



OBSERVATION OF CHLOROPHYCEAE (*PEDIASTRUM* MEYEN) IN MANGLI RIVER OF BUNDI, RAJASTHAN (INDIA)

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ABSTRACT

Algae are a global group of thalloid plants that can survive in a range of environmental conditions, such as freshwater, marine water, warm water, and cold water. They are also a useful indicator for assessing the quality of water. The study focuses on *Pediastrum*, a freshwater green algae (Chlorophyceae: Chlorococcales), found in Mangli river, Bundi. Water samples were collected from five different locations (S1, S2, S3, S4, S5) of Mangli river during various seasons (Pre-monsoon, monsoon and Post-monsoon) from 2022 to 2024. In the present study, total 11 species of *Pediastrum* were identified and *Pediastrum tetras*, *Pediastrum tetras* var. *excisum*, *Pediastrum duplex* var. *rugulosum* and *Pediastrum boryanum* var. *campanulatum* have been reported as dominant algae and also from all the sites of studied river. This study represents the first report of *Pediastrum* species from the Mangli river.

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Keywords: *Pediastrum*, Mangli River, Chlorophyceae, Algae.

INTRODUCTION

Bundi district situated in the Kota division of state Rajasthan and it has several rivers flowing through it, which are tributaries of the Chambal River. The main tributaries river includes Mej, Bajan, Kural and Mangli river. The Mangli river is particularly important for Bundi district because the district is located very close to it, making it crucial source of water supply for Bundi. It is one of the important sources of water supply for the drinking, livestock, agriculture etc. purposes for nearby locality. The Mangli River originates from the Bhadkya Mataji waterfall at Bijolia, located above the Uparmal Plateau, and meets the Kurel River at its confluence near Sangwada village, approximately 12 km from the Kota-Bundi national highway. The length of the Mangli river is 44-48 km from its point of origin to its confluence site. The hydrological characteristics of the Mangli river create

favorable conditions for the development and distribution of freshwater algal diversity.

Algae are the global group of thalloid plants that can survive in a range of environmental conditions, such as freshwater, marine water, warm water, and cold water. They are also useful indicator for assessing the quality of water. Chlorophyceae is an important class of algae and chlorococcales order of chlorophyceae is dominant, largest and widely distributed along the world. *Pediastrum*, *Tetradon*, *Closteridium* and *Hydrodictyon* are belong to hydrodictyaceae family. These family cells are found generally in free living, unicellular, cylindrical form.

Pediastrum is found in slow running water. It is a type of freshwater algae that inhabit colonies or groups. Colonies are stars shaped and cell wall is made of

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sporopollenin which helps the algae to survive under unfavorable condition. It play important role in photosynthesis and ecological food chain. The genus *Pediastrum* is a free floating, coenobial, green algae occurs commonly in natural freshwater lentic environments like ponds, lakes, reservoirs etc. Their occurrence in brackish and salty waters is rare (Keshri and Mallick, 2013). Parra (1979) provides a detailed taxonomic revision of the genus *Pediastrum* Meyen, clarifying species boundaries and providing identification keys and highlighted its prevalence in freshwater lentic habitats and rare occurrence in brackish waters, remaining a key reference for ecological and systematic research. The outer layer of cell wall of *Pediastrum* is composed of sporopollenin combined with silicon oxide which makes them high resistance to decay. Therefore, they remain preserved well in lake sediments as fossil record for palynological studies (Komarek and Jankovska 2001). Thus, the knowledge of *Pediastrum* can be useful for the determination of trophicity or salinity of water at present and past (Paształeniec and Poniewozik, 2004). *Pediastrum* has been studied by Bhatnagar and Bharadwaj (2015); Pilatti *et al.* (2023); Rai & Misra (2012); Jena & Adhikary (2007); Meena (2017); Lenarczyk and Saługa (2018); Baruah *et al.* (2022). Four species of *Pediastrum* Meyen identified by Barupal and Narayan (2016) and 22 species were identified by Navatha & Reddy (2016). *Pediastrum* diversity in Rajasthan has been extensively studied by Tyagi *et al.* (2006); Tiwari and Chauhan (2006); Rathore *et al.* (2014); Barupal and Narayan (2016); Patel and Rana (2020) and Rathore (2020).

MATERIAL & METHODS:

The Present study has been done from 2023 to 2025 and algal samples have been collected from all the selected sites (S1, S2, S3, S4, S5) across three seasons i.e. Pre-monsoon (Feb-May), Monsoon (Jun-Sep) and Post-monsoon (Oct-Jan) of Mangli river. Algal samples were collected with the help of phytoplankton net and a steel utensil and preserved in 4% formaldehyde in labelled bottles for further study in laboratory. With the setup of trinocular microscope and digital camera clear image of the algae has been captured and identified with the help of standard keys, monograph and flora (Philipose, 1967; Sevindik, 2010; John *et al.*, 2011; Merza and Abdul, 2020; Pereira *et al.*, 2024).

RESULTS & DISCUSSIONS:

After thorough examination of collected algal samples, 11 *Pediastrum* species were identified and taxonomic numeration with details as follows:

1. *Pediastrum tetras* (Ehrenb) Ralfs (Plate 1, Fig. 1)

The colony is round, four to eight-celled, and has a diameter of 26 μ . It resembles a flat plate, with cells that have and do not have intercellular spaces. The marginal cells are divided into two lobes and have a diameter of 6 μ , while the interior cells have four to six sides and a single linear incision.

Collection site: S2 & S3 during monsoon & post-monsoon.

2. *Pediastrum tetras* var. *excisum* (RABENSH) (Plate 1, Fig. 2)

Colonies are 18.5 μ in diameter; cells are 10.5 μ long and 12 μ broad; marginal cells have lobes that are more or less deeply concave; the remaining cells are comparable to those found in *P. tetras*.

Collection site: S2 & S3 during pre-monsoon.

3. *Pediastrum tetras* var. *tetradon* (corda) RABENH (Plate 1, Fig. 3a-3b)

Colonies: 4–8–16 cells; deep cell incision with lobes next to the marginal cell incision; colonies: 30 μ in diameter; marginal cells: 10 μ long and 9–10 μ wide; inner cells: 8 μ long and 9 μ wide.

Collection site: S2 & S3 during post-monsoon.

4. *Pediastrum duplex* var. *rugulosum* Raciborski (Plate 1, Fig. 4)

Colonies 4 angled inner cells with a deep incision; smooth cell wall; marginal cells measuring 6 μ in width and 10 μ in length; inner cells measuring 4–13 μ in width and 3–12 μ in length; triangular or trapezoid marginal cells at the basal portions; two triangular processes formed by a deep incision; the process outer side was slightly/deeply concave.

Collection site: S2 & S3 during pre-monsoon.

5. *Pediastrum boryanum* var. *campanulatum* Wille (Plate 1, Fig. 5a-5b)

Colonies are free-floating, round to ellipsoid, include 16–32–64 cells, and lack holes. They have a campanulate shape rather than being flat. Coenobia

have a diameter of 90 to 150 μ . The length of the marginal cells is slightly longer than their width. Cells are close to one another. The marginal cell processes feature a deep incision, are V-shaped and are as long as the cells. The inner cells have a little incision on the outside. The cell wall is composed of granules. The marginal cells are 15 μ long and 18 μ in diameter. The inner cells are 10 μ long and 15 μ in diameter.

Collection site: S2 & S3 during pre-monsoon.

6. *Pediastrum duplex* var. *clathratum* (Plate 1, Fig.6)

Residences eight-celled cells and intercellular gaps roughly correspond to the species type, but the cell wall is clearly granulate with a diameter of 16 μ .

Collection site: S2 & S3 during monsoon & post-monsoon.

7. *Pediastrum duplex* Meyen var *subgranulatum* (Raciborski) (Plate 1, Fig.7a-7b)

8–16–32 celled colonies. In organisms that are colonies, cells are essentially intercellular gaps. However, the cell wall is clearly granular. Colonies of 16–32 cells and a diameter of 100 μ with cells measuring 18 μ .

Collection site: S2 & S3 during post-monsoon.

8. *Pediastrum duplex* Meyen var. *gracillium* W. et G.S. West(Plate 1, Fig.8a-8b)

Large intercellular spaces are present in colonies; cells are narrow, either as broad or narrower than the processes; marginal cells are curved outward and have two long processes with an emarginated apex; inner cells are similar to marginal cells but have shorter processes; colonies have a diameter of 50 μ ; marginal cells are 14 μ long and 8 μ broad; inner cells are 13 μ long and 10 μ broad.

Collection site: S1, S2, S3 & S4 during pre-monsoon.

9. *Pediastrum boryanum* var *longicorneplex* (Plate 1, Fig.9a-9b)

Colonies that are round to oval in shape and typically

contain 16–32 cells organized in concentric rings with no gaps between cells. The outer surface of marginal cells is slightly to profoundly emarginated, with two short processes ending in stumpy spines, and the interior cells are polygonal with straight sides. The cell wall is often granulate, but it can occasionally be smooth. The diameter of the cell is 30 μ . 8 μ in length. Colonies with sixty-four cells up to 90 μ in diameter.

Collection site: S1 & S3 during post-monsoon

10. *Pediastrum simplex* meyen var *duodenarium* (bailey) RABENH (Plate 1, Fig.10)

Colonies circular to oval, of 16-32 or more cells. Inner side of margin cells nearly straight, outer side produced into a gradually tapering process.

Collection site: S2 & S3 during post-monsoon

11. *Pediastrum simplex* Meyen (Plate 1, Fig.11)

Colonies of 8 cells, ranging from round to oval. The marginal cell's is almost straight, its outer side forms a progressively tapering process, and its inner cell is polygonal. Cells are in close proximity to one another and typically lack intercellular gaps. Smooth cell wall, 8 μ wide, 19 μ length.

Collection site: S2 & S3 during monsoon

The present study highlights the diversity of *Pediastrum* in the Mangli River, documenting 11 species and varieties, including *P. tetras*, *P. tetras* var. *excisum*, *P. duplex* var. *rugulosum* and *P. boryanum* var. *campanulatum*. *Pediastrum* is reported first time from this studied river, emphasizing its importance as an indicator of freshwater ecosystem health. It help in further studies which focus on seasonal variations, ecological factors influencing algal distribution and molecular characterization to better understand the diversity and ecological role of *Pediastrum* in freshwater river.

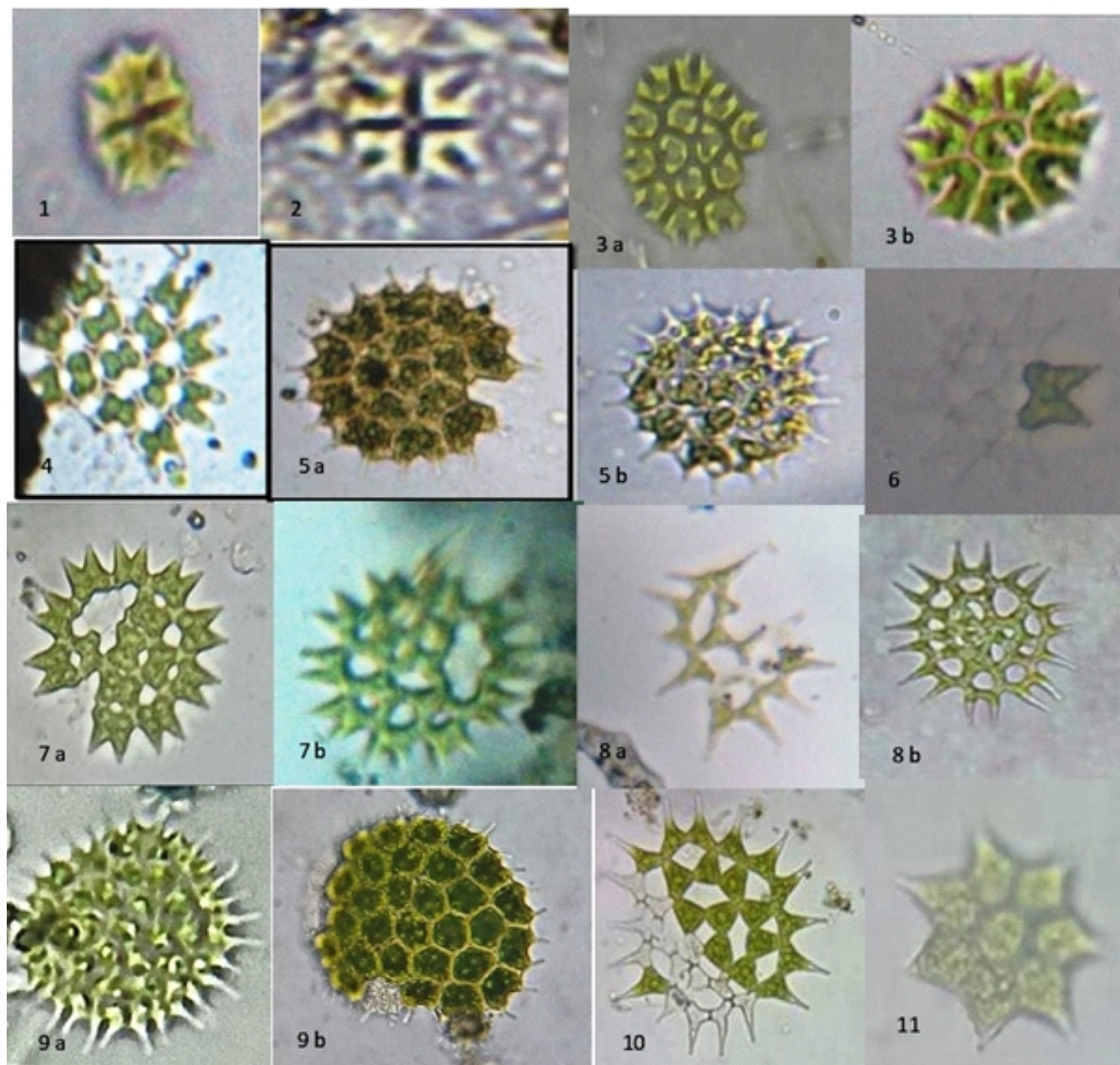


Plate 1. *Pediastrum* identified from Mangli river, Bundi district (Rajasthan).

1. *Pediastrum tetras* (Ehrenb.) Ralfs; 2. *Pediastrum tetras* var. *excisum* (RABENSH); 3. a, b-*Pediastrum tetras* var. *tetradon* (corda) RABENH; 4. *Pediastrum duplex* var. *rugulosum* Raciborski; 5. a, b- *Pediastrum boryanum* var. *campanulatum* wille; 6. *Pediastrum duplex* var. *clathratum*; 7. a, b- *Pediastrum duplex* Meyen var. *subgranulatum* (Raciborski); 8. a, b- *Pediastrum boryanum* var. *longicorneplex*; 9. a, b- *Pediastrum Duplex* Meyen var. *subgranulatum* (Raciborski); 10. *Pediastrum simplex* Meyen var. *duodenarium* (bailey) RABENH; 11. *Pediastrum Simplex* Meyen

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