

An Observation Of Water Analysis & Algal Flora Of Order Chroococcales In Water Pond Of Ranthambhore Fort at District Sawai Madhopur (RAJ.)

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Abstract: Regular monitoring of every water body has become an important environmental concern due to their contamination by human activities and modernization. These days, most of the freshwater bodies all over the world are getting polluted, thereby decreasing the suitability of the freshwater. The present paper deals with the assessment of certain physicochemical parameters and phytoplankton community in surface water samples of Padmala (Padam) Pond, a man-made ancient freshwater reservoir located in Ranthambhore Fort in Sawai Madhopur District of Rajasthan State. The water samples were collected from the sampling site for two years study period between November 2014 to October 2016 on a monthly basis and the seasonal data were evaluated. The results show fluctuations in the values of different physicochemical parameters in each season of both the sampling years. However, the values of most parameters were recorded higher in summer season except for the dissolved oxygen which found slight higher in winter season. The majority of phytoplankton species were found to be abundant during the summer season where values of most physicochemical factors were also higher. A total of 11 species of order Chroococcales belonging to 4 genera were recorded. These ponds were dominated by toxic cyanobacteria *Microcystis* spp and *Merismopedia* spp. These forms especially *M. aeruginosa* (Kutz.) found to be toxic for aquatic flora, fauna as well as human beings. These species are good indicators of water pollution.

Keywords: Ranthambhore fort, Phytoplanktonic diversity, Water pollution.

INTRODUCTION:

During the recent past, many studies on microscopic forms of algae (phytoplankton) have been highlighted their important role in monitoring the human-modified aquatic ecosystems. Phytoplankton, also regarded as biological indicator organisms, is essential component of any aquatic habitat and their presence are good source for the assessment of water quality¹.

Water is a vital concern of mankind since it is directly linked with human welfare. Infect the maintenance of a healthy aquatic ecosystem is dependent on the physico-chemical characters of water and also biological diversity (phytoplanktonic) of water ecosystem. The pollution of the aquatic environment is concerned as of the most serious problems faced by human. The water quality assessment involves the analysis of both physicochemical and biological characters of water and it reflects the biotic and abiotic status of an ecosystem. Aquatic organisms need a healthy environment to live and they require adequate nutrients for their growth and development, the productivity depends on the unique physicochemical properties of the water. The changes in hydrological condition of water considered as ecological indicators are being used to estimate the status of water pollution². The pollution of water is increase due to human population, use of fertilizer and man-made activity and by rich growth of phytoplankton. Phytoplankton is essential component of any aquatic habitat and good source of water quality³⁻¹³. They also affect water properties such as water color, taste, odor and chemical composition which may cause potential hazards for human and animal health. Temperature, pH, turbidity nutrients, hardness, alkalinity, BOD, DO etc. are some of the important hydrological factors that determine the growth of living organism in several freshwater bodies⁷. In the last three decades, a number of authors have studied the occurrence and range of algal flora in relation to physicochemical properties of polluted as well as non-polluted freshwater bodies across the world.¹⁴⁻¹⁷

Material and Methods:

Investigation area

Sawai Madhopur is the gateway to the world's renewed Ranthambhore National park a wild life reserve and a place of historical importance famous for conservation of Tiger.

The Ranthambhore fort, a famous place of historical importance is located 14 km away from Sawai Madhopur at 76°28' East longitude and 26°2' North latitude, surrounded by the Vindhya and Aravalli hills of the desert ecology of Rajasthan state. Ranthambhore National Park is derived its name from the fort situated within its precincts. This park is one of the best parks in the country for observing and photographing the activities of tigers by the visitors of all around the world. The Ranthambhore fort is a well-known fort in the Southeastern Rajasthan. It has marvelous architectural monuments, ponds and lakes enlighten avid lovers. Every part of the fort reflects the ancient character of Indian culture and philosophy. Many people around the world visit the fort throughout the year. Ranthambhore is not only the wild life sanctuary but it is also a symbol of faith, hope & conviction, due to 8

centaury Ganesh Temple is major attraction in the fort where millions of people come from every corner of the country to seek blessing for happiness and prosperity. Some important man-made pond in the Fort are – Rani Sagar Pond, Padmala Pond, Jangali Pond Bada Pond etc. Padmala pond are the major source of water for inhabitation in the fort. Padmala (Padam) Pond is one of the major freshwater bodies and a regular source of water for drinking, washing, bathing and other activities of the local inhabitants and pilgrims in the fort. Padmala Pond is situated in fort at the front side of Ganesh Temple. These people take water either directly from the pond or nearby water-wells. Since last two decades, daily human activities resulting into pollution of water with visible growth of water blooms and hydrophytes in the pond. This situation may cause a serious problem for future use of water. Thus, this freshwater pond has been selected for the present study with regard to the assessment of water quality and phytoplankton community and further to know the current status of water pollution.

Sample collection

To record the physicochemical and phytoplankton characteristics of Padmala Pond, the freshwater samples were collected for a period of two years between November 2014 to October 2016. The surface water samples were collected in the clean sampling bottles (plastic, one liter capacity) manually on a monthly basis. Every water sample was taken during the morning time (between 9-10 am) in every first week of each month and photography was done to see the actual view of the pond. Physical factors like water temperature and pH was recorded at the site. The water samples were brought to laboratory for estimation of certain physicochemical parameters according to the standard methods¹⁸. The samples for algal forms were collected through the phytoplankton-net and stored in separate bottles. Algal samples were also brought to the laboratory for microscopic examinations as reported earlier.¹⁶ Most of the algal samples were analyzed fresh as far as possible while some amount of the samples were preserved in 4% formalin for further study. The taxonomic identification of phytoplankton species was done with the reference of standard monographs and books¹⁹⁻²².



Figure – 1. Actual view of Padmala pond in winter season

Result & Discussion:

The present study was carried out for two subsequent years i.e. from October 2014 to November 2016. The monthly data on certain physicochemical parameters and possible phytoplankton population were observed in the surface water samples of Padmala Pond, located in the Ranthambhore fort in Sawai Madhopur (Rajasthan). The data of both the study years were evaluated seasonally (summer, rainy and winter). The recorded data on physiochemical parameters were given in (Table-1), the data on seasonal diversity of Phytoplankton were represented in (Table- 2) and the photos of various forms of phytoplankton observed in the current study were given in (Plate 1). The result of water analysis show fluctuation in the value of various physico- chemical parameter of the water of the pond in different season throughout the study period. (Table-1). The value of all parameter are higher in summer except the DO, this might be possible due to high temperature decrease in water level and hug growth of macrophytes during the summer. The variation in physico-chemical characters and phytoplanktonic diversity of different water bodies show that India has wide variation in climate factor in different months in different region.²³

Table- 1

Seasonal variation of physico -chemical parameters of water at Padam pond (Padmala) from Nov. 2014 to Oct.2016

Ranges

Parameters	Summer	Rainy	Winter
Temperature (°C)	28-36	20-30	11.5-19.0
pH	7.8-8.4	7.2-8.0	7.6-8.2
Colour	Green	Brown	Light green
COD (mg/l)	20-70	10-40	15-50
BOD (mg/l)	4.0-8.0	1.5.-5.0	5.0-7.0

DO (mg/l)	2.5-5.0	3.0-5.5	3.0-7.1
Chloride (mg/l)	70-80	30-55	45-52
Calcium (mg/l)	22-38	18-24	26-34
Phosphate (mg/l)	0.1-0.2	0.1-0.8	0.5-0.2
Hardness (as CaCO ₃ mg/l)	160-210	105-180	90-160
TDS (mg/l)	385-504	370-480	280-380
Nitrate (mg/l)	15-35	3.2-12	5.5-7.0
Alkalinity	165-185	160-240	80-230
MPN Number	35-500	50-650	600-1100

Summer: March-June, Rainy: July-October, Winter: November-February

The present study is an effort to the list of the members of order *Chroococcales* commonly found in Padmala pond of Ranthambhore fort. About 11 *sp.* belonging to the order of *Chroococcales* are enumerated in (Table – 2) (Plate-1). The visible water blooms and the majority of phytoplankton community were found to be abundant during the summer season (March to June) where values of most of the physicochemical factors were also higher, such findings were also observed by several workers.¹¹⁻¹⁷. During this investigation it is noted that water body were contaminated due to anthropogenic activities (Bathing and washing) link enriched with N and P. After one month of rains Padmala pond is dominated by toxic algae bloom of *Microcystis spp.* covering the entire water surface as thick layer as well as up to various depth. *Microcystis aeruginosa* (Kutz) is dominant species and form thick mats on the upper surface of water. This species persistent throughout the year but it's gradually decreases after Oct- Nov. Such bloom may be responsible for replacement of algae that already present in water pond to its allelopathic interaction

Table - 2
Algae of Order Chroococcales Collected From Padam Pond (Padmala) In Ranthambhore Fort.

Sr. No.	Name of the Algae
	Family – Chroococcaceae
1.	<i>Microcystis robusta</i> (Clark) Nygaard.
2.	<i>Microcystis elongata</i> Desikachary.
3.	<i>Microcystis protocystis</i> Crow.
4.	<i>Microcystis aeruginosa</i> Kutz. (Kutz)
5.	<i>Microcystis flos-aquae</i> (Wittr.) Kirchner.
6.	<i>Microcystis bengalensis</i> Banerji.
7.	<i>Merismopedia minima</i> Beck
8.	<i>Gloeocapsa gelatinosa</i> (Menenghini)Kutzings
9.	<i>Gloeocapsa nigrescens</i> Nag.
10.	<i>Aphanothece pallida</i> (Kutz.) Rabenh.
11.	<i>Merismopedia punctata</i> Meyen.

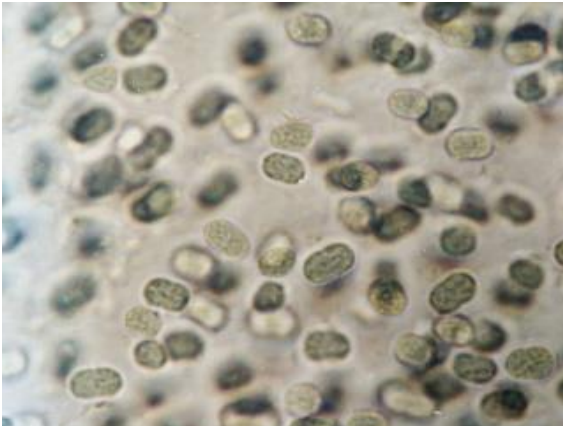
CONCLUSIONS

The recorded values of thirteen physicochemical parameters of water show fluctuations in different seasons, but the values of most of the parameters were found higher in summer season except for the DO values which found slight higher in winter season. The results also show variation in both the sampling years.

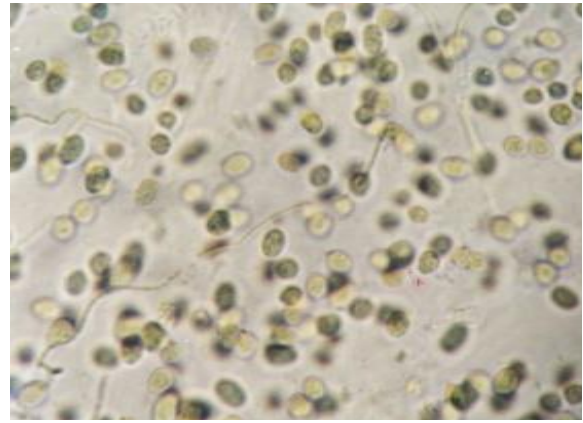
Limits of the analyzed parameters were observed almost within the range of required and permissible limits of Indian standards except phosphate (higher) and DO levels (low) in summer.

The majority of phytoplankton taxa were found to be profuse during the summer season where values of most physicochemical factors were also higher. The summer and rainy months were more favorable for the proliferation of water blooms

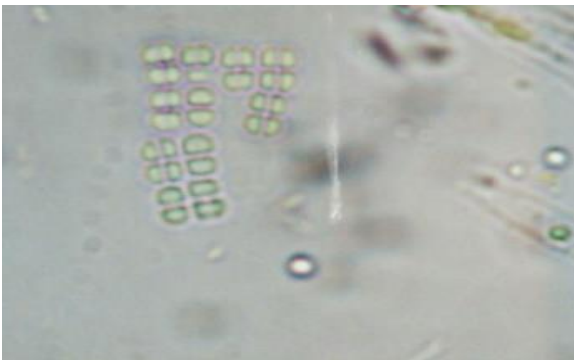
Plate - 1



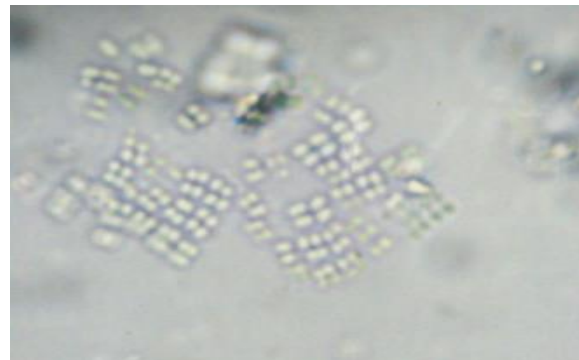
01. *Aphanothece pallida*



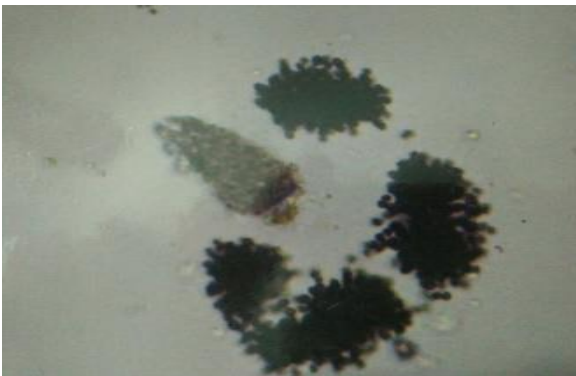
02. *Gloeocapsa nigrescens*



03. *Merismopedia glauca*
(Ehrenb.) Nag.



04. *Merismopedia minima* Beck.



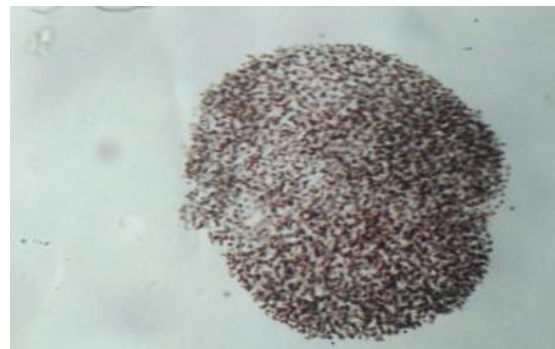
05. *Microcystis aeruginosa*.



06. *Microcystis aeruginosa*



07. *Microcystis protocystis* Crow



08. *Microcystis robusta*

So the regulation of water bodies are much necessary because majority of public use this water directly for various purposes like drinking, washing, bathing, and domestic uses without any treatment and invites many unnecessary diseases like diarrhea (due to Microcystin toxin produced by *M. aeruginosa* (Kutz) and effect their physical capacity. So before any use of surface water the knowledge of phytoplankton must be incorporated for any future plan for utilization of any water source.

With this report we further conclude that if precaution is not taken, the pond will become highly polluted. This information is important to communicate to general public. Further research is also needed to predict effect of phytoplankton on the environment & ecological characteristic in Padmala pond of Ranthambhore Fort.

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