scenedesmus obliquus (Tyurpin) Kütz.	*Chroococcus limneticus* var.*distans* G.M.Smith
Scenedesmus opoliensis P. Richter	*Coelosphaerium pusillum* van Goor
Scenedesmus quadricauda (Turp.) Brebisson	*Cylindrospermopsis raciborskii* (Woloszynska)
Selenastrum gracilis (Reinsch)	Seenayya & Subba Raju
Sorastrum spinulosum Nageli	*Dactylococcopsis smithii* R. & F. Chodat
Spirogyra varians (Hass) Kütz.	*Gloeocapsa aeruginosa* (Carm.) Kütz. (After Cooke).
Staurastrum gracilis Ralffs	*Gomphosphaeria apoiana* Kütz. (After west)
Sturastrum paradoxum Meyen	*Gomphosphaeria lacustris* Chodat
Tetradedron minimum (A.Br.) Hansgirg	*Lyngbya majusula* (Dillw.) Harv. (After Gomont)
Tetradedron muticum (Kütz.)	*Merismopedia elegans* A. Braun
	Merismopedia glauca (Ehr.) Nageli
Bacillariophyceae	*Merismopedia warmingiana*
Achnanthes andicola (Cl.) Hust.	*Microcystis aeruginosa* Kütz. emend. Elenkin
Achnanthes brevipes Agardh	*Nostoc microscopicum* Carm. (After Cooke)
Amphora ovalis Kütz.	*Oscillatoria agardhii Gom.* (After Lemmermann)
Biddulphia laevis Ehr.	*Oscillatoria chalybea* Mert. (After Gomont)
Biddulphia placentula eulepta (E.) Grun	*Oscillatoria limnetica* Lemm.
Caloneis amphisbaena (Bory) Cleve	*Oscillatoria limosa* Agardh
Cocconies pediculus Ehr.	*Oscillatoria tenuis* Agardh
Cocconies placentula Ehr.	*Phormidium autumnale* (Ag.) Gom. (After Gomont)
Cyclotella comta (Ehr.) Kütz.	*Spirulina major* Kütz.
Cyclotella glomerata Bachmann	

Euglenophyceae *Euglena sanguinea* Her. *Euglena viridis* Ehr. *Phacus longicauda* (Ehr.) Duj *Phacus pyrum* **Dinophyceae** *Ceratium hirundinella* (O.F. Müller) Dujardin *Peridinium cinctum* O.F. Müller	**Chrysophyceae** *Chrysococcus* sp Klebs *Mallomonas* sp. Perty

During the present study the most abundant groups were Chlorophyceae (91.09%), Bacillariophyceae (8.16%), Euglenophyceae (0.52%) and Cyanophyceae (0.15%). In addition to Dinophyceae and Chrysophyceae which were observed 0.06% and 0.002% of the total phytoplankton standing crops, respectively. Total number of phytoplankton and chlorophyll *a* were represented In Fig. (3).

The maximum standing crop for all phytoplanktonic classes, except Dinophyceae, was observed during spring. The highest density of dinoflagellates was observed during fall with an average value of 67.6 cells ml^{-1}.

The most leading species of Chlorophyceae were Ankistrodesmus spiralis, Pandorina morum, Pediastrium simplex, Ankistrodesmus falcatus, Scenedesmus longispina. While the most abundant species of Bacillariophyceae were, *Cyclotella ocellata, C. kutzingiana, C. meneghiniana, Melosira granulata* var. *angustissima* and *Synedra acus*. The predominant species of blue-green algae were, *Merismopedia glauca, Microcystis aeruginosa, Merismopedia warmingiana* and *Oscillatoria tenuis*.

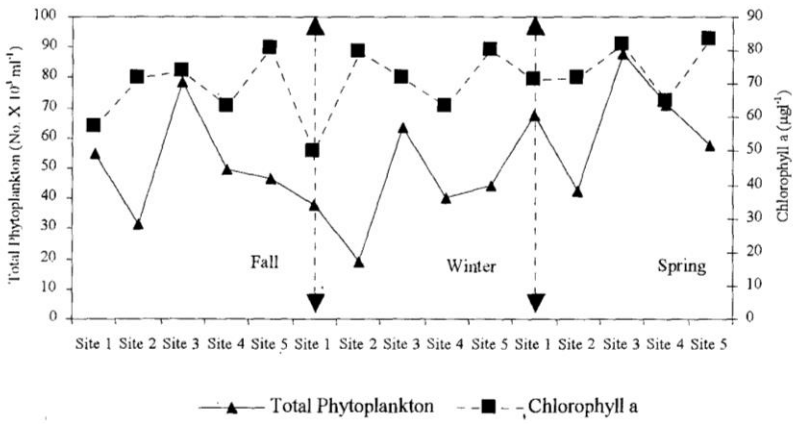

Fig. 3: Total number of phytoplankton (No. X 10^3 ml^{-1}) and Chlorphyll *a* (µg l^{-1}) during the period of investigation (1999-2000).

The diversity index was fluctuated between 0.621 at Site 5 during spring and 0.752 at Site 3 during winter (Table 3).

Table (3): Total Species (S), D: Species Richness (according to Margalf), H' (Loge) : Shannone (Diversity Index) and Trophic State Index ($TSI_{chl.}$) during the investigation period (1999 – 2000).

Season & Sites		S	D	H'(loge)	$TSI_{chl.}$
Fall	Site 1	70	6.32	3.10	56.80
	Site 2	58	5.50	2.73	71.81
	Site 3	63	5.50	2.66	73.91
	Site 4	55	5.00	2.74	63.48
	Site 5	61	5.58	2.76	80.51
Winter	Site 1	70	6.54	3.17	49.67
	Site 2	52	5.16	2.94	79.69
	Site 3	63	5.61	3.12	71.60
	Site 4	60	5.57	2.78	63.43
	Site 5	62	5.70	2.58	79.89
Spring	Site 1	70	6.21	3.01	70.98
	Site 2	67	6.19	2.79	71.89
	Site 3	69	5.98	2.95	81.78
	Site 4	66	5.82	2.90	64.81
	Site 5	65	5.84	2.59	83.14

Discussion

This study offered some information's of water quality of newly formed canal. It is worth to mention that, El-Salam Canal has vital importance for reclamation of Sinai desert. Hynes (1970) and Benzi (1984) suggested the possible control of phytoplankton by some physical and chemical factors. The low transparency and high chlorophyll a concentration are attributed to the agricultural wastes discharged from the different drains. This view is supported by a strong negative relations between Secchi-disc transparency and phytoplankton biomass represented by chlorophyll a ($r= -0.7$, $p<0.004$, Fig. 4). Several investigators reported such negative relation in different aquatic bodies e.g. Waikto River in New Zealand (Coulter *et al.*, 1983), Vaal River in South Africa (Roos & Pieterese, 1994) and in River Nile (Touliabah, 1996). Generally, the pH values of the canal water lies on the alkaline side. This could be mainly due to activation of photosynthetic process (El-Attar, 2000). The same situation was reported for the Nile water from Esna to Delta Barrage (Touliabah 1996) and for the two Nile branches Rosetta Branch (Saad & Abbas 1985) and Damietta Branch (Abd El-Kareem 1999 and El-Bassat 2002). The effect of agricultural drainage was found to elevate the values of electrical conductivity (El-Attar, 2000 and Sabae & Abdel-Satar, 2001). Anaerobic denitrifying bacteria caused the high values of nitrite during fall and winter which forming nitrite as intermediate stage during reduction of nitrate to ammonia. The decrease in nitrate during the spring may be attributed to the consumption of nitrate by phytoplankton, since the statistical analysis indicates that significant effect ($p < 0.001$). Ueda *et al.*, (2000) and Sabae & Abdel-Satar (2001) were attributed the decrease in nitrate during spring due to reduction by denitrifying bacteria. The present data showed that, nitrate values of El-Salam Canal water were more or less similar to those obtained by some other authors worked on the River Nile (El-Ayouty & Ibrahim, 1980; Kobbia *et al.*, 1995; Touliabah, 1996 and Abd-El-Kareem 1999). The increase in ammonia concentration towards east may be attributed to the agricultural wastes containing high amounts of organic matter discharged into the canal from Hadous Drain. In this connection, Hegewald & Runkle (1981) reported that any water body influenced by agricultural discharges is certainly unstable in chemical composition. (Mancy & Hafez, 1979) explained that phenomenon by the combination of several factors, including reduction of the water velocity, industrial, agricultural and domestic waste discharge Therefore; it was not a surprise to record that phenomenon at El-Salam Canal. The significant decrease of reactive silicate in El-Salam Canal during spring may be related to the uptake by diatoms ($p < 0.001$). The present results and the previous investigates (Abdel-Hamid *et al.,* 1992 and El-Attar, 2000) showed that, the lowest concentration of reactive silicate coincided with the blooming of *Cyclotella meneghiniana*.

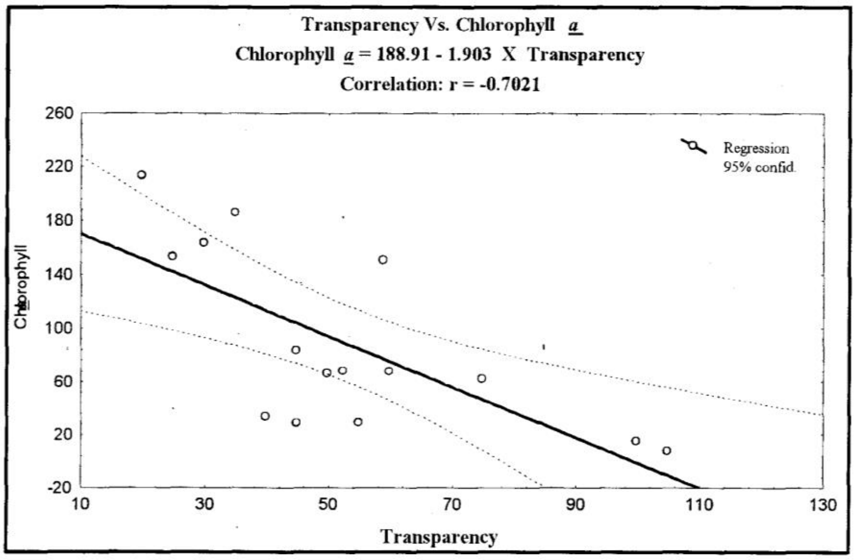

Fig. 4: Statistical correlation between Chlorophyll a and Transparency.

It is clear that, the fluctuation and changes of the phytoplankton standing crops reflects the fluctuations of the chemical properties in the studied area. Also, the phytoplankton standing crops were higher at the sites which receive an agricultural drainage. During the period of study, general trend of total phytoplankton coincides with the general trend of the biomass represented by chlorophyll a concentration where the maximum chlorophyll concentration was recorded during spring season. This result agrees with the findings obtained by Economou-Amilli (2000) and El-Attar (2000).

In the present study 44 species of green algae, 24 of blue-green algae, 4 of euglenoides, 39 of diatoms, 2 of dinoflagellates and 2 of Chrysophyceae were recorded. El-Attar (2000) recorded 28 species of Chlorophyta, 22 of Cyanophyta, 32 of Bacillariophyta, 3 of Euglenophyta, 3 of Dinophyceae and 2 of Chrysophyceae. The most abundant species of Chlorophyceae group was Chlorococcales. These species considered as eutrophic plankton type (Palmer, 1980) and generally found in water containing high level of phosphate and nitrate ($r= 0.75$, $p<0.001$). Diatoms (centric species) represented the second dominant group during the period of investigation. El-Attar (2000) reported that, the pennales forms more abundant than centric forms.

Trophic State Index (TSIchl.) is one of the more popular quantitative classifications of trophy (Schultz, 1985). The present data fluctuated between 49.67 and 83.14. In most cases it was more than 70 especially during spring and at site 2, 3 and 5 these sites are subjected to the agricultural effluents. Abdel-Hamid *et al.*, (1992) found that, the trophic state index at Damietta Branch more than 70 due to, where the studied area influenced by freshwater and polluted water.

Species diversity (Table 3) was high. Also an inverse relation between conductivity and diversity index was recorded ($r= -0.54$, $p < 0.038$) since the diversity index decreased east wards while conductivity increased. Zajic (1971) found that species diversity decreased by increasing conductivity values. The present results of diversity index agree with the conclusion of Nather Khan, 1991 and Nwankwo, 1996. The low values of the diversity index indicate domination of low number of species while the high values indicate more evenly dispersed species (Table 3). Generally, the number of species plays an important role in diversity index (Trifonova, 1993). In accordance of Holzmann (1993), the diversity index depends on some factors as the period of compositional of phytoplankton communities.

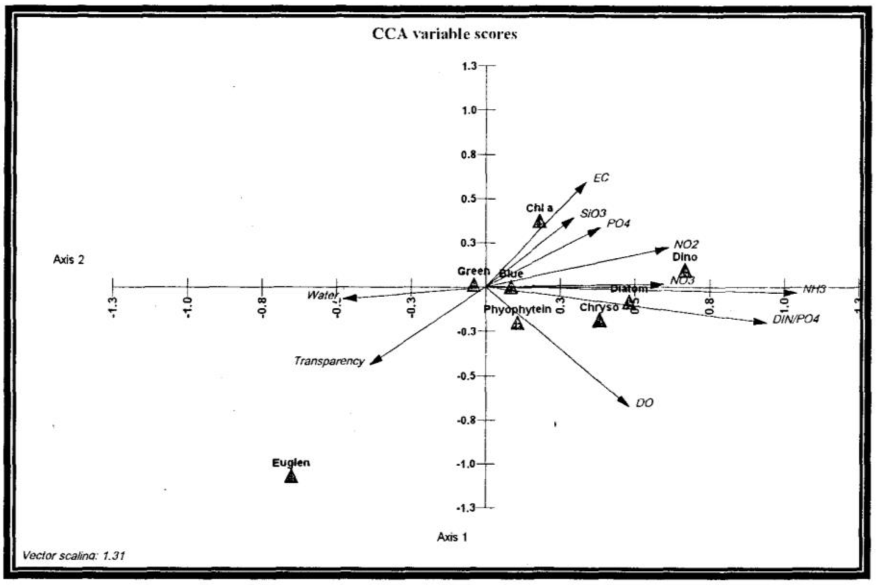

Fig. (5): Relationships between phytoplanktonic groups and some environmental parameters as revealed by Canonical Correspondence Analysis.

Canonical Correspondence Analysis (CCA) was performed to summarize the major trends in the relationship between phytoplankton groups and some environmental parameters (Fig. 5). The nutrients (NO^2-N, NO^3-N, PO^4-P & SiO^3-Si) showed an opposite relationship to egulenoids and positively correlated to dinoflagellates and blue-green algae. On the other hand, silicate was found to be negatively affected by abundance of diatoms. Chrysophyceae showed the same ordination with DIN/PO^4-P. Generally the results of CCA revealed that, site 2, 3 & 5 with special features due to the fact they are subjected to the agricultural effluents (El-Serw Drain, El-Mataryia effluents and Hadous Drain, respectively).

This project is likely to generate the following positive impacts;

- Improved socio-economic conditions
- Improved land tenure and land registration and
- Development of new agro-ecological habitats..

On the other hand, negative project impacts:

- Loss of natural habitats and increased pressure on remaining wild lands. The desert reclamation scheme will lead to the loss of important habitats for flora and fauna communities, and as a result will have a negative impact on populations of flora and fauna elements which have a limited distribution range in the region.

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التركيب النوعى للهائمات النباتية و بعض القياسات الفيزيائية و الكيميائية فى قناة مائية عذبة بفعل الإنسان (ترعة السلام) ، مصـــر

حسين السيد طليبة

كلية البنات للآداب و العلوم و التربية

جامعة عين شمس

من المشروعات العملاقة التى تتبناها الدولة حاليا هى مشاريع إستصلاح الأراضى فى شبه جزيرة سيناء و كذلك المحاولة للإستفادة من كل قطرة مياه. و نظراً لذلك فقد تم إنشاء ترعة السلام حيث تم الأستفادة من المياه العذبة التى كانت تلقى فى مياه البحر الأبيض المتوسط و تحويلها الى ترعة السلام و ذلك بخلطها بنسبة حوالى ٥٠% من مياه الصرف الزراعى من بعض المصارف التى تصب فى بحيرة المنزلة مثل مصرف حادوس و السرو. و الهدف الأساسى من إنشاء هذه الترعة هى إدخال مياه النيل الى سيناء و ما سوف يتتبع ذلك من مشروعات قومية ضخمة. و ما ينجم عن اجراء مثل هذه المشروعات من آثار إيجابية و أخرى سلبية.

تم خلال هذه الدراسة قياس بعض العوامل الفيزيائية مثل قياس درجات حرارة المياه و الشفافية و العمق و درجة التوصيل الكهربى و الذى يزداد كلما إتجهنا للشرق و ذلك نتيجة التأثربالخلط بمياه الصرف الزراعى. أيضاً تم قياس بعض العوامل الكيميائية مثل الأكسجين الذائب و بعض من العناصر مثل النيتريت و النترات و الأمونيا و الفوسفور غير العضوى و السيليكات. و قد تبين من النتائج ارتفاع تركيزاتها فى معظم المواقع التى تمت دراستها.

فى خلال فترة الدراسة تم رصد ١١٥ نوعاً من الهائمات النباتية. حيث سادت الطحالب الخضراء يليها الطحالب الدياتومية ثم الطحالب الخضراء المزرقة ثم اليوجلينية ثم السوطيات ثم مجموعة الطحالب الذهبية. و قد كانت الطحالب السوطية و الذهبية أكثر المجاميع ندرة . كانت أعلى كثافة للهائمات النباتية خلال الربيع. و قد تم أيضا قياس الكلوروفيل (أ) حيث أنة يعبر عن الوزن الحيوى للهائمات النباتية و لقد أمكن استخدام الكلوروفيل (أ) فى التعبير عن مدى ثراء منطقة الدراسة. أيضا وجد أن هناك علاقة عكسية بين الكلوروفيل (أ) و الشفافية.

فى مناقشة هذا البحث تم أستخدام العوامل الأحصائية و ذلك لبيان مدى علاقة الهائمات النباتية و الوزن الحيوى مع العوامل الفيزيائية و الكيميائية التى سجلت فى الدراسة.