ESTIMATION OF SOME CHEMICAL FACTORS IN THE WATER SAMPLES COLLECTED FROM DIFFERENT PARTS OF SIND AREA

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Water samples were collected from 24 localities and 120 stations from the province of Sind to isolate the eurythermic strains of fresh water phytoplankton. One hundred twenty samples were analysed for dissolved oxygen, free carbon dioxide, ammonia, nitrate, nitrite, silica, manganese and inorganic phosphorus present in the aquatic habitates.

It was noted that *Chlorella vulgaris, Chloroceum humicola, Scenedesmus dimorphus, Scenedesmus quadricauda* and *Monoraphidium contortum* appear to be resistant to fluctuation in the concentration of the above chemicals in the water body from different localities of Sind. Significant variations among chemical constituents were observed (Table 1).

Keywords: Estimation, Chemical factors, Water samples.

INTRODUCTION

An aquatic environment is a dynamic system in which complex interactions take place among the diversed organisms and its abiotic factors. In this regard Mc Combe [1] and Hutchinson [2] have been investigated that pH, oxygen, free carbon dioxide, inorganic phosphate, ammonia, nitrite, nitrate, silica and manganese are extremely important chemical factors for phytoplankton growth and for their pattern of distributions in the aquatic environments such as lakes, rivers, ponds and pools. These also effect on the population of their surroundings.

Phytoplankton occuring in ponds, puddles, pools, lakes and rivers are considered as chief sources of food for fish population. The limnologists have taken, therefore, interest in phytoplankton due to their ability to synthesize protein. The present work was undertaken during August, 1983-February, 1985, to report phytoplankton and water characteristics from the province of Sind.

In nature phytoplankton obtain their phosphorus from phosphate salts. Phosphorus supply, therefore, effects both the building and energy metabolism as studied by many workers [3-8]. An increased quantity of nitrogen and phosphorus has been recorded in winter season, the same becomes decreased after blooming period has been demonstrated by Fogg [9].

pH, nitrogen, ammonia, silica, and manganese effect the production of phytoplankton and other inhabitants of water. Nitrogen in the water body is generally present in the form of ammonia, nitrate and nitrite which are produced during decomposition of planktonic organism by direct bacterial action as cited by Emerson and Lewis [10] and Myeres [11].

MATERIALS AND METHODS

Water samples were collected from 25 localities and 120 stations (Map of Sind). Samples were filtered twice before estimation of nutrients. Dissolved oxygen was determined by the procedure of Welch [12]. Free carbon dioxide was determined after Ellis *et. al.* [13]. Ammonia was estimated by a modification of the original method of
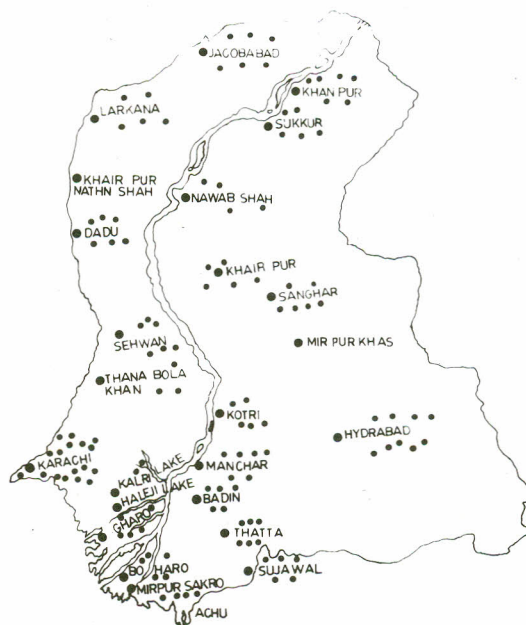
Map of Sind showing places of collection.

Nessler [13]. Nitrite was determined after Snell and Snell [14]. Nitrate was estimated by phenoldisulphonic acid method [14]. Silica contents were determined by the method recommended by the Institute of Water Engineers, London [15]. Manganese was determined by modified permanganate method [13] and inorganic phosphate was determined by Fogg and Wilkinson's method [16].

RESULTS AND DISCUSSION

During the survey, it was generally observed that phytoplankton concentration has increased with the increase in the concentration of nitrogen and phosphorus. In every season, the dominating species were *Scenedesmus quadricauda, S. dimorphus* and *Monoraphidium centortum*. These eurythermic species contain high percentage of protein [17] and can florish very well in the temperature range of Sind region which usually remain 10-44°.

Maximum concentration of green algae were observed during March-August [18]. Maximum blooms of cyanophyceae appeared from July to August. Besides temperature fluctuations, chemical constituents also influence the concentration of the species abundance in the particular locality [17] the level of important nutrients remain high throughout the year in the different parts of Sind (Table 1).

The quantity of dissolved oxygen varied from 0.4-4.6 μmg/l. Maximum was recorded at Kotri barrage, Haleji lake, Kalri lake, Hyderabad, Larkana, Gharoo, Boharo and

Mirpur Khas (Table 1). Significant lower values were observed from the most of the localities of Sind due to the fluctuation in the atmospheric temperature and light which effect on the rate of photosynthesis of phytoplankton population.

Maximum concentration of free carbon dioxide were recorded in the waters of Sanghar, Khairpur Nathan Shah, Kalri lake and Haleji lake. It ranged from 1.3-10.9 μmg/l (Table 1).

The concentration of ammonia varied in between 252-506 μmg/l. The maximum concentration was observed from Manchar and Sehwan (Table 1), during the month of October few species of *Oscillatoriales nostocales* and some diatoms were also recorded in this concentration (Zahid, 1988, unpublished).

The amount of nitrate varied from 93.7-138.0 μmg/l. The maximum concentrations were recorded in the Haleji, Hyderabad, Achu lake, Boharo, Manchar, Sehwan and Mirpur Khas. Species of *Scenedesmus* were growing there in abundance (Table 1).

Nitrite concentration varied from 2.3-13.7 μmg/l (Table 1) at Sehwan and Karachi. Abundant growth of the species belonging to genus *Scenedesmus* and *Monoraphidium* was recorded.

Silica contents varied from 12.0-48.4 μmg/l. Maximum concentration was recorded in the waters of Manchar, Sanghar, Khanpur, Sehwan and Dadu (Table 1).

Manganese concentration varied from 30.5-76.3 μmg/l.

Table 1. Mean concentration of chemical factors in water samples collected from Sind – Pakistan

S. No.	Location	Dissolved O$_2$ μmg/l	CO$_2$ μmg/l	Ammonia μmg/l	Nitrate μmg/l	Nitrite μmg/l	Silica μmg/l	Manganese μmg/l	Inorganic phosphorus μmg/l
1.	Karachi	1.52±0.0	2.73±0.1	395±0.7	109.11±0.4	3.48±0.0	17.06±0.2	69.76±0.3	133.92±0.3
2.	Hyderabad	2.81±0.2	1.53±0.3	497.33±0.4	136.92±0.5	13.48±0.0	12.06±0.3	50.03±0.4	136.82±0.4
3.	Kotri	4.62±0.0	4.35±0.2	449.5±0.3	103.53±0.3	2.35±0.0	16.25±0.3	67.15±0.2	90.24±0.35
4.	Mirpur	3.01±0.0	1.42±0.2	410.73±0.5	100.24±0.6	2.92±0.6	16.3±0.3	58.6±0.3	110.14±0.3
5.	Haleji	3.35±0.0	9.22±0.2	502.0±0.4	138.12±0.5	5.21±0.0	16.75±0.3	76.35±0.3	105.22±0.35
6.	Thatta	1.36±0.0	5.61±0.2	464.14±0.5	109.55±0.5	2.76±0.0	14.73±0.2	71.15±0.3	136.82±0.3
7.	Sujawal	1.00±0.0	4.22±0.2	378.12±0.5	98.67±0.4	4.17±0.5	14.44±0.2	64.33±0.3	140.36±0.3
8.	Badin	1.42±0.0	3.72±0.2	433.11±0.5	142.62±0.4	5.87±0.0	22.2±0.1	65.37±0.3	110.33±0.3
9.	Mirpur Sakro	1.44±0.0	2.61±0.2	371.72±0.4	93.72±0.3	3.30±0.0	17.41±0.1	59.03±0.3	141.32±0.3
10.	Ghulam Ullah	1.82±0.0	1.42±0.3	408.31±0.3	100.32±0.4	4.01±0.0	14.46±0.2	60.65±0.3	98.91±0.3
11.	Achu lake	1.12±0.0	1.33±0.2	431.33±0.3	129.23±0.3	4.91±0.0	16.22±0.2	69.75±0.3	142.38±0.2
12.	Jacobabad	1.45±0.0	1.41±0.3	412.92±0.3	115.91±0.4	3.66±0.0	13.72±-0.2	60.33±0.3	137.21±0.2
13.	Gharoo	2.35±0.0	1.55±0.2	491.12±0.4	127.85±0.4	4.27±0.0	14.32±0.2	61.25±0.3	127.85±0.3
14.	Nawabshah	1.98±0.0	2.12±0.1	472.34±0.4	120.35±0.4	4.35±0.0	14.25±0.2	62.71±0.3	143.37±0.3
15.	Boharo	3.05±0.0	1.72±2.5	453.92±0.4	128.27±0.5	4.00±0.0	13.83±0.2	63.32±0.3	137.25±0.2
16.	Manchar	0.75±0.0	8.17±0.1	252.12±1.2	128.44±1.2	4.55±0.0	48.45±0.3	43.11±0.3	156.42±0.4
17.	Kalri	3.42±0.0	9.35±0.2	287.32±0.4	126.95±0.8	4.62±0.1	22.17±0.3	40.75±0.2	70.82±0.4
18.	Sehwan	1.35±0.0	6.65±0.1	506.25±0.6	133.62±0.5	13.72±0.2	33.63±0.2	38.43±0.2	141.55±0.4
19.	Larkana	2.36±0.0	15.82±0.1	315.31±0.9	141.15±0.5	4.01±0.0	21.52±0.1	39.45±0.2	108.44±0.5
20.	Dadu	0.55±0.0	13.00±0.2	460.37±1.3	120.00±0.6	4.00±0.0	32.78±0.4	30.51±0.3	122.66±0.5
21.	Khanpur	1.49±0.0	13.42±0.2	360.01±0.4	96.65±0.5	3.75±0.0	35.6±0.2	40.52±0.4	73.00±5.0
22.	Sanghar	1.26±0.2	10.92±0.3	410.1±1.3	118.24±0.5	4.14±0.0	42.67±0.3	35.47±0.4	52.83±0.3
23.	Khairpur Nathan Shah	0.45±0.0	9,72±0.4	472.5±0.2	102.15±0.2	3.81±6.0	24.95±0.3	37.45±0.3	168.77±0.3
24.	Mirpur Khas	2.56±0.0	2.16±0.1	475.12±0.5	128.34±5.0	4.08±0.0	17.36±0.2	59.55±0.3	137.3±0.2

Maximum records were observed from Haleji lake, Thatta, Karachi, Achu lake, Kotri and Hyderabad, (Table 1).

The concentration of dissolved inorganic phosphate was fluctuated between 52.8-168.7 µmg/l. Its maximum records were found from the waters of Khairpurs Nathan Shah, Jacobabad, Boharo, Mirpur Sakro and Mirpur Khas (Table 1).

CONCLUSION

It is concluded that species of green algae such as *Chlorella vulgaris, Chlorococcum humicola, Scenedesmus dimorphus, S. quadricauda* and *Monoraphidium controtum* appeared to be resistant to the concentration of dissolved oxygen, carbon dioxide, ammonia, nitrate, nitrite, silica, manganese and inorganic phosphorus as compared to other algal species. Even in the presence of maximum concentration of the above chemicals these species have been collected throughout the year from almost all the localities mentioned in the (Table 1). Therefore these species can be considered (Table 1) for the mass cultivation purpose.

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