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Taxonomic Diversity and Morphological Characterization of Genus Euastrum in Freshwater Habitats of Machagora dam of Chhindwara District, Madhya Pradesh

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The genus Euastrum is a key representative of the division - Chlorophyta often serving as a bioindicator for oligotrophic and slightly acidic water bodies. This study documents the species diversity of Euastrum within Machagora dam. A total of five species were identified based on morphometric analysis. The present work will be carried out in June 2020 to June 2022. The qualitative analysis was done by microscopic observation of one genera of the class Chlorophyceae were described each one illustrated by means of photomicrography and ocular micrometer

Keyword: Euastrum, Desmid, Machagora Dam, Freshwater, Algae, Microalgae,

INTRODUCTION:

Euastrum is a genus of green algae belonging to the group known as Desmids, which are part of the Class - Chlorophyceae. These algae are commonly found in clean, still, slow moving freshwater such as ponds, river, bogs and lakes.

Euastrum are microscopic unicellular species and identify by their distinctive, symmetrical shape. Each semicells is divided into two mirror-image connected by a narrow central region known as the isthmus. The cell wall is mostly elaborately ornamented with lobes, granules, spines and giving Euastrum species a highly attractive appearance under the microscope. Euastrum known for their unique taxonomic structure.

The chloroplasts in Euastrum cells are usually contain one or more pyrenoids, like other desmids, Euastrum reproduces by cell division. The diversity of Euastrum Species is showed a significance correlation with nutrient status, High concentrations of nitrates and phosphates often correlate with the presence of *Euastrum spinulosum*, whereas species like *Euastrum denticulatum* were found in cleaner, more oligotrophic sampling sites (Sharma et al., 2022). Studies in similar tropical wetland suggest that Desmid Species structure is a function of nutrient status and water level (Nirmal Kumar, 2011).

Ecologically, Euastrum desmid is considered an indicator of unpolluted water because it thrives in oligotrophic conditions. So, its presence is indicator of good water quality. Euastrum is an ecologically important genus of green algae, mostly research studied for their taxonomy, morphology and role in aquatic ecosystems.

MATERIALS AND METHODS

Description of the study area

Chhindwara is situated 21.28'' to 22.49º (N) north longitude 78.40'' to 79.24º(E) east latitude and 470 m to 1160 m above mean sea level. Biogeographically it comes under central Inia. Pench river is most important for chhindwara. because Machagoa dam was constructed on Pench river.

Sampling method: Aquatic macrophytes were plucked, submerged plants, leaves, roots were squeezing over the mouth of vials, sample were preserved immediately in 4% formalin, submerged twigs, dead clump of aquatic plant, decaying leaves, stones, were also collected in polythene bags.
Preservation: Samples were preserved in 4% formalin.
Microscopic Observation: under 40x and 100x magnification with the help of Doa digital attached microscope camera model no. 1080p 60 FPS.

RESULTS AND DISCUSSION

The present research works the analysis of the sample resulted in the identification of one genus (Euastrum) belonging to five species, Euastrum species characteristic, taxonomic details are as follows.
Systematic enumeration
Kingdom – Plantae
Division - Chlorophyta
Class - Chlorophyceae
Order - Zygnematales
Genus - Euastrum
Eustrum bidentatum Nageli Var. *bidentatum*.
Plate-1, Fig-2
Ref:- Gatt. Einz. Algen (1849) plate:01, Figs:1, (A—F) Pa:122; Aquino *et al*. (2017) Plate: 01, Pa:04, figs: 07.
Comm: - Cell longer than wide. Semi cell: is semi elliptical, apical margin is angular, spine, V shape incision and truncated - Median constriction deep, Smooth cell wall, each semi cell in one pyrenoid present.
Dimen: -. Leng: 20.5-26.2 µm; Wedh: 13.2-17.3 µm; Isthu: 3.3-4 µm.
Occurrence :- SA- A, Coll. No.54, 453, 467.
Euastrum ceylanicum West and West
Plate-1 , Figs- 1
Ref:- Scott and Prescott, (1961). Plate:11, Figs:3 to 5; Paul and Sreekumar (2013) Pl: 1. Fig: 4.
Dimen: - Length: 36 µm, Bred. 29--31µm, Isthu:8-9 µm,
comm: - Cells size longer than broad, three lobed semi cell, sinus constricted, short spine present in linear lateral wall of isthmus.
Occurrence: - SA-C, Coll. No- 218, 301, 423.
Euastrum coeselii Kouwets
Plate-1, Fig-3
Ref:-Anissimova and Terlova (2015) Figs:06, Plate:01; Maheshwari and Baluswami (2017) Pa:50, Plate:01, Figs:19. Page:50.
Comm:- Cell size sub rectangular and small , linear sinus, apex truncated broadly,
Dimen:- Cell lengh:15-17µm, widt: 12-15 µm, Isth: broad: 2-5 µm.
Occurrence:-SA-A, Coll. No-159, 643.
Euastrum denticulatum (Kirchner) Gay var *denticulatum*
Plate-1, Fig-4
Ref:- Prescott *et al* (1977) Plate: 75, figs:7f, Pa: 40; Das (2013) Plate: XXVIII, figrs:488-489. Pa:169.
Comm:- Cell size is small and sub rectangular outline, cell is 1.5 times longer than broad. Moderate and closed sinus, semi cell is truncate pyramidal. Broad- undulating margins . apex Truncate, narrow angles and apex well decorated with short spines, small notch in upper median side, undulate upper lateral margins, open angular, and smooth cell wall.
Dimen:- Cell leng: 22--23 µm, Brdh: 15:16 µm, Isthu:7--9 µm.
Occurrence:- SA- B. Coll. No. 271, 711
Euastrum divergens Schm

Plate-1, Fig-5
Reff:- Agarkar and Agarkar (1972) Plat:01, Pa:09, Figs:12; Patil (1982) (Plat:11, Pa:113, Figs:11
Comm:- Cells deeply constricted and green, spines on the lobe arranged in a series, central protuberance with a ring of 11 to 12 granule.
Dimen:- Cell length is 49µm, breadth 49 µm, isthmus 16.5 µm
Occurrence:- SA-D, Coll.no. 100, 202, 752.

CONCLUSION

The study concludes that the Chhindwara district rich in diversity of Euastrum species .The morphological characterization provided here serves as a baseline for monitoring the water quality and supports the conservation of the aquatic biodiversity of Machagora dam (Madhya Pradesh).

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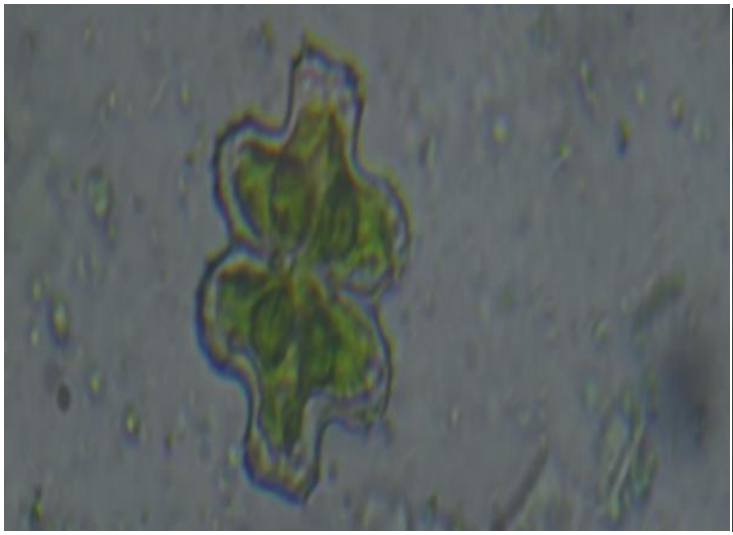
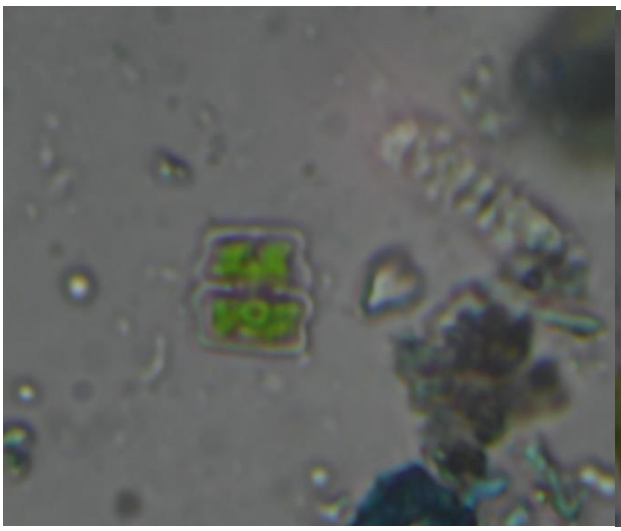
Plate-1

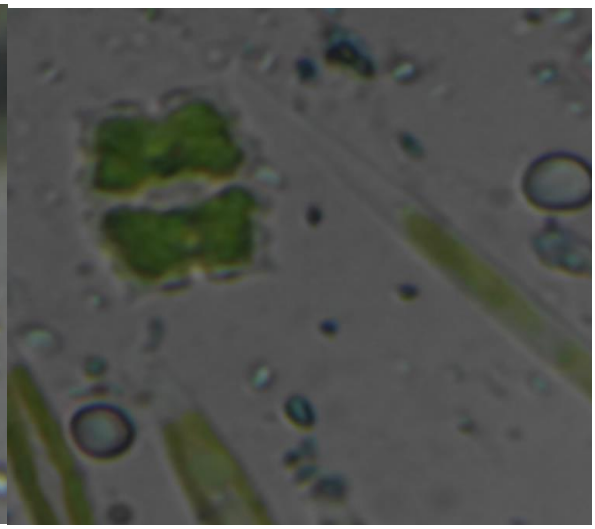


1) *Euastrum ceylanicum* West and West

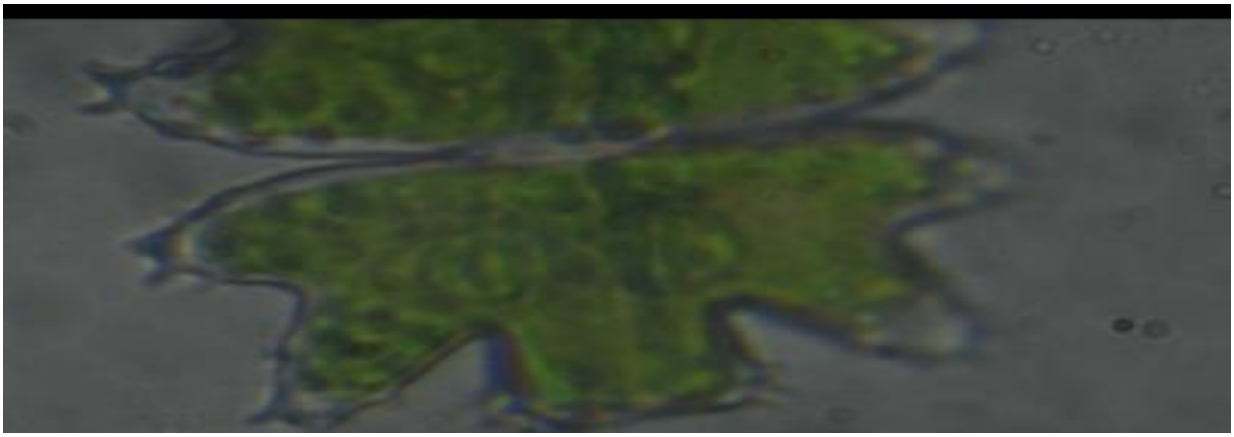
2) E.bidentatum Nagelli var. bidentatum



3) Euastrum coeselii



4) Euastrum. denticulatum var. denticulatum



5) Euastrum divergens Schm