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Ecological and Physico-Chemical Studies on Blooms of Anabaena in Hadapsar Fish Pond, Pune (M.S.) Area

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Absract

A dense growth of planktonic algae often involving just one or few species and usually importing distinct color to the water body is referred to as "Algal blooms". Bloom mostly seen to occur when the water is sufficiently rich in dissolved plant nutrients. Bloom formation is attributed to algal genera belonging to the class Bacillariophyceae, chlorophyceae, cyanophyceae, Dinophyceae and Euglenophyceae.

In the present study a bloom of *Anabaena* was investigated in the fish pond near Hadpsar(Pune). The pond was studied for oxygen, free CO2, PH, total hardness, total suspended solids, sulphates, ortho phosphates chlorides. Phytoplankton analysis of the pond was also studied. The results of the observations indicate that bloom of *Anabaena*mostly occur due to warmer water, alkaline pH, higher levels of organic matter and bicarbonates. No fish mortality was reported during the period of bloom.

Key words: Physico-chemical parameters-*Anabaena*- algal bloom- fish mortality-Pune.

Introduction

Water is a transparent and nearly colorless chemical substance that is the main constituent of Earth's streams, lakes, and oceans, and the fluids of most living organisms. Water plays an important role in the world economy. Approximately 70% of the freshwater used by humans goes to agriculture.

Human activities (e.g., agricultural runoff, inadequate sewage treatment, runoff from roads) have led to excessive fertilization (eutrophication) of many water bodies. Cyanobacteria can grow rapidly in surface water and cause bloom (Carmichael, 1992; Humbertb etal-2010; Dadheech etal-2001; Rollond etal-2010; Codd GA etal-2005)Nutrients like phosphorus and nitrogen from the domestic wastes and fertilizers accelerate the process of eutrophicationThis has led to the excessive proliferation of algae and cyanobacteria in fresh water and thus has had a considerable impact upon recreational water quality. In temperate climates

cyanobacterial dominance is most pronounced during the summer months, which coincides with the period when the demand for recreational water is highest.Cyanobacteria, or blue-green algae, are ubiquitous in nature and found in nearly all environments. Many species have selective advantages such as the ability to use atmospheric nitrogen for growth or gas vacuoles to control their exposure to light. In contrast to true algae, many species of planktonic cyanobacteria possess specialized intracellular gas vesicles. Implementation of new environmental strategies and administrations, and international agreements, are positive 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.

Hadapsar Fish Pond

The Department of Fisheries, Government of Maharashtra has constructed about ten ponds for fish spawning, near Hadapsar about 15km. east of Pune on Pune-Solapur highway. Out of these one pond was with dense algal growth and hense selected for the study.

PonD-A (Plate –I)

The pond measured 250' in length, 125'in breadth and 6' in depth. The sides of the ponds are well constructed so that the standing water would remain directly in contact with the terrain. The Khadakwasla canal forms the source of water for the pond. Rice bryan and oil cakes were regularly added to the pond water as the pond was used for fish spawning.

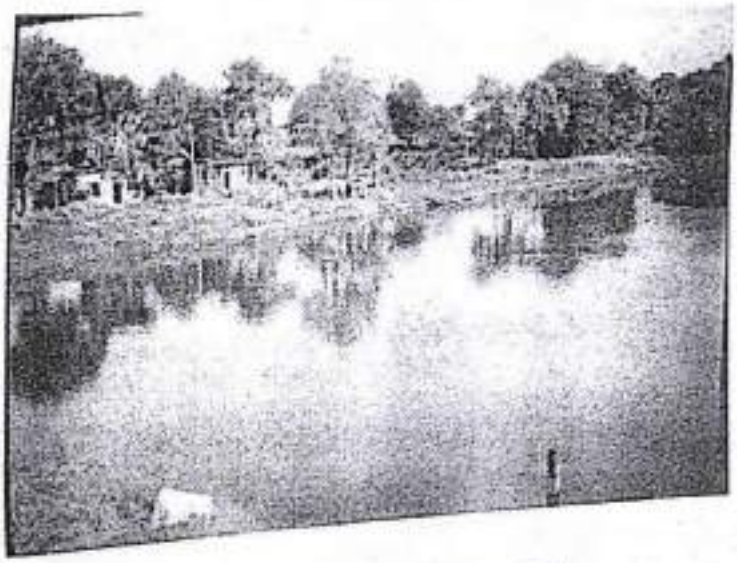


Figure-I: Hadapsar fish Pond-A

Materials and Methods

Samplingmethod

Water samples from locality mentioned above was collected and analysed for various physico-chemical parameters following table No.1 describes the methodology. The methods recommended by APHA 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 in a single drop (0.05 ml.) under 10X or 45X magnification of microscope objectives. Algal forms from 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	Titrimetricmethod
5.	Ortho-phosphate	Ammonium molybdate 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

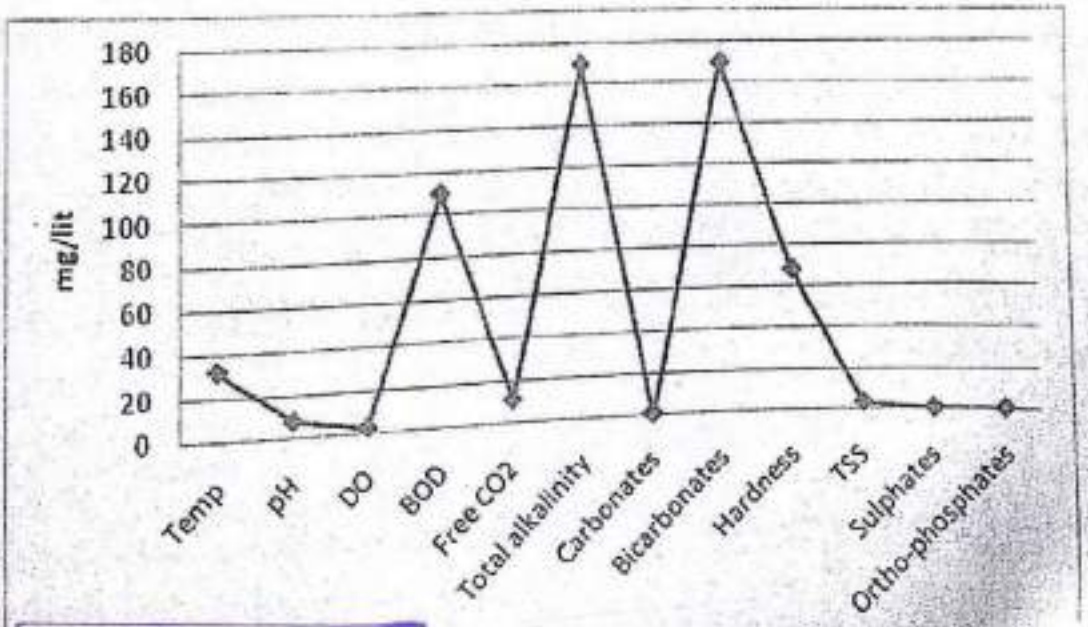
Observations

PHYSICO-CHEMICAL OBSERVATIONS ON ANABAENA BLOOM

Location: Fisheries Institute – Pond-A Hadapsar, Pune

Sr.No.	Parameters	Observation
1	Color	Green
2	Temperature	32°C
3	pH	7.5
4	Dissolved oxygen	2.21mg/l
5	Biochemical Oxygen Demand	110mg/l
6	Free Co2	10.4mg/l
7	Total Alkalanity	170mg/l
8	Carbonates	000mg/l
9	Bicarbonates	170mg/l
10	Hardness	68mg/l
11	Total suspended solids	2.8mg/l
12	Sulphates	0.12mg/l
13	Ortho-phosphates	0.06mg/l

Figure-II: Graph Physico-chemical observations on *Anabaena* bloom



Phytoplanktons: In this fish pond *Anabaena circinalis* Kutz was reported as bloom forming; the population of the *Anabaena* in the pond water was 159×10^5 trichoms/lit.

Similarly *Euglena, Navicuna, Scenedesmus* and *Cyclotella* were also noted in the pond.

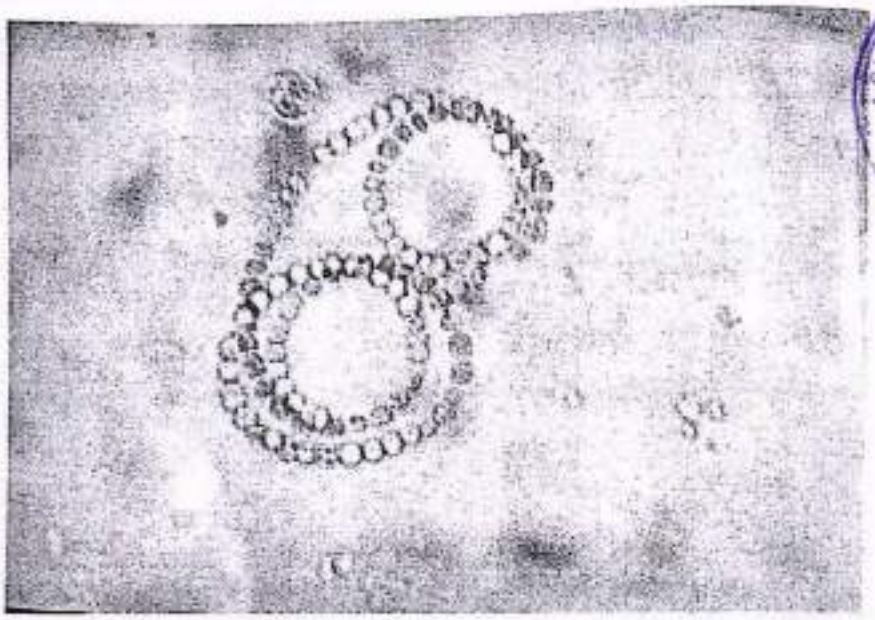


Figure-III: *Anabaena* sp.

Discussion

Anabaena circinalis Kutz. Was present in bloom in the Hadapsar fish pond A. The physico-chemi conditions were favorable for the growth of blue green algae. The water was alkaline and warm. Low organic matter was higher. The bicarbonates were at higher level. Philipose, (1972) recorded bloom of *Ancha spiroids* Kleb. when the phosphateconcentrations were much lower. But the level of phosphate was very l in the Hadapsar fish pond A. similar observations of water bodies with poor phosphate contents with b green algal blooms was made by Shrinivasan (1974). Abott, (1982) also did not correlate blue green al blooms with the levels of phosphates.

Blue green algal blooms are considered to be toxic to the fish and often lead to fish mortality. T bloom of Anabaena observed in the Hadapsar fish pond was light and appeared to be harmless to the fi Fauna. As indicated by Philipose, (1972) such light blooms may serve as food to the aquatic animals.

Conclusion

One more species of *Anabaena* viz *A.circinalis* developed into bloom in one of the fish pond locat at Hadapsar. Here also warmer water, alkaline pH, higher levels of organic matter and bicarbonates pla positive role in the formation of bloom. However, no fish mortality was reported during the period of bloo

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