

Occurrence of Genus *Cosmarium* in Machagora Dam, Chhindwara District Madhya Pradesh, India

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ABSTRACT

This paper presents a pioneer investigation of (Desmid) *Cosmarium* species with the aim of documenting, description and exploring of freshwater habitats from Machagora Dam, Chhindwara. The result of the present study reveals the presence of 11 taxa belonging to family Desmidiaceae of the class Chlorophyceae. The study area showed rich algal (Desmid) Diversity. Genus *Cosmarium* includes *Cosmarium angulatum*, *Cosmarium contractum*, *Cosmarium crenulatum*, *Cosmarium cucumis*, *Cosmarium granatum*, *Cosmarium maculiforme*, *Cosmarium moniliforme*, *Cosmarium quadratum*, *Cosmarium quadratum*, *Cosmarium quadrum*, *Cosmarium trilobulatum*. All of these are indicators of oligotrophic water.

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KEY WORDS : Algae, Chhindwara, *Cosmarium*, Desmid, Freshwater, Machagora dam

Introduction

Cosmarium is one of the genus of desmidiaceae widely distributed in aquatic water bodies. About 1500 species are found, out of which 954 species are accepted taxonomically in Algae. ^{4,9}

Cosmarium is free floating Desmid. It is unicellular, plant body joined by isthmus and divided into two parts called semi cells. Cells wall is ornately sculptured green, chloroplasts make them very attractive and beautiful, one or more pyrenoids present in chloroplast. *Cosmarium*, are comprised of diverse groups of microscopic algae. They are biological indicators because of unpolluted waters having low levels of calcium (Ca) and magnesium (Mg) with slightly acidic pH. ^{5,21} A good deal of investigations on *Cosmarium* flora of India have been done by a number of workers. ^{1,2,6,14,18, 23,24}

In this study we are reporting 11 taxa of *Cosmarium* species from Machagora dam, Chhindwara district of Madhya Pradesh, India.

Materials and Method

The study was carried out during every season in the period from June 2020 to June 2021. The site was situated between latitude 22° 7' 10" N and longitude 79° 10' 25" E, at a distance of 34 km away from district place.

The study was based on field work, laboratory work and literature survey. *Cosmarium* samples were collected from four different sites AS-1, AS-2, AS-3, and AS-4 of Machagora at monthly intervals using plastic bags, bottles and squeezing technique. Collected samples were preserved immediately in 4% formalin which was used to fix the samples. Microscopic studies carried out under compound microscope with camera attachment using semi-permanent slides and the measurements were taken with the help of ocular micrometer. Morphological investigations have been performed using standard books, floras, monographs and relevant research publications ^{5,14,16,18,25,26}.

Results and Discussion

Cosmarium angulatum

(Fig. 1)

Cells 58.2 μm long and 32.7 μm broad. Isthmus is 10 μm long, chloroplast large granular masses with two pyrenoids in each semi cells, lateral margins is angular and apex is truncate and retuse.

Occurrence- It was found in river Pench

Site; AS -1 and AS-3

Habitat; Freshwater

Location: Machhagora dam (latitude 22° 7' 10" N and longitude 79° 10' 25"E)

Cosmarium contractum

(Fig. 2)

Cell shape- Cell is longer than broad, semi cells is face and vertical view broadly elliptic, lateral view circular, cell wall is smooth, median constriction is deep, sinus open and broad, isthmus is slightly elongated, chloroplast is axile with single central pyrenoid per semi cell. Length of cell is 24 to 32 μm , Width is 15.5 to 17.5 μm and Isthmus is 6 to 7 μm .

Occurrence- It was found in river Pench

Site - AS -1 and AS-3

Habitat- Freshwater

Location: Machhagora dam

Cosmarium crenulatum

(Fig. 3)

The species is found in the river Pench. The cells outline is generally, 24.9-32.3 μm long and 18.4 to 23.8 μm wide. Semi cell is smooth, cellwall is undulating, sinus narrow and linear, isthmus is 6.2 to 6.6 μm wide.

Occurrence- It was found in river Pench

Site; AS -2 and AS-4

Habitat; Freshwater

Location: Machhagora dam.

Cosmarium Cucumis

(Fig. 4)

Cell- 91.8 μm x 52.7 μm in size longer than broad broad isthmus 22.7 μm , long. deeply constricted, sinus is narrowly linear, open, semi cell obovate with slightly depressed apex, cell wall within the margin finely granulates, Axile chloroplast pyrenoid oneper semi cell.

Occurrence- It was found in river Pench

Site; AS -2 and AS-3

Habitat; Freshwater

Location: Machhagora dam.

Cosmarium granatum

(Fig. 5)

Cells are medium, near about 1.5 times as long as broad, cell wall is punctuated, semi cell pyramidal, constriction deep and linear, slightly dilated apex, Basal angles is rounded, sub rectangular, sides at the base sub parallel, then converging to the apex, slightly concave straight slightly convex. Apex is straight and broadly rounded.

cell Size: - 30 μm -32 \times 44-46 μm , Isthmus: 8 μm -10 μm .

Occurrence: - It was found in river Pench

Site- AS-2 and AS-4

Habitat; Freshwater

Location: Machhagora dam

Comarium maculatiforme

(Fig. 6)

Cell is 62.5 μm broad, and long- 120 μm , isthmus is 42.5-45 μm wide,

Occurrence- It was found in river Pench

Site- AS -4 and AS-3

Habitat- Freshwater

Location- Machhagora dam

Cosmarium moniliforme

(Fig-7)

Cell shape -Cells is small and globose, semi-cell is united by small neck, cell wall is smooth, cell length is 23-26 μm , 10-13 μm breadth, and isthmus is 3-5 μm .

Occurrence- It was found in river Pench

Site- AS -2 and AS-4

Habitat; Freshwater

Location: Machhagora dam

Cosmarium quadratum

(Fig. 8)

Cell shape- Cell is minute and slightly longer than broad, sinus is linear and deep. Dilated apex. semi cells are sub-rectangular, cell wall is smooth; length is 7 to 10 μm , breath is 5-7 μm , isthmus is 1.5-3 μm .

Occurrence- It was found in river Pench

Site- AS -3 and AS-4

Habitat- Freshwater

Location: Machhagora dam

Cosmarium quadratum

(Fig. 9)

Cell size- Cell is medium sized, twice as long as broad, smooth-cell wall, Semi cells is sub quadrate,



Fig.1 : *C. angulatum*



Fig.2 : *C. contactum*

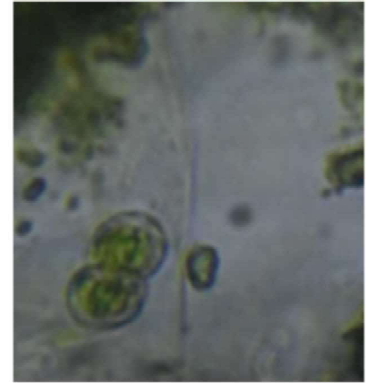


Fig.3 : *C. crenulatum*



Fig.4 : *C. granatum*

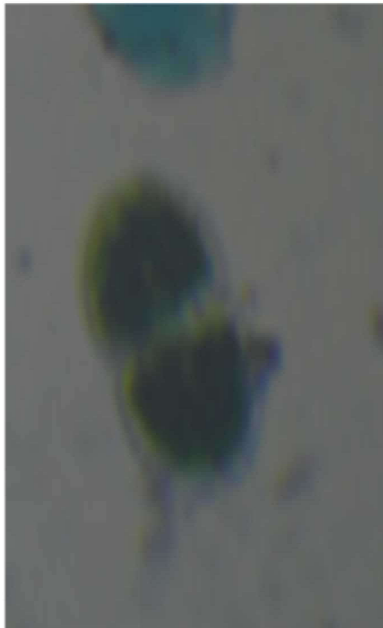


Fig.5 : *Cucumis*



Fig.6 : *C. maculatifforme*

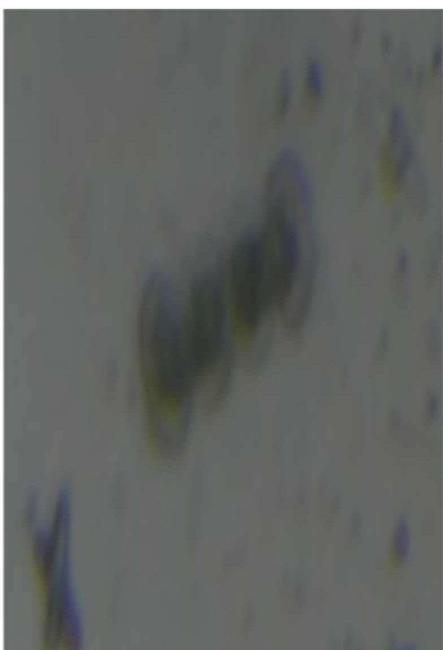


Fig.7 : *C. moniliforme*



Fig.8 : *C. quadratum*

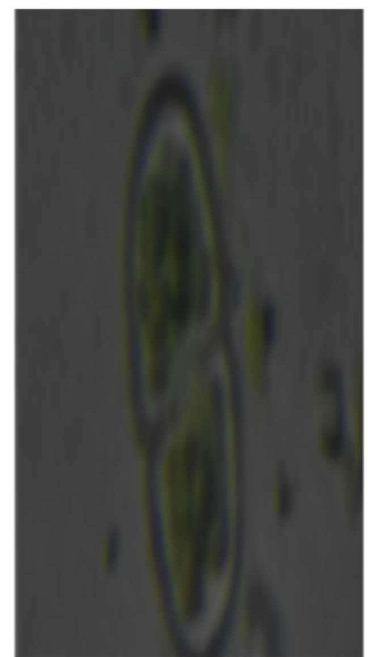


Fig.9 : *C. quadratum*



Fig.10 : *C. quadrum*

constriction linear and deep. Sides parallel first than slightly converged. Basal angle is angular round, apex is convex round.

Dimension: cell- 15 μm -17 μm \times 30 μm -32 μm ;
Isthmus: 4 μm -5 μm .

Occurrence- It was found in river Pench

Site- AS-2 and AS-3

Habitat; Freshwater

Location: Machhagora dam

Cosmarium quadrum

(Fig. 10)

Dimension- Cell Length is 36.48 μm , cell 35.264 μm Width, Isthmus is 13.376 μm ,

Occurrence- It was found in river Pench

Site; AS -1 and AS-3

Habitat; Freshwater

Location: Machhagora dam

Cosmarium trilobulatum

(Fig. 11)

Cell shape- Cell is 1.1 to 1.2 μm times longer than

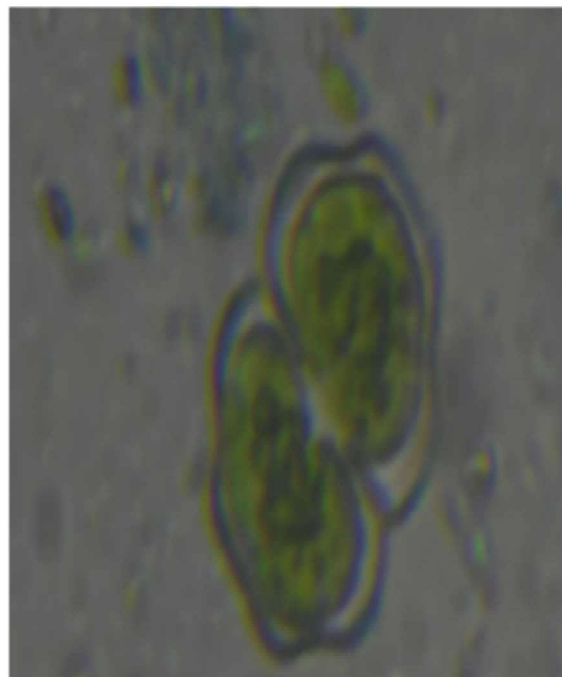


Fig.11 : *C. trilobulatum*

wide. Semi cell is sub trapeziform, third lobed with slightly convex lateral margin. Truncate and wide apex. Smooth or punctate cell wall. Median construction is deep, linear sinus closed. Axial Chloroplast with one Pyrenoid per semi cell. Length, 25.8 to 27.6 μm , Width 20.5 to 28 μm ; Isthmus is 7.8 to 10 μm .

Occurrence- It was found in river Pench

Site- AS -3 and AS-4

Habitat- Freshwater

Location: Machhagora dam

Conclusions

In spite of enormous range of algal biodiversity very little work has been done on algal diversity in Chhindwara district. Total number of 11 taxa of *Cosmarium* species reported first time from this study area, and these taxa occurred during winter season, decreased in summer and low in rainy season, which may be possible due to low nutrient availability. Most of the *Cosmarium* species present in study site AS-3, AS-4 because they are not deeper.

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