

# A Preliminary Note on Three Phytoplankton taxa reported from Gajner Lake Bikaner Rajasthan India: New citation to Phycological flora of Bikaner District, Rajasthan (India)

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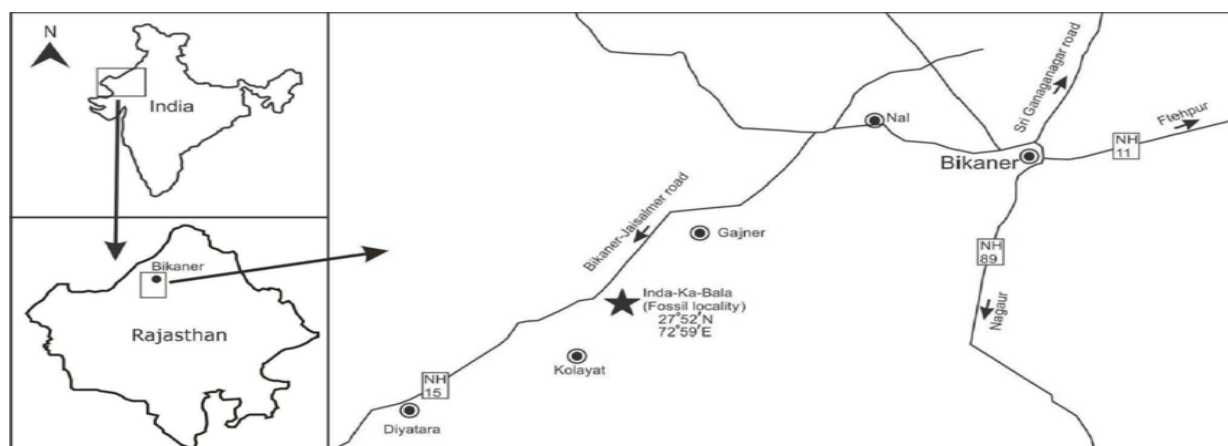
## Abstract

In an aquatic ecosystem Phytoplanktonic community dominated by Algae. Algae are the photosynthetic producers which accounts approx. one third of total photosynthetic activity on this planet. Our study deals with a freshwater lake ecosystem. Chlorophyceae, Cyanophyceae, Bacillariophyceae are the dominant position occupying Algal classes in any freshwater ecosystem. Present paper deals with taxonomical and morphometrical detail of three algal taxa which are new citation to algal flora of Bikaner district of Rajasthan. Gajner lake was selected for our study which located around 33 kms away from Bikaner toward west side. Study was carried out for one year January 2017 to December 2017. We collected samples from 3 sites of Gajner lake twice in a month. Gajner lake is a part of wildlife sanctuary, managed properly under Sanctuary act. A tourist spot Gajner palace also located along the Lake. So it is less polluted. Due to trophic level of lake Chlorophyceae alga profoundly present in the lake. Although a portion of Lake is under village panchayat which is openly accessed by the local people of Gajner village. Anthropogenically active site of lake has totally different algal diversity in comparison of that Portion of lake which is heavily managed under sanctuary as well as tourism act. The taxa which are in the view of paper reported from managed site of lake.

**Keywords:** Phytoplanktons, New Citation to Bikaner Flora, Gajner lake, Morphometry, Taxonomy.

## Introduction

Bikaner district is the key note region of the Rajasthan representing typical climatology of this arid state. Beside the crucial scarcity of water surprisingly Bikaner has a privilege of some temporary and permanent pond Like Harsholav, Devikund Sagar, Sansolav, Shiv Bari, Kolayat, Gajner. These all ponds were the potent source of drinking water in ancient time and bear the religious values also. Now a days IGNP Project become the life line for water need of Bikaner district. Gajner lake is an artificial rainfed lake. The maharaja Ganga singh ruling that time boring this lake along their hunting site. Now it is a part of Gajner wild life sanctuary. Lake retain water throughout the year. It is located 33 kms from Bikaner towards west. We were collected our sample from different sites of lake twice in a month from January 2017 to December 2017. We also collected the water sample to assess the hydrochemistry of Lake. Morphometrical enumeration is the only way to denote the diversity of algae during the various seasons of study period. Most of these species occurs as epiphyte on the macrophytes of Lake Serve as potent producers for aquatic fauna.



An outline map to locate the study site Gajner Lake, Bikaner district Rajasthan (India)

### Review of Literature

Iyenger (1941) explored desmid diversity from south India. A lot of contribution was made by Bhandhari (1952) in the field of algal flora of Rajasthan. Later on a very conceived elaboration on phytoplanktonic diversity of Udaipur District (Rajasthan) was given by Vyas and H D Kumar (1968). Phytoplanktonic diversity studied by numerous workers (Agarkar 1979; Bharti 1982; Prasad 1992; Habib 2001; Malik 2006) Bhardwas and Sony (1980, 1988) illustrated phytoplanktonic flora from Rajasthan. Mali M.C (2002), Mali M.C and Gehlot (2003) extensively studied Phycology of Bikaner city representing an arid climate in Rajasthan. The elaboration were token set in Roadmap of Phytoplanktonic study. Keshri (2012, 2013, 2017) studied desmid Biota from West Bengal. Later on Mali, MC and Santosh (2016) illustrated Algal flora from Kodemdesar and Kalyan Sagar Pond of Bikaner District Rajasthan. Mali MC and Modi (2010, 2011) elaborated the account of Algal Biodiversity from a Famous religious Site Kolayat (Bikaner). Mali & Rohitash (2017, 2018) explored Phytoplanktonic Flora of Gajner Lake, Bikaner (Rajasthan).

### Material and Methods

The samples were collected from different sites of lake during 9 am to 12 pm twice in a month. Algae were analysed in living condition with the help of light microscope because during preservation many of characters are lost. That's why analysis in living condition preferred. After analysis of samples algae were preserved in 4% formalin solution. Along with algal sample water sample were also collected. Water sample analysed for detection of numerous physico-chemical parameters. Study of interaction of numerous physico-chemical parameters is the prima facie need to understand about the potent presence of particular algal species diversity in the lake. Due to microscopical morphology and rapid multiplication rate algae frequently respond against a minor fluctuation in the hydrochemistry of lake. Morphometrical study was done by using De winter trinocular research microscope. Microphotography also carried out for future taxonomical studies. Taxonomical enumeration was done with the concerned literature like The structure and reproduction of algae Vol I (F.E Fritsch), Manual of

phycology (G .M. Smith), Algae a review (G W Prescott). and various other monograph and research works.

### Objective of the Study

Rajasthan that carries a unique identity by imprinting an image of water scarcity, extreme arid climate. Thus, a study of water body in an arid zone regarding its trophic concern is automatically become key note criterion. Phytoplanktonic diversity can be programmed directly to conclude about water quality for its uses in multiple type of purpose. Ecophysiological concern of a water body reflected directly in growth of specific Phytoplanktonic species diversity. Thus by scaling phytoplanktonic diversity it become easy to denote the status of a lake regarding its uses. Gajner lake was selected for our study because it is a part of sanctuary that is why by concerning numerous birds fauna which are feeding directly on this lake it become worthy.

### Result and Discussion

Taxonomic and Morphometric enumeration of reported Taxa

**Class: Chlorophyceae**

**Order: Chlorococcales**

**Family: Dictyosphaeriaceae**

Genus: *Westella botryoides* (w west) De Wildmann

Colonies of irregular shape and about 40-80 cells usually small spherical and arranges in groups of four or eight. Chloroplast single with or without pyrenoids. Cells 3.5-9µ in diameter. (Fig A)

**Order: Chaetophorales**

**Family: Coleochaetaceae**

Genus: *Coleochaete orbicularis* Pringsheim

Thallus epiphytic. The cells of thallus quadrangular, sometime polygonal or cylindrical. Cells are uninucleated. Each cell has large laminate parietal chloroplast with a single pyrenoid. Some of cell have a long unbranched cytoplasmic thread called seta. The base of seta is covered with a gelatinous sheath. during winter globose spermatocarp observed. Spermatocarp is 35.0 µ long and 58.0 µ wider Cell: 5.5-14.0 µ broad, 9.4-35.0 µ long. (Fig B)

Genus: *Coleochaete nitellarum* Jost in Ber.

Branched filament, forming mono stromatic expanses. vegetative cell elongated, cylindrical, chloroplast parietal having 1-2 pyrenoids.

Spermocarp spherical, 12-23 μ long and 50-80 μ broad, Cell: 9-15 μ broad. (Fig C)

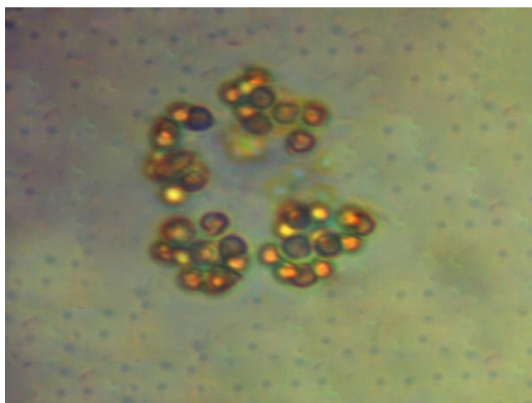


Fig A. *Westella botryoides* (w west) De Wildmann

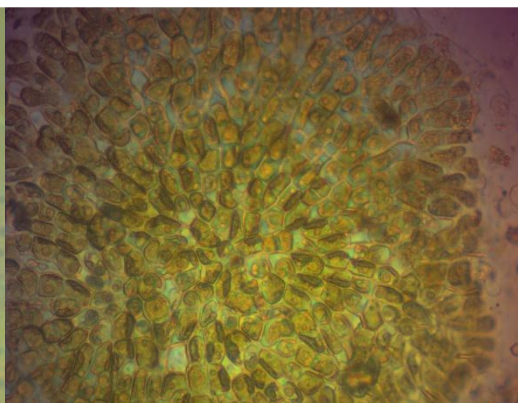


Fig B. *Coleochaete orbicularis* Pringsheim

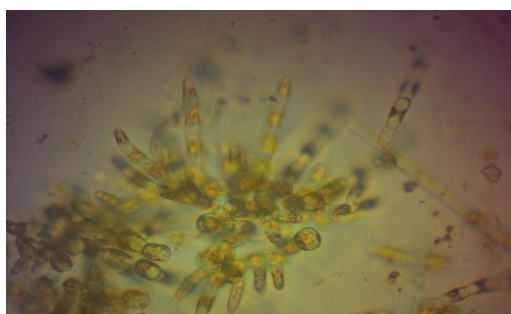


FIG C. *Coleochaete nitellarum* Jost in Ber



Fig D. Spermocarp of *Coleochaete*

Figure: Showing microscope stage photograph of newly reported taxa from Gajner lake Bikaner Rajasthan (India)

**Periodicity of reported taxa**

| Name of Taxa                                    | Date on which abundantly present  |
|---|---|
| <i>Westella botryoides</i> (w west) De Wildmann | 13 November ,21 December ,17 January  |
| <i>Coleochaete orbicularis</i> Pringsheim       | 17 November,18 December ,17 January   |
| <i>Coleochaete nitellarum</i> Jost in Ber.      | 1 January, 17 January ,18 December  |
| Spermocarp of <i>Coleochaete</i>                | Reproductive structure of <i>Coleochaete</i> formed in the beginning of March |
| (Fig D.)  |   |

**Physico-chemical parameters**

**Temperature**

Atmospheric temperature and water temperature relies on topography and meteorological conditions of water body. Periodical enumeration of water temperature has great significance to denote the biotic and abiotic composition of lake.

Water temperature directly regulates species composition and abiotic parameter which inhabit in the lake ecosystem. In contrary to atmospheric temperature, fluctuations in temperature of aquatic body are less frequent. A minor fluctuation in temperature can bring change in P<sup>H</sup>, water conductivity in turn have direct influence on numerous trophic stratifications and phytoplanktonic composition. Periodical analysis of water sample from different site of Gajner lake enumerations assumed that minimum temperature was in January, that was 14.7° C and maximum recorded in mid of June that was 31° C.

Atmospheric temperature was always higher than water in all periodical sample analysis. Maximum and minimum temperature of atmosphere was

recorded in June and January, respectively. The values were 44.1° c and 18 °c, respectively.

**P<sup>H</sup>**

Negative logarithm of hydrogen ion concentration is the potent measure for acidity and alkalinity of water. It is an important measure to illustrate the aquatic ecosystem in term of biotic and abiotic composition. Dissolved carbonate and bicarbonate ion concentrations, amount of dissolved carbon dioxide are the proportional ingredient of p<sup>H</sup> values in water bodies. Change in P<sup>H</sup> also accommodate by the fluctuations in regulating physicochemical parameters inhabiting in the lake.

Periodical analysis of water sample from different sites of gajner lake assumes slight alkaline throughout the year. Minimum P<sup>H</sup> was observed in the beginning of June, that was 7.85 and maximum P<sup>H</sup> was observed in last week of November that was 8.88. Therewas extreme raise in P<sup>H</sup> during the last week of March and April. Values were 9.54 and 9.15, respectively. Possible cause was religious rituals input.

## Conductivity

It is measurement to denote the efficiency of water to pass on the electrical current. Electrical conductivity affected due to dissolved salt like sodium and potassium salts. Periodical analysis of water sample enumerated maximum conductivity in September that was 1.37 mmhos/ cm. Minimum conductivity was observed in last week of November that was 0.12 mmhos/ cm. Conductivity fluctuates in 0.12 mmhos/ cm to 0.45 mmhos/ cm ranges throughout the year. Extreme values in September were due to rain fall targeted runoff into the lake.

## Alkalinity:

Alkalinity of water sample is the measurement of various combinations of carbonate, bicarbonate; hydroxides of different cations dissolve in water. Alkalinity provide buffer job which prevent the change in  $P^H$  toward acidic range.

Periodical analysis of water sample taken from Gajner lake reveal that Bicarbonate alkalinity contributing only. The bicarbonate ions were maximum in water sample of March, the value were 2.5 meq/liter and Minimum in last week of February that was 0.07 meq/liter. Due to rain inducted runoff into lake during September extreme raise was observed, concentration raise till 6.5 meq/ liter. Alkalinity varies from 125 ppm to 161 ppm. Maximum alkalinity was observed in March and minimum during December. Periodical variations were highest during summer and lowest during winter.

## Calcium and Magnesium

Most of calcium derived from calcareous dust, gypsiferous shale. Periodical analysis of water sample enumerated that both ion concentration ranges from 0.60 meq/liter to 2.0 meq/liter. Maximum values observed in beginning of March and minimum value observed during first week of October. Values of both ions take an increase from December and continuous to March afterward again fall observed. Rain fall Induced run off into water caused extreme values during September that was 6.0 meq/liter.

## Sodium

By using flame potometer periodical analysis of water sample carried out. Values of sodium ion were maximum in last week of April and minimum in the last week of November. The values were 0.45 meq/ liter and 0.12 meq/ liter respectively.

## Potassium

Periodical analysis of water sample from different sites of Gajner lake enumerated that potassium was observed during March only in 0.10 meq/liter concentration and absent throughout the rest of year.

## Chloride

Concentration of chloride ion is the proportion measurement of anthropogenic disturbance to lake. Maximum value of chloride ions observed in beginning of March and minimum in First week of February. The values 1.5 meq/ liter and 0.10 meq/ liter respectively. The extreme peak observed in September due rain fall input.

In our complete investigation we reported 109 species of different taxa belonging to Chlorophyceae, Cynophyceae, Bacillariophyceae, Euglenophyceae.

Out of these 109 species reported 58 species belongs to Chlorophyceae. Among these 58 species of Chlorophyceae 3 taxa (*Coleochaete* having 2 species and *Westella* having one species) are the new Citation for the Algal flora of Bikaner district of Rajasthan, India.

We found lake slightly eutrophic toward anthropogenically active site of lake while studying the physico-chemical parameters of lake. The site of lake heavily managed under sanctuary act that was oligotrophic during our study period. These newly reported taxa recorded on managed site only.

## Conclusion

Although in Rajasthan phytoplanktonic studies are accelerated after the pioneer workers like Vyas and Kumar (1968). In Bikaner district we studied limnology of Gajner lake. We reported 109 different species of Algal taxa from the lake. These three Named *Coleochaete orbicularis*, *Coleochaete nitellarum*, *Westella botryoides* are the prime and new citation to Phycological flora of Bikaner district.

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