International Journal of Biology Research
ISSN: 2455-6548, Impact Factor: RJIF 5.22
www.biologyjournal.in
Volume 2; Issue 3; July 2017; Page No. 65-67

Physico-chemical of water and species diversity of spirogyra in Tapti pond of Multai

[*1] Lakhanlal Raut, [2] Dr. AK Bhardwaj

[1] Asst. Professor of Botany, Govt. College Multai, Betul, Madhya Pradesh, India
[2] Professor of Botany, Institute of Excellence for Higher Education, Bhopal, Madhya Pradesh, India

Abstract
The present study was undertaken to study the Physico-chemical properties of water and species of Spirogyra in Tapti pond of Multai, District Betul (M.P.). The study revealed the presence of different species of Spirogyra. Spirogyra is cosmopolitan, freshwater, filamentous green algae, represented by about 300 species in world. Most of them are green floating in stagnant ponds and pools, a few species are attached and some occur in running water. Spirogyra is commonly known as pond silk, water silk, pond scum or mermaid's trees because of their bright green silky appearance.

Keywords: spirogyra, water physico-chemical, conjugation

Introduction
The life in an aquatic ecosystem is directly or indirectly depends on the water quality. Water quality can be defined in terms of physical, chemical and biological characterization of water. In some developing countries they are a contributing source of water for domestic use such as washing of cloths, bathing and sometimes as sources of drinking water. The increased demand for as a consequence of population growth, agriculture has usurped environmentalists to determine the chemical, physical and biological characteristics of natural water resources.

The origin of Tapti River is known to be in the Betul district. The particular place of the river's birth is the town of Multai. The Tapti River originates in the Betul district from a place called Multai. The Sanskrit name of Multai is Multapi and the term means the origin of Tapi Mata or the Tapti River. Tapti pond is located in Multai at 21.77ºN 78.25ºE. It has an average elevation of 749 meters (2457 feet).

The investigation assesses the water quality from various angles of physico-chemical and biological Parameters and suggests the possible control measures for sustainable quality improvement of water for various purposes which leads to increase the productivity of river eliminating in hygienic on better use of water for drinking and irrigation. It will add information about the algae diversity in Tapti River. The investigation of physio-chemical characteristics of water i.e. temperature, total hardness, turbidity, dissolved gases (CO_2 and O_2), pH , total alkalinity, dissolved nutrients and total solids have been done according to APHA(1976).

Spirogyra is a member of the Algae. These are simple plants ranging from single-celled organisms to complex structures. They contain chlorophyll and make their food by photosynthesis. Spirogyra is a filamentous algae. Its cells form long, thin strands that, in vast numbers, contribute to the familiar green, slimy 'blanket weed' in ponds. Seen under the microscope, each filament consists of an extensive chain of identical cells. Each cell contains a helical chloroplast, a nucleus, cytoplasm and a vacuole enclosed in a cellulose cell wall.

Mateerials and method
a) Collection of water sample
Water sample for analysis of Physico-chemical parameter were taken from the Tapti pond in Multai. Water samples are collected for four month. The collection of water samples were done in bottles and analyzed in the laboratory. For estimation of dissolved oxygen separate samples were collected in 250ml BOD glass bottles and fixed in the field where water temperature of the pond was recorded periodically by using mercury centigrade thermometer at depth of 4 to 6 cm from the surface layer of water, pH of water was examined using universal pH meter and was also confirmed by using digital pH meter.

The Physico-chemical analysis of water samples from the Tapti pond were carried out by standards methods of APHA (1985) [1] and Trivedy & Goel (1984). The parameters were selected of water analysis viz. water temp. , Turbidity, pH, dissolved oxygen, total alkalinity, chloride, hardness calcium, hardness magnesium, TDS, and fluoride were recorded from June to September-2016. The methods for analysis of physic-chemical parameters are shown in table.

Table 1: Physico-chemical parameter of Multai pond

S.N.	Parameters	Unit	June	July	August	September
1.	Temperature	^{O}c	26.5	18.9	21.4	20.5
2.	Turbidity	Ntu	0.8	0.6	1.0	1.2
3.	ph	Ph scale	7.5	7.0	7.5	7.0
4.	Total alkalinity as caco3	Mg/l	116	126	110	100
5.	Chlorides as cl	Mg/l	110	110	80	100

6.	Total dissolved solids	Mg/l	397	275	335	400
7.	Total hardness	Mg/l	350	260	300	580
8.	Calcium hardness as caco3	Mg/l	60	80	77.2	79.2
9.	Magnesium hardness as mgco3	Mg/l	31.2	26.8	22	15.8
10.	Fluoride	Mg/l	0.3	0.4	0.3	0.4

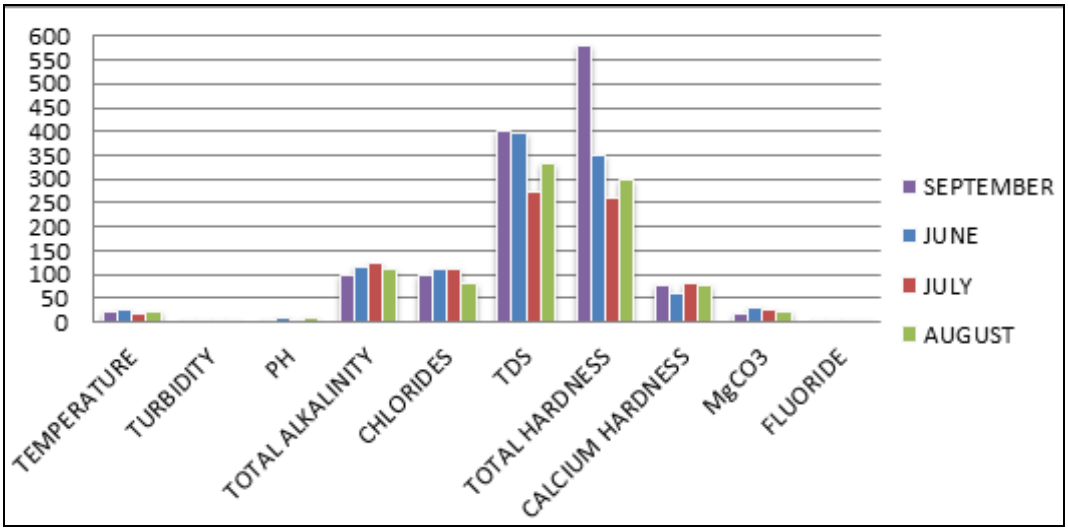

Fig 1

b) Collection of Algal samples

Algal samples were collected at: SITE 1 (North-East Corner of Pond), SITE 2 (South-East Corner of Pond), SITE 3 (North-West corner of Pond), SITE 4(South-West corner of Pond) for four months (from June to Sep.-2016). The attached epiphytic and floating forms of algal were collected separately in acid washed collection bottles and preserved in 4% formalin for further taxonomic investigations. Algae come in a variety of shapes and forms. They exhibit a wide range of reproductive strategies, from simple, asexual cell division to complex forms of sexual reproduction.

Studied algal samples were preserved in 3-4% formalin for further examinations and slides were prepared by staining Chlorophycean algae by Iodine and mounted in Glycerine. Detailed studies were made by examining specimens under compound microscope and pictures were taken by Nikon camera.

Table 2: Diversity of Different species of *Spirogyra*

Sr. No.	Name of Species	Site 1	Site 2	Site 3	Site 4
1.	*Spirogyra communis*	√	√	√	√
2.	*Spirogyra grevilleana*	x	√	x	√
3.	*Spirogyra varians*	√	√	x	√
4.	*Spirogyra pratensis*	x	x	√	x
5.	*Spirogyra juergensii*	√	√	√	√
6.	*Spirogyra porticalis*	x	√	√	x
7.	*Spirogyra diagr*	√	x	√	√
8.	*Spirogyra sentiformis*	x	√	x	x
9.	*Spirogyra nitida*	√	x	√	x
10.	*Spirogyra occidentalis*	√	√	x	√

Result and Discussion

Spirogyra species can reproduce both sexually and asexually. Asexual, or vegetative, reproduction occurs by simple fragmentation of the filaments. Sexual reproduction occurs by a process known as conjugation, in which cells of two filaments lying side by side are joined by outgrowths called conjugation tubes. This allows the contents of one cell to completely pass into other and fuse with the contents of the other. The resulting fused cell (zygote) is surrounded by a thick wall to overcome winters, while the vegetative filaments die. Spirogyra is a member of the Algae. These are simple plants ranging from single-celled organisms to complex structures. They contain chlorophyll and make their food by photosynthesis. Spirogyra is a filamentous alga. Its cells are in the form of long, thin strands that, in vast numbers, contribute to the familiar green, slimy 'blanket weed' in ponds. When viewed under microscope, each filament consists of an extensive chain of identical cells.

Fig 2

Spirogyra is a genus of filamentous chlorophycean green algae of the order zygnematales, named for the helical or spiral arrangement of the chloroplast that is diagnostic of the genus. It is commonly found in freshwater areas, and there are more than 400 species of spirogyra in the world. Spirogyra measured approximately 10 to 100µm in width and may stretch centimetre long. Life Cycle of Spirogyra and Germination of Zygospore!

Systematic Position:

Kingdom – Plantae - Division -Algae
Order- Conjugales/Zygnematales - Family- Zygnemataceae
Species –Karnalae - Sub Kingdom -Thallophyta
Class- Chlorophyceae - Sub-order- Zygnemideae
Genus- Spirogyra

In Spirogyra, 3 types of life cycle can be seen –out of which vegetative and sexual cycles are most common. But asexual cycle occurs only occasionally. Life cycle of Spirogyra is haplontic where the haploid vegetative filament represents a prolonged gametophyte generation and the brief sporophyte phase is represented by diploid Zygospore (zygote). In the life cycle, the thalloid vegetative filaments multiples by vegetative and sexual reproductions are most common, while asexual reproduction occur only occasionally.

Conclusion

This study was done in a short period of time for algal species distribution and water quality assessment from different Sites within Tapti Pond Multai. This will help as in guidelines and data base in many research programs. This type of study is proposed to be done in four sites. During the day, submerged plants and algae use carbon dioxide taken from the water where it is in the form of carbonic acid. Animals (fish, etc.) provide plenty of carbon dioxide.

Referance

1. APHA AWWA. Standard Methods for the examination of water & waste water. Washington DC 18th Edition. 1985
2. Ara J, Faridi MAF. The genus Spirogyra of Peshawar Valley. Biologia 1978; 24:421-436.
3. Ashraf M, MBE Godward. Ultrastructure and chemistry of the zygospore wall of Siprogyra. Ann. Bot. 1980; 46:485-487.
4. Bajpai *et al*. Limnological studies to assass water quality of upper lake, Bhopal, Abst. Nat. Sem. on conservation and development of aqu. Resources 1993; 23-24
5. Chaturvedi RK, Sharma KP, Bhardwaj SM, Sharma S. Plankton Community of polluted water around Sanganer, Jaipur. Journal of Environment and Pollution: 1999; 6:77-84.
6. Mathur M. An ecological study of the algal flora of the river Narmada at Hoshangabad. Ph.D. thesis, 1990
7. Patil P. An ecological study of algal flora of Bhopal, Ph. D. Thesis, 1982
8. Prasad BN, Dutta S. Spirogyra variformolata Sp. Nov. and a new variety of of spirogyra from India. J. Ind. Bot. Soc., 1970; 49(1-4):194-168.
9. Ratan RS. Spirogyra desikacharvensis, a new species from Punjab. Phykos, 1970; 9(2):148.
10. Rattan RS. Notes on some Zygnemaceae from Punjab. Phykos, 1967; 6:(1-2):95-99.
    Some new taxa of Spirogyra link from Punjab-Phyks 1971; 10:(1-2):137-140.
11. Wehr, JD, Sheath RG. Freshwater Algae of the North America: Ecology and Classification, Acad. Press, London 2003, 918.