

Sewage Algae and the Efficiency of Wastewater Treatment Plant at Port Said, Egypt

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ABSTRACT

Algae in the lagoons of wastewater treatment plant at Port Said were analysed qualitatively and quantitatively for the biological indication of the change and improvement in wastewater quality from aerated through facultative and polishing lagoons before pumping the treated wastewater into lake Manzala. The first treatment lagoon proved to be dominated by blue-greens, and in the algal toxicity assessment showed to be toxic with higher filtrate concentrations.

The anoxic zone of the facultative lagoon was also dominated by blue-greens. It's filtrate showed no toxicity when tested with *Selenastrum capricornutum*.

The oxic zone of the facultative pond was quite different reflecting a clear change in the quality of water. It was dominated by centric diatoms and chlorococcalean algae. When assessed for toxicity, it showed stimulation except at 90 and 100% filtrate which showed dramatic toxicity even lower than the EC_{50} . It's toxicity may be referred to the high counts of *Oscillatoria amphibia*. The polishing lagoon had a rich algal vegetation dominated by the centric diatom *Cyclotella menegheniana* followed by the chlorococcalean *Crucigenia tetrapedia*. Its filtrate showed a slight toxicity with concentrations over 70% which could be again referred back to the high counts of *Oscillatoria amphibia*. The effluent pump station was dominated by *Cyclotella menegheniana* and the chlorococcalean

Ankistrodesmus falcatus. When assessed with the algal bioassay, it showed no toxicity except over 90% concentration.

These qualitative and quantitative phytoplankton analysis with the toxicity assessment by algal bioassays proved an insufficient efficiency of the Port Said wastewater treatment plant. This biological analysis is in agreement with data of BOD₅, COD and TSS that were compared in the influent and effluent wastewater.

INTRODUCTION

The two major strategies applied for the wastewater treatment are the non-algal conventional intensive treatment and the integrated microalgal-bacterial system. When climate permits in tropical and subtropical regions, algal-bacterial system can equal or exceed the intensive conventional treatment and do so less expensively. The algal-bacterial photosynthetic oxygenation of soluble organics in sewage is carried out in special reactors termed high-rate ponds. Properly designed and operated high-rate ponds are capable of removing more than 90% of the carbonaceous BOD and up to 80% of the nitrogen and phosphorus in a very less expensive way (Oswald, 1988). In these ponds, the more algal biomass is produced, the more oxygenation of organics in sewage and the more nutrient reduction are achieved. In developing countries with warm sunny climates, shallow oxidation ponds or lagoons about 1 m deep have proved very effective for sewage treatment.

Many algal genera are known to occupy wastewater ponds from time to time (Palmer, 1980). Genera like *Chlamydomonas*, *Euglena*, *Chlorella*, and *Oscillatoria* being either flagellated or small enough or having buoyancy that would make them fail to settle are nondesirable in the algal oxidation ponds. In flow-mixed ponds, best algal genera are like *Scenedesmus* and *Micractinium* protected with spines or setae with rapid growth and would settle easily for harvesting when the pond is not mixed.

Bux and Kassan (1994) found that the algae detected in many activated sludge plants were the common ones known for polluted freshwater.

The problem with vigorous algal growth in sewage oxidation ponds arises when they become dominated by toxic phytoplankters like dinoflagellates, some blue-greens or coccolithophorids. Dinoflagellate toxins are known to be extremely hazardous to public health and they may cause human and animal death through paralytic shellfish poisoning (PSP). Several dinoflagellates have been identified to be toxic especially *Gonyaulax acatenella* (Prakash and Taylor, 1966).

Toxic blue-greens have been also described for their peptide toxins. Examples are: *Microcystis viridis* (Watanabe et al., 1986) *Phormidium formosum* (Skulberg et al., 1992) and *Oscillatoria acutissima* (Barchi et al., 1984).

The aim of the present work was to analyse the phytoplankton population of the lagoons of wastewater treatment plant at Port Said qualitatively and quantitatively to detect the dominant and subdominant species and to match them with the chemical analysis, BOD₅, TSS (total suspended solids) and the count of coliforms for both influent and effluent to check the efficiency of the treatment plant. It was also aimed to check any possible toxicity in the lagoons water using algal bioassay.

MATERIALS & METHODS

Water samples were collected from the aerated lagoon, anoxic and oxic zones of the facultative lagoon, middle of polishing lagoon and at the effluent pump station during fall 1997. One liter of each sample was filtered with GF/C whatman glass filters, the filtrate was preserved in the dark at 4°C for immediate chemical and biological analysis. The residue was dried at 105°C until constant weight to measure the total suspended solids. Another liter of the sample was kept in the dark at 4°C for COD and BOD analysis.

Table 1 : Port Said WWTP influent and effluent data for the month of October 1997.

Date	Day of Week	WWTP INFLUENT							
		Flow, 1,000 m ³ /d	pH, SU	Alk, mg/L	TDS, mg/L	VSS, mg/L	TSS, mg/L	BOD ₅ , mg/L	Coliforms, N/100 ml
1	Wed	108.5	7.7	275	2094	97	123	115	8,000,000
2	Thu	105.2	7.6	275	2094	136	178	141	1,400,000
3	Fri	112.4	7.6	272	1970	91	108	122	3,600,000
4	Sat	110.8	7.6	264	1976	141	180	126	3,600,000
5	Sun	104.0	7.5	270	2088	97	123	125	4,000,000
6	Mon	101.2	7.6	278	2524	180	225	200	300,000
7	Tue	103.7	7.6	271	1740	114	144	180	600,000
8	Wed	105.9	7.7	273	2044	130	180	116	900,000
9	Thu	108.7	7.6	276	2210	152	192	140	1,000,000
10	Fri	105.5	7.5	275	1728	172	224	160	1,500,000
11	Sat	106.1	7.6	265	1968	140	186	136	1,650,000
12	Sun	108.9	7.6	287	1912	120	174	126	1,830,000
13	Mon	105.6	7.6	285	2046	96	130	160	1,600,000
14	Tue	111.7	7.7	286	1818	92	118	110	3,200,000
15	Wed	104.3	7.8	282	2078	168	222	164	1,900,000
16	Thu	103.3	7.5	295	2098	158	198	180	5,200,000
17	Fri	105.8	7.5	280	1636	111	151	92	2,000,000
18	Sat	111.3	7.5	282	2053	101	126	101	2,500,000
19	Sun	107.2	7.6	278	1811	89	118	131	6,700,000
20	Mon	105.7	7.6	271	1764	91	118	128	8,700,000
21	Tue	108.4	7.6	277	1961	112	155	100	1,200,000
22	Wed	108.9	7.6	275	1880	141	175	127	6,000,000
23	Thu	107.1	7.6	273	1914	141	148	178	20,000,000
24	Fri	115.4	7.6	280	1935	90	124	160	10,600,000
25	Sat	102.5	7.6	288	1962	144	177	213	20,200,000
26	Sun	106.1	7.6	282	2403	101	141	171	20,000,000
27	Mon	103.1	7.7	265	2151	118	152	204	18,000,000
28	Tue	101.8	7.6	275	1917	136	175	172	15,000,000
29	Wed	112.4	7.6	282	2082	102	134	157	3,000,000
30	Thu	95.6	7.7	278	2030	138	182	221	8,400,000
31	Fri	101.2	7.5	275	1828	112	162	191	18,000,000
Minimum Day		95.6	7.5	264	1636	89	108	92	300,000
Maximum Day		115.4	7.8	295	2524	180	225	221	20,200,000
Monthly Average		106.4	7.6	277	1991	123	159	150	6,470,323
Monthly Average Corrected for Algae									

BOD₅ is the amount of dissolved oxygen consumed by microorganisms, over a 5-day period, biodegrading the organic constituents in the wastewater

Table 1 : Port Said WWTP influent and effluent data for the month of October 1997.

Date	Day of Week	WWTP EFFLUENT PUMP STATION							
		pH, SU	Alk, mg/L	TDS, mg/L	Chlorophyll A, mg/L	VSS, mg/L	TSS, mg/L	CBOD ₅ , mg/L	Coliforms, N/100 ml
1	Wed	8.0	147	2317	0.248	14	30	6	265
2	Thu	7.9	145	2317		15	30	20	405
3	Fri	7.8	143	2094		17	28	11	735
4	Sat	7.8	138	2137	0.039	17	31	8	135
5	Sun	7.9	147	2113		11	18	4	205
6	Mon	8.0	147	2171		16	35	17	55
7	Tue	8.0	149	2118		12	22	4	80
8	Wed	8.0	150	2170	0.112	19	26	11	130
9	Thu	7.9	154	2170		12	21	2	80
10	Fri	7.9	151	2190		14	26	5	140
11	Sat	7.6	150	2174		37	50	19	25
12	Sun	8.0	146	2171	0.017	10	20	4	39
13	Mon	7.9	157	2177		7	18	5	61
14	Tue	7.8	151	2107		5	10	3	25
15	Wed	7.9	152	2130		28	39	17	68
16	Thu	7.8	145	2152	0.000	11	21	3	73
17	Fri	8.0	150	2161		9	21	3	762
18	Sat	7.8	154	2084		16	27	13	160
19	Sun	8.0	155	2180	0.010	9	20	3	193
20	Mon	7.9	156	2092	0.020	11	25	5	175
21	Tue	8.0	158	2058		5	17	2	77
22	Wed	8.1	160	2049	0.002	13	23	7	164
23	Thu	8.2	163	2038		16	19	7	59
24	Fri	8.0	172	2042		5	22	3	110
25	Sat	8.0	173	2040		7	14	7	22
26	Sun	8.0	183	2177	0.000	8	13	4	40
27	Mon	7.9	206	2204		11	20	9	85
28	Tue	8.0	191	2126	0.000	9	20	4	63
29	Wed	8.0	190	2083	0.030	8	16	2	20
30	Thu	8.0	192	2098	0.008	16	25	7	29
31	Fri	8.0	202	2105		7	23	3	180
Minimum Day		7.6	138	2038	0.000	5	10	2	20
Maximum Day		8.2	206	2317	0.248	37	50	20	762
Monthly Average		7.9	160	2137	0.041	13	24	7	150
						10	21	5	

BOD₅ is the amount of dissolved

Average pH values of different water samples were directly determined right at the sampling stations using a horizon ecology Co pH-meter model 5995. Welsh method (1948) was used for the determination of total alkalinity. BOD and COD were determined according to Standard Methods (1989).

Identification of algal taxa for phytoplankton analysis was followed according to Smith (1950), Desikachary (1959), Prescott (1962, 1978), Javronisky and Papovsky (1971) and Hindak et al. (1975). Diversity of algal vegetation was followed as Shannon and Weaver (1963). Chlorophyll "a" was estimated by the method adopted by APHA (1985). Possible toxicity of water samples was tested through algal bioassays using the international test alga *Selenastrum capricornutum* incubated for a period of 5 days. Values of EC_{50} were calculated as toxicity parameters.

RESULTS AND DISCUSSION

Physical and chemical parameters with counts of coliforms for the influent and effluent water samples during fall 1997 are shown in Table (1). Qualitative and quantitative phytoplankton analysis with diversity index and saprobic index for water samples of the different lagoons are shown in Table (2). Counts of *Selenastrum capricornutum* for the toxicity test using the algal bioassay are shown in Table (3).

Algal bioassays for toxicity assessment of the different lagoons are shown in Fig. (1). Algal species identified in the different lagoons are illustrated in Plate (1).

The qualitative and quantitative analysis of phytoplankton in the polishing lagoon Table (2) had a diversity index indicating a heavy polluted water. As for the effluent pump station pumping the treated wastewater into lake Manzala, it showed a slightly better water quality

with a diversity index of 0.164, although it was still within the range of heavy polluted water.

This should be an alarm that the efficiency of the wastewater treatment plant at Port Said is not enough to safely pump its effluent to Lake Manzala. The phytoplankton analysis of aerated lagoon, anoxic and oxic zones of facultative lagoon, also showed diversity indices of heavy pollution with total algal counts maximum at the oxic - zone of the facultative one.

Looking at Table (3) and Fig. (1) for the toxicity assessment of water samples from the different lagoons through algal bioassay, we found that the wastewater from the aerated lagoon was shown to be stimulating the growth of the test alga *Selenastrum capricornutum* all the way to 57% concentration with SC₂₀ (concentration of water sample causing stimulation by 20% comparable to control) at 58%. Over 58%, the water sample proved to be slightly toxic inhibiting the growth of the test alga lower than the control, but never reached EC₅₀ (concentration inhibiting the growth of the test alga by 50% comparable to control). As for the anoxic - zone of the facultative lagoon, the wastewater sample showed no toxicity but rather stimulation with all concentrations with SC₂₀ at 90%.

Wastewater from the oxic-zone of the facultative pond showed slight stimulation up to 80%, after which it proved to be toxic even lower than the EC₅₀ level which was reached at 90% concentration. Wastewater of the polishing lagoon proved to be slightly stimulating up to 65% concentration with SC₂₀ at 43%. Over 65% it started to be slightly toxic. The treated wastewater from the effluent pump station proved to be stimulating the growth of the test alga with no toxicity. The toxicity recorded for the oxic-facultative and polishing ponds, may be attributed back to the high counts of the blue - green alga *Oscillatoria amphibia*. Several species of *Oscillatoria* have been reported to be toxigenic (Barchi et al., 1984). The stimulation of the test algal growth for all samples is most probably due to the available phosphorus in wastewater. Plate (1) showed that the algal vegetation was dominated by chlorococcalean species in addition to some diatoms, blue-greens and euglenoids. Looking at

Table 2. Qualitative and quantitative analysis of phytoplankton in wastewater lagoons during fall 1997.

Species	Number cells x 10 ⁴ /ml				
	aerated lagoon	Anoxic zone of facultative lagoon	oxic zone of facultative lagoon	polishing lagoon	effluent pump st.
<i>Arthrospira platensis</i> var. <i>tenuis</i>	-	1.56	0.45	-	-
<i>Chroococcus minutus</i>	807	1.56	150	0.46	1.43
<i>Chroococcus turgidus</i>	-	-	4.4	-	-
<i>Lyngbya martensiana</i>	-	-	-	2.78	-
<i>Merismopedia glauca</i>	-	1.2	-	-	-
<i>Merismopedia tenuissima</i> lemm.	-	962	2.54	1.63	0.92
<i>Microcystis</i> sp.	-	-	-	0.46	-
<i>Oscillatoria amphibia</i>	1.56	38.5	150	20.8	-
<i>Oscillatoria chlaybea</i>	-	0.78	-	-	-
<i>Oscillatoria curviceps</i>	-	-	0.6	-	-
<i>Oscillatoria foreau</i>	-	0.78	-	-	-
<i>Oscillatoria subbrevis</i>	0.39	0.78	1.6	0.04	5.1
<i>Oscillatoria willei</i>	0.39	0.68	-	0.46	-
<i>Oscillatoria</i> sp.	-	-	-	2.78	-
<i>Spirulina princeps</i>	-	0.39	0.4	-	-
<i>Actinastrum gracilimum</i>	-	16.9	40	3.24	-
<i>Ankistrodesmus flacatus</i>	0.39	67.3	110	65.8	6.95
<i>Ankistrodesmus flacatus</i> var. <i>mirabilis</i>	0.39	86.5	120	34	463
<i>Botrydiopsis arhiza</i>	-	7.6	35	0.92	-
<i>Chlamydomonas pseudopertyi</i>	-	12	-	-	-
<i>Chlorococcum humicola</i>	173	0.68	-	0.92	-
<i>Chlorogonium spirale</i>	-	-	120	14.3	-
<i>Closterium peracerosum</i> var. <i>elegans</i>	-	2	0.4	0.92	0.92

<i>Crucigenia tetrapedia</i>	-	57.7	70	681	0.71
<i>Dictyopshaerium ehrenbergianum</i>	-	1.56	-	0.46	-
<i>Micractinium Pusillum</i> var. <i>elegans</i>	-	12	-	-	-
<i>Micractinium pusillum</i> <i>Fresensius</i>	-	2.7	0.4	-	-
<i>Oocyst borgei</i> snow	-	2.4	35	68.2	2.3
<i>Scenedesmus acuminatus</i>	-	48	20	34	-
<i>Scenedesmus armatus</i> var. <i>bicaudatus</i>	-	19.2	30	0.92	6.95
<i>Scenedesmus dimorphus</i>	0.39	23.5	50	45.5	12.9
<i>Scenedesmus quadricauda</i> var. <i>longispina</i>	-	-	0.4	-	-
<i>Scenedesmus quadricauda</i> var. <i>maxima</i>	-	3.13	20	2.3	0.92
<i>Selenastrum minutum</i>	0.39	57.7	90	68.2	-
<i>Tetrademus wisconsinense</i>	-	1.56	-	6	-
<i>Tetraedron muticum</i>	-	2.35	15	45.45	3.7
<i>Tetraedron trigonium</i> var. <i>gracille</i>	-	0.76	-	-	-
<i>Cyclotella comta</i>	1.177	423	450	65.8	0.92
<i>Cyclotella menegheniana</i>	1.177	9.32	200	3159	761
<i>Cyclotella michiganiana</i>	-	-	-	34	-
<i>Cyclotella</i> sp.	-	6.7	3.6	-	0.82
<i>Navicula canalis</i>	0.39	0.78	-	0.46	-
<i>Cyndra actinastroides</i>	0.39	48	160	45.5	6.95
<i>Euglena gracilis</i>	0.784	4.7	4.4	0.45	0.95
<i>Phacus arbicularis</i> var. <i>caudatus</i>	-	-	0.45	-	-
<i>Chroomonas nordstedtii</i>	-	1.2	20	1.36	0.68
<i>Cryptomonas ovata</i>	-	3.13	-	-	-
Total number of of all species	988.61	2231	4367	4542	1085
Diversity index (pollution index)	0.2	0.069	0.073	0.153	0.164
Saprobic index	1.68	1.5	1.44	1.26	2.79

Table 3. Number of cells $\times 10^4$ of *Selenastrum capricornutum* ml⁻¹ after 5 days incubation with different concentrations of wastewater.

% Conc.	S1	S2	S3	S4	S5
0.1	595	962	355	414	340
1	786	820	380.2	561	540
10	663	530	319	361	375
20	613	389	292	375	450
30	834	532	338.8	336.1	474
40	588	398	452	339	422
50	520	636	374	275	366
60	211	708	465	288.4	424
70	202	432	347	243	383
80	200	388	418	181	558
90	192	312	108	222	269
100	204	293	106	275	325
Control	269	269	269	269	269
EC ₅₀	134.5	134.5	134.5	134.5	134.5
SC ₂₀	322.8	322.8	322.8	322.8	322.8

S1 = Aerated lagoon.

S2 = Anoxic Mid. Fac. lagoon.

S3 = Oxid. Fac. lagoon.

S4 = Polishing lagoon.

S5 = Eff. Pump. Station.

Table (1) comparing the influent and effluent parameters, we notice that the TSS (total suspended solids) was reduced by 75%, while the BOD (biological oxygen demand) was reduced by 90%. The coliform counts were reduced by 99.9%.

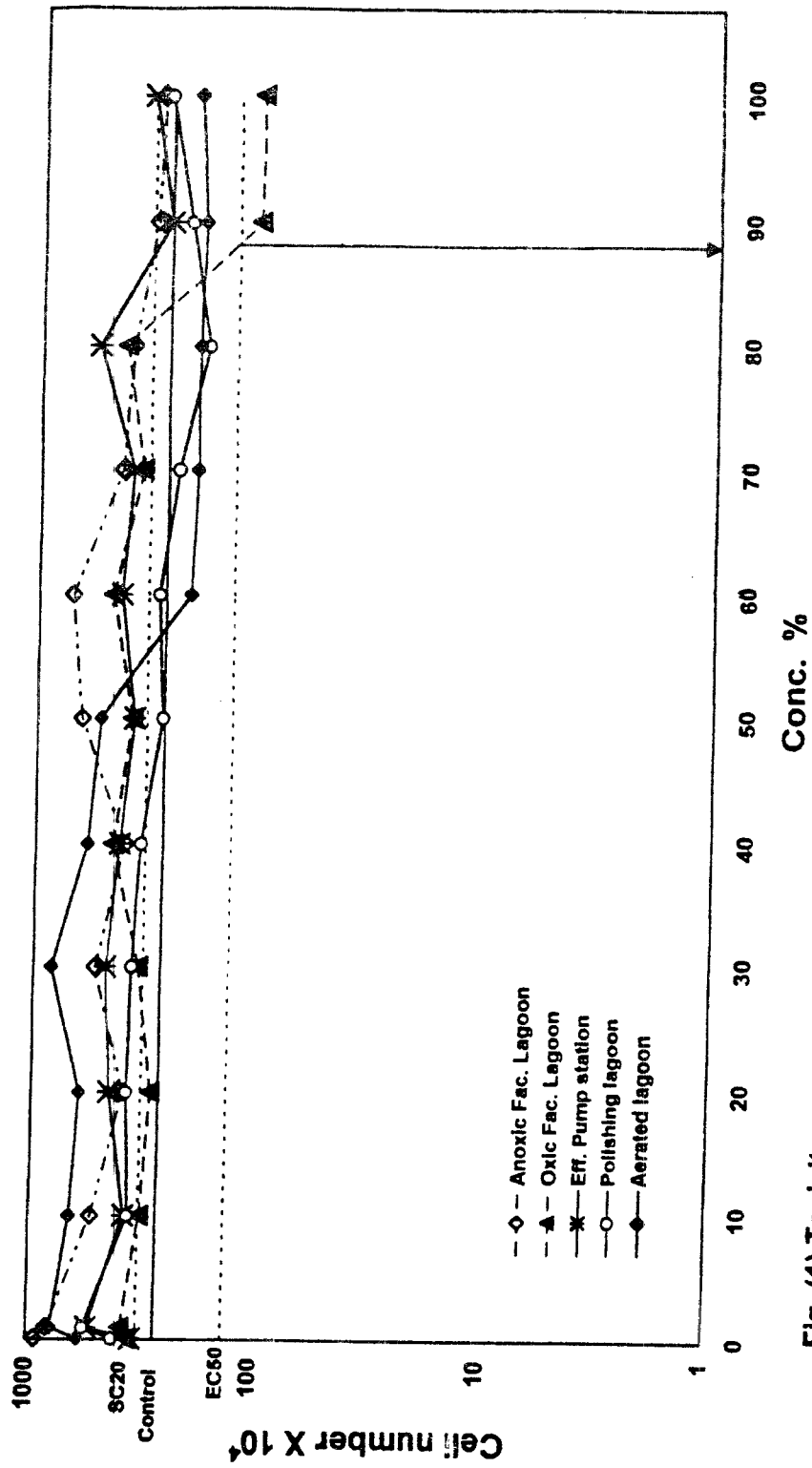
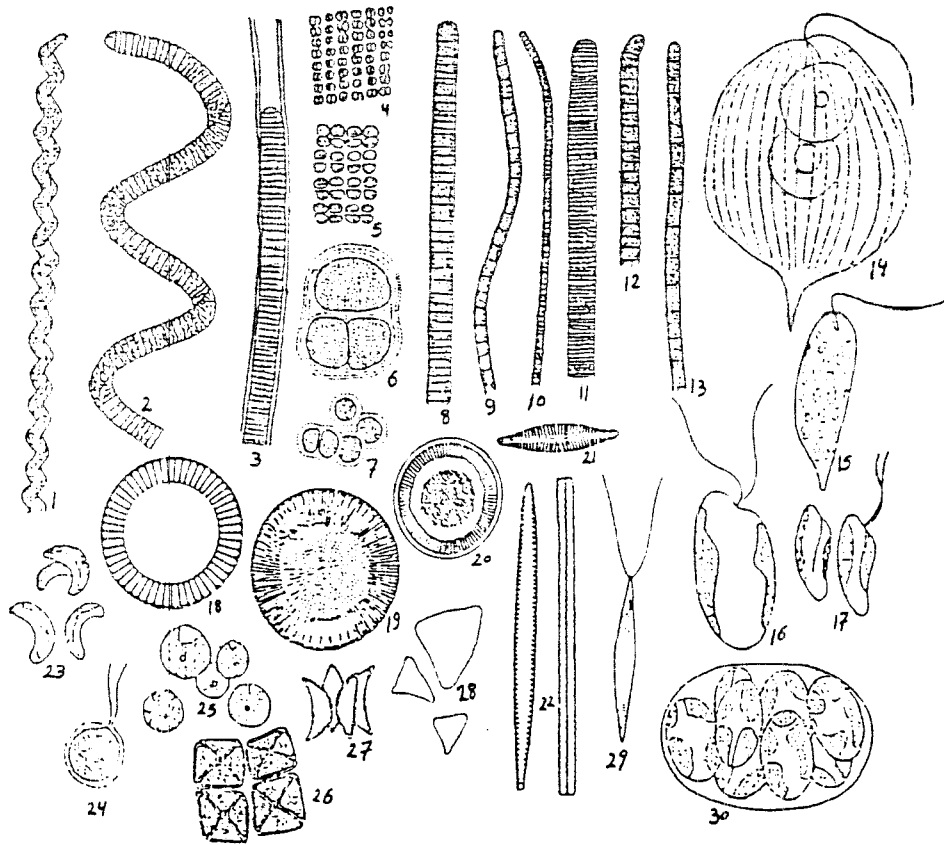


Fig. (1) Toxicity assessment using algal bioassay for different wastewater lagoons.

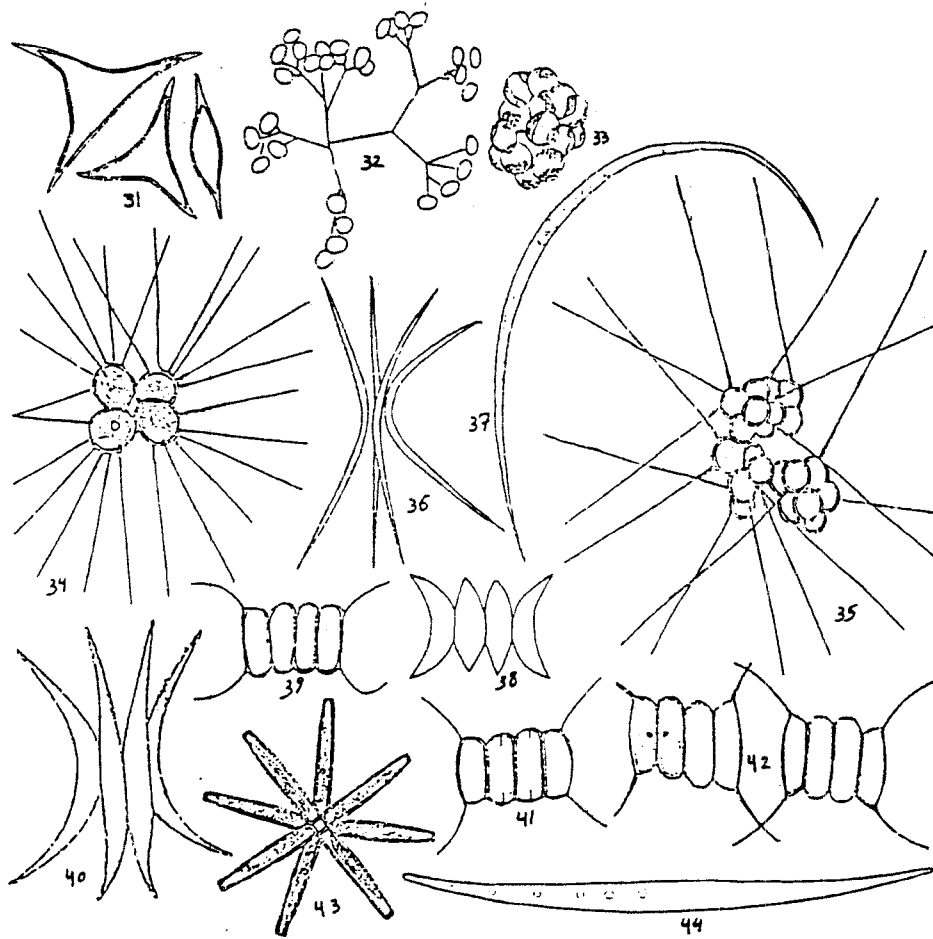
Plate (1): Algal species identified in the wastewater lagoons.

1. *Spirulina princeps* (L=5 μ)
2. *Arthrospira platensis* var. *tenui* (L=6 μ)
3. *Lyngbya martensiana* (L=2.5 μ)
4. *Merismopedia tenuissima* Lemm. (D=3 μ)
5. *Merismopedia glauca* (D=100 μ)
6. *Chroococcus turgidus* (D=30 μ)
7. *Chroococcus minutus* (D=8 μ)
8. *Oscillatoria subbrevis* (L=1.2 μ)
9. *Oscillatoria willie* (W=3 μ)
10. *Oscillatoria foreau* (W=3 μ)
11. *Oscillatoria curviceps* (L=3 μ)
12. *Oscillatoria chlaybea* (L=5 μ)
13. *Oscillatoria amphibia* (L=5 μ)
14. *Phacus orbicularis* var. *caudatus* (L=70 μ)
15. *Euglena gracilis* (L=50 μ)
16. *Cryptomonas ovata* (L=60 μ)
17. *Chroomonas nordstedii* (L=11 μ)
18. *Cyclotella menegheniana* (D=15 μ)
19. *Cyclotella comto* (D=20 μ)
20. *Cyclotella michiganiana* (D=10 μ)
21. *Navicula canalis* (L=13 μ)
22. *Cyndra actinastroides* (L=35 μ)
23. *Selenastrum minutum* (D=3 μ)
24. *Chlamydomonas pseudopertyi* (D=18 μ)
25. *Chlorococcum humicola* (D=15 μ)
26. *Crucigenia tetrapedia* (D=6 μ)
27. *Tetrademus wisconsinense* (L=13 μ)
28. *Tetraedron muticum* (D=9 μ)
29. *Chlorogonium spirale* (L=19 μ)
30. *Oocyst borgei* snow (D=12 μ)
31. *Tetraedron trigonium* var. *gracille* (D=30 μ)
32. *Dictyosphaerium ehrenbergianum* (D=6 μ)
33. *Botrydiopsis arhiza* (D=9 μ)
34. *Micractinium pusillum* var. *elegans* (D=7 μ)
35. *Micractinium pusillum* Fresensius (D=4 μ)
36. *Ankistrodesmus flacatus* (L=65 μ)
37. *Ankistrodesmus flacatus* var. *mirabilis* (L=150 μ)
38. *Scenedesmus dimorphus* (L=17 μ)
39. *Scenedesmus quadricauda* var. *longispina* (L=9 μ)
40. *Scenedesmus acuminatus* (L=35 μ)
41. *Scenedesmus armatus* var. *bicaudatus* (L=10 μ)
42. *Scenedesmus quadricauda* var. *maxima* (L=30 μ)
43. *Actinastrum gracilimum* (L=17 μ)
44. *Closterium peracerosum* var. *elegans* (L=140 μ)

Continue, Plate (1).



Continue, Plate (1).



Although the wastewater treatment plant at Port Said, Egypt, could be considered efficient for improving some parameters of wastewater like total suspended solids, biological oxygen demand and Coliform counts, it can't be considered as sufficient to pump its effluent to Lake Manzala. The effluent is slightly toxic and it is certainly rich in the inorganic nutrients. This high nutrient content would undoubtedly lead to high eutrophication of the lake which is already over-loaded. The lake is used as one of the main fishery resources in Egypt. Therefore, the design of this treatment plant and other similar ones distributed in the country must be changed to the high-rate algal-bacterial system in which circulated high-rate ponds will be used for vigorous algal growth that would consume the inorganic nutrients and then harvested for fertilizer or fuel production (Oswald, 1985 and 1991). If such a design change is not considered, the toxicity of the effluent and the high eutrophication would have their drastic impact on the lake biota and public health.

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الملخص العربي

دراسة الطحالب المتواجدة في بحيرات معالجة مياه الصرف الصحي وكفاءة محطة المعالجة في مدينة بورسعيد بمصر

تمت دراسة الطحالب المتواجدة في بحيرات محطة معالجة مياه الصرف الصحي بمدينة بورسعيد كمياً وكيفياً كدلالة بيولوجية على مدى التحسن والتغير الحادث في مياه الصرف الصحي وذلك في بحيرات الأكسدة الهوائية والاختيارية والتهديبية قبل ضخ المياه المعالجة إلى بحيرة المنزلة.

بينت الدراسة أن الطحالب السائدة في البحيرة الأولى وهي بحيرة الأكسدة الهوائية هي الطحالب الخضراء المزرققة وباختبار السمية عن طريق الطحالب الحساسة في المعمل تبين أن راسح مياه هذه البحيرة سام مع التركيزات العالية. كما كانت المنطقة غير المؤكسدة في البحيرة الاختيارية تسودها أيضاً الطحالب الخضراء المزرققة ولكن مياهها لم تكن سامة في اختبار الطحلب الحساس سيليناسترم كابريركورنوتم. وبالنسبة للجزء المؤكسد من البحيرة الاختيارية فقد كان مختلفاً عن الجزء غير المؤكسد مشيراً إلى تغير واضح في صفات المياه المعالجة حيث كانت الطحالب السائدة في هذا الجزء من البحيرة هي الدياتومات المركزية والطحالب الخضراء ثم الطحالب الخضراء المزرققة. وفي اختبار السمية أثبتت مياه هذا الجزء من هذه البحيرة أنها محفزة لنمو الطحلب الحساس ماعداً عند تركيزات ٩٠، ١٠٠% التي كانت سامة حتى تحت مستوى التركيز الذي يقتل ٥٠% من خلايا الطحلب الحساس ويمكن أرجاع هذه السمية إلى الأعداد الغير قليلة من طحلب أوسيلاتوريا أمفيبيا. أما البحيرة الأخيرة في محطة المعالجة وهي البحيرة التهديبية فكان الطحلب السائد فيها هو الدياتوم المركزية سيكلوتيللا مينيغينيانا متبوعاً بالطحلب الأخضر كروسيجنيا تيترابيديا وتبين أن مياهها سامة في اختبار السمية مع تركيزات فوق ٧٠% وتعزى هذه السمية أيضاً إلى أعداد غير قليلة من طحلب أوسيلاتوريا أمفيبيا. أما مياه محطة الضخ إلى بحيرة المنزلة فكان يسودها دياتوم سيكلوتيللا مينيغينيانا والطحلب الأخضر انكستروديزمس فالكاتس وثبت أنها سامة بتركيزات ٩٠% فما فوق.

أثبتت هذه التحاليل الطحلبية الكيفية والكمية مع اختبارات السمية بالطحالب الحساسة أن كفاءة محطة معالجة الصرف الصحي بمدينة بورسعيد غير كافية وهذه النتائج البيولوجية تتفق من نتائج تحليل الأكسجين اللازم للأكسدة البيولوجية والأكسجين اللازم للأكسدة الكيميائية وكذا مجموع المواد العالقة.