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on
Impact of Globalization on
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Ecological and Physicochemical Studies on Blooms of *Melosira* and *Gymnodinium* in Pune (MS) Area

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Abstract :

A dense growth of planktonic algae often involving just one or few species and usually imparting a distinct colour to the water body is referred to as "Algal blooms" or

"Flowering of waters". Blooms generally seen to occur when the water is sufficiently rich in dissolved plant nutrient. Bloom formation is attributed to the algal genera belonging to the classes *Bacillariophyceae*, *Chlorophyceae*, *Cyanophyceae*, *Dinophyceae* and *Euglenophyceae*.

In the present study blooms of *Melosira* and *Gymnodinium* were investigated from two ponds in pune region. Studies were conducted to determine ecological and physicochemical parameters like dissolved oxygen, free CO₂, pH, total hardness, Total suspended solids, sulphates, orthophosphates and chlorides responsible for blooms of *Melosira* and *Gymnodinium*. The results indicate that bloom of *Melosira* mostly occur in oxygen deficient water with high level of organic matter. Whereas the bloom of *Gymnodinium* preferred water with low level of phosphates, sulphates, suspended solids and high concentration of bicarbonates, hardness and organic matter.

Key Words : Algal bloom, *Melosira*, *Gymnodinium*, Physicochemical parameters, Pune region.

Introduction:

Water is very precious for every living organism on this earth. Water of good quality is required for living organisms for its survival. Ponds have been used since time immemorial as a traditional source of water supply in India. Water quality can be defined in terms of physical, chemical and biological characterization of water. However, the water of the ponds, lakes and river are polluted mainly due to discharged waste water from residential areas, sewage outlets, solid wastes, detergents, automobile oil wastes, fishing facilities and agricultural pesticides from farmlands. Nutrients like phosphorus and nitrogen from the domestic wastes and fertilizers accelerate the process of eutrophication (Rao and Valsaraj, 1984; Jalizadeh et al., 2009). Ponds constitute an ecosystem that supports a wide array of organisms ranging from lower plants to higher plants. The distribution and abundance of microalgae in this system are controlled by a wide range of physical, chemical and biological factors. Presently, the biodiversity of pond and lake ecosystems is endangered by human activities, among which the most imperative comprise of threat of eutrophication, acidification and pollution by poisonous substances. Implementation of new environmental strategies and administrations, and international agreements, have resulted in signs of changes that should improve the ability to manage old as well as new, yet undiscovered threats. Lakes and ponds are important freshwater habitats throughout many regions of the world.

although the amount of water in them constitutes only a minute fraction of the total freshwater resource on earth. Since ancient times, ponds have been used as a customary resource of water supply in India.

Materials and Methods:

Hadapsar Fish Pond (Melosira bloom):

The pond is situated near main entrance gate. The pond measured about 200' in length, 125' in breadth and 6' in depth. The khadakwasla canal forms the source of water for the pond. Rice bran oil cakes were added regularly to pond water, as it was used for fish spawning.

Chaturshringi Hill Quarry (Gymnodium bloom):

The pond was located behind the famous chaturshringi temple and was smaller in size about 50' in length, 35' in breadth and 4' in depth.

Sampling method:

Water samples from above locality mentioned above was collected and analysed for various physico-chemical parameters following table describes the methodology. The methods recommended by APHA (1980) have been followed in most cases. Quantitative analysis of the algae was done by simple drop method. Frequency of an algal form in a sediment sample was calculated by counting its individuals at 10 different fields in a single drop (0.05 ml.) under 10X or 45X magnification of microscope objectives. Algal forms from the samples were identified using standard monographs. Photographs of the study site, and the microscopic specimens were taken using Minolta-X-700 camera.

Table No. 1:

Sr.No.	Parameters	Methods
1.	Dissolved Oxygen	Modified Winkler method
2.	pH	pH Paper
3.	Chloride	Titrimetric method
4.	Total Hardness	Titrimetric method
5.	Ortho-phosphate	Ammoniummolybdate stannous chloride method
6.	Sulphate	Colorimetric method
7.	Free CO ₂	Titrimetric method
8.	Total Alkalinity	Titrimetric method
9.	Bi- Carbonates	Titrimetric method
10.	Carbonates	Titrimetric method

Discussion:

Centrales have been to occur in blooms (Bold and Wynne, 1985). Earlier reports indicate preference of centrales to the alkaline waters (Liebmann, 1962; Cholonoky, 1968; Swala, 1969; Hecky and Kilham, 1973). The authors observations on Hadapsar fish pond B agrees with the observations mentioned above (Hecky and Kilham, 1973 and Bhargava and Alam, 1979) found less alkaline water as most favourable for the growth of centrales. But in Hadapsar fish pond B, total alkalinity was much higher and ranged up to 290 mg/lit. Even biochemical

oxygen demand was high particularly during the bloom of *Melosira*, indicating higher load of organic matter in the pond. Aspecies of *Cyclotella* which is a common member of central diatom has been repted in water which are oxygen deficient and with a high level of organic matter (Cholonoky, 1968; Round, 1984). *Melosira* appears to follow the path of *Cyclotella* in this regard.

Dinoflagellate blooms have been known to occur commonly in the marine environment and often described as "red tides". In fresh water environment dianoflagellates commonly seen in pools, ditches, ponds, puddles, lakes and rivers. However, very little attention has been paid to study ecology of this groups (Venkateshwarlu, 1990).

Philipose, 1959 reported that *Peridinium* and *Ceratium* frequently forms blooms in turid water giving dirty brown colour to the water. Venkateshwarlu et. al. (1990) studied blooms caused by *Peridinium*, *Gymnodinium* and *Glenodinium*.

While studying algal flora of an abandoned quarry water near National Chemical Laboratory (NCL) the author came across bloom of *Gymnodinium* giving green yellow colour to the water. According to Loeblich, (1966) various factors like vitamin B12 high silicate, high salinity, light, temperature, water stratification, sees population and favourable concentrations of nutrients are responsible for formation of dinophycean bloom. While studying water bodies from Osmania university campus Venkateshwarlu, et. al. (1990) attributed factors such as high alkalinity and high oxygen level for the development of blooms of dianoflagellates. The water of abandoned quarry near N C L as studied by author was alkaline PH of 8.0 contrary to the findings of Venkateshwarlu, et. al. 1990, the fish pond water was moderate in its oxygen content. It seems that the observed *Gymnodinium* bloom preferred water with low level of phosphates, sulphates, suspended solids and high concentration of bicarbonates, hardness and organic matter.

Conclusions :

For the occurrence of *Melosira* bloom high load of organic matter, high total alkalinity appeared to be responsible. Where as for bloom of *Gymnodinium heterostratum* low levels of phosphates, sulphates, suspended solids and high concentrations of bi-carbonates, and high amount of organic matter are mainly responsible.

Table No. 2

Physico - Chemical observations on *Melosira* Bloom :

Sr. No.	Parameters	Observation
1	Colour	Green
2	Temperature	32°C
3	pH	7.5
4	Dissolved Oxygen	1.61 mg/l
5	BOD	141 mg/l
6	Free CO ₂	15.4mg/l
7	Total Alkalinity	290mg/l
8	Carbonates	00
9	Bicarbonates	290mg/l
10	Hardness	88mg/l
11	TSS	2.4mg/l
12	Sulphates	0.07mg/l
13	Phosphates	0.02mg/l



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Phytoplankton Analysis : Following algal genera were recorded as occurring in the fish pond—B- *Scenedesmus* *Cyclotella* *Melosira* & *Pediastrum*, of these *Melosira granulata* (Ehr.) Ralfs. Dominated the other genera . Population of *Melosira* species was 167×10^5 individuals/ lit.

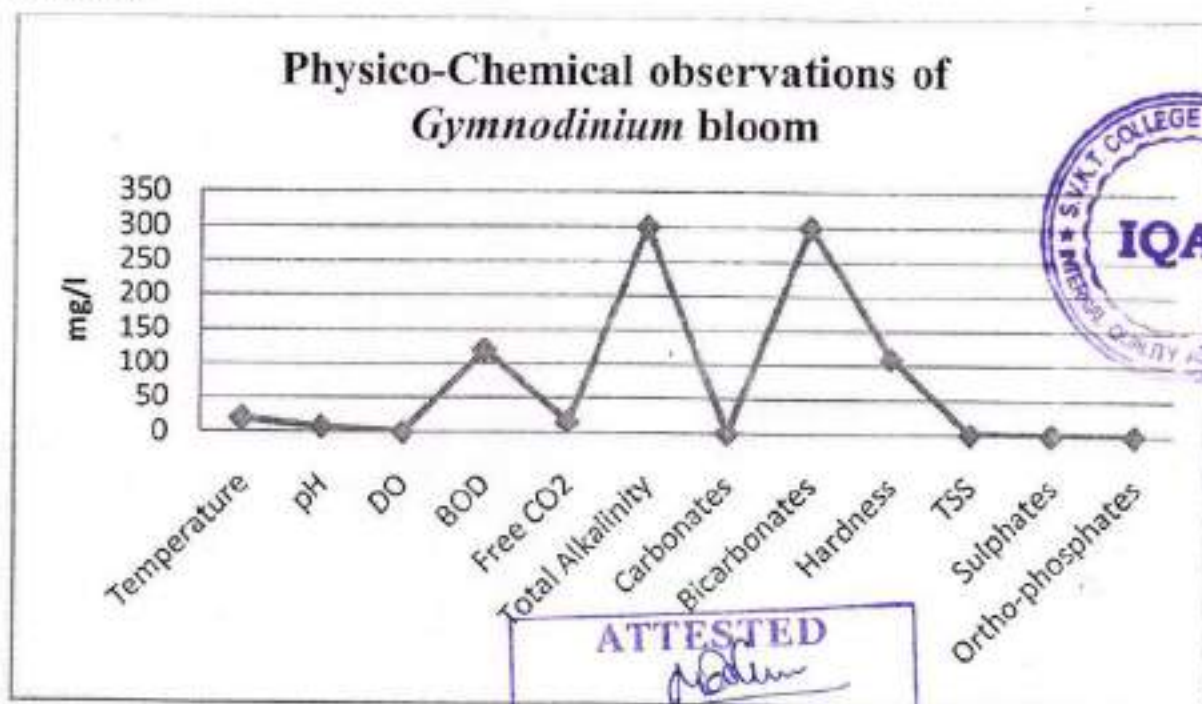
Table No.3:

Physico – Chemical observations on *Gymnodium* Bloom:

Sr.No.	Parameters	Observation
1	Colour	Yellow Green
2	Temperature	20°C
3	pH	8
4	Dissolved Oxygen	1 mg/l
5	BOD	120 mg/l
6	Free CO ₂	15.4mg/l
7	Total Alkalinity	300mg/l
8	Carbonates	00
9	Bicarbonates	300mg/l
10	Hardness	110mg/l
11	TSS	1.24mg/l
12	Sulphates	0.29mg/l
13	Ortho-Phosphates	0.1mg/l

Phytoplankton analysis : The water samples from chatushringi quarry was dominated by the *Gymnodinium heterostratum* (Kof.) population . The total no of *Gymnodinium* individuals per lit. was 331×10^5 collective population of *Euglena* , *Chlorella* & *Oscillatoria* was 33×10^5 ind/ lit.

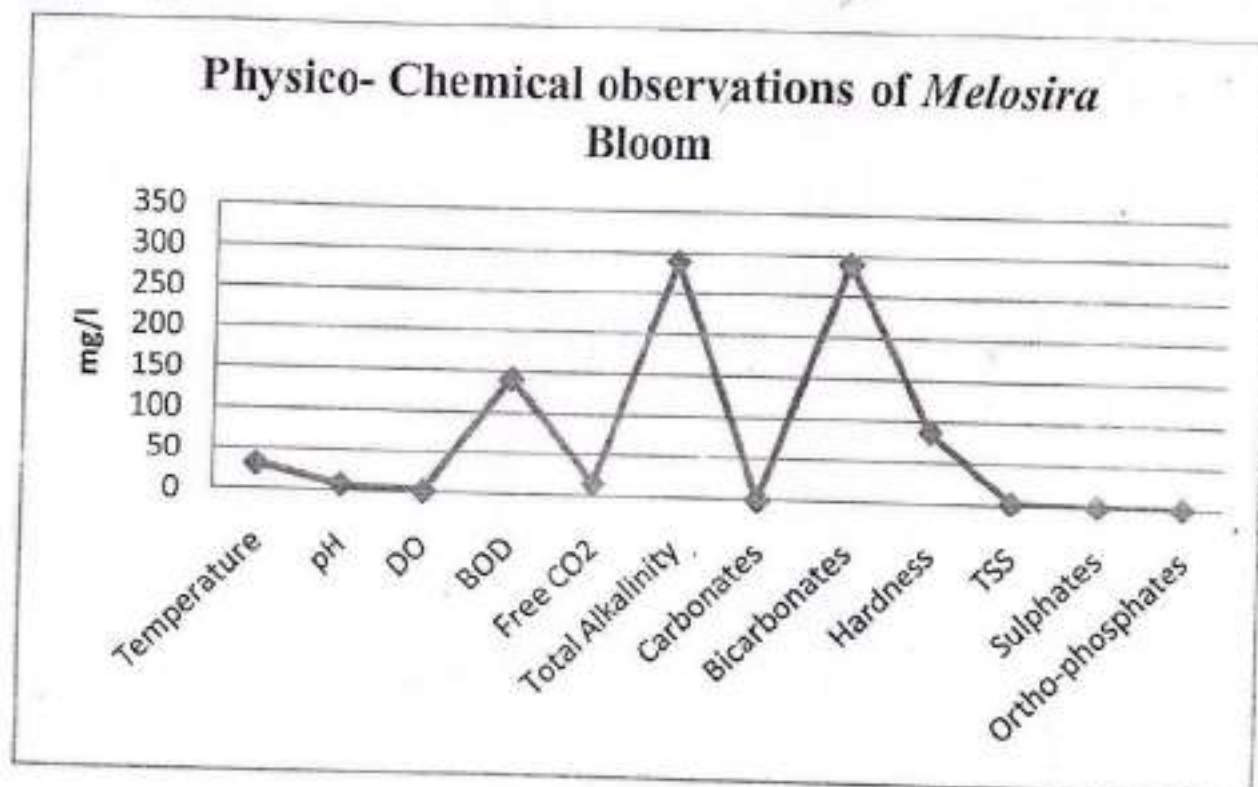
Graph No.1



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Graph No.2

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of Dept. of Microbiology, SVKT Arts, Sci & Comm College, Nashik has participated / published a paper on
Ecological & physicochemical studies on blooms of Metasira . His/Her
and Gymnodinium in Pune (MS) area .
active participation in this Conference is appreciated.

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