"Diversity and Distribution of *Navicula* species in the Freshwater Ecosystem of Jambhora Dam"

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Abstract

The present investigation focuses on the taxonomical study of the algal genus *Navicula* from Jambhora Dam, a natural source of drinking water located in Jambhora village, Dharangaon Taluka, Jalgaon District, in the North Maharashtra region. This study is a part of the broader hydrobiological and biodiversity assessment of the dam, situated along Parola Road. The region has remained largely unexplored with respect to the taxonomic diversity of algae. During the course of this investigation, five distinct species belonging to the genus *Navicula* were identified and documented from various aquatic habitats within the dam ecosystem. In addition to these, five taxa from the class Bacillariophyceae were also recorded. The findings contribute significantly to the understanding of algal diversity in this region and highlight the need for further taxonomical and ecological studies of freshwater algal flora in North Maharashtra.

Key Words: Freshwater Diatoms, *Navicula,* Jambhora dam.

Introduction:

Freshwater ecosystems such as lakes, rivers, and dams are vital reservoirs of biodiversity, supporting a wide array of micro and macro-organisms. Among these, algae play a crucial ecological role as primary producers, contributing significantly to the aquatic food web and maintaining oxygen balance. Diatoms, a major group of algae, are known for their silica-based cell walls and are widely used as bioindicators in water quality assessments due to their sensitivity to environmental changes.

The genus Navicula, one of the most species-rich and ecologically significant diatom genera, is commonly found in freshwater habitats across the globe. Members of this genus exhibit a wide range of morphological diversity and occupy diverse ecological niches, making them a subject of interest for taxonomical and ecological studies. Despite their importance, many freshwater bodies in India, particularly in semi-arid and rural regions, remain underexplored in terms of algal diversity.

Jambhora Dam, located in Jambhora village, Dharangaon Taluka, Jalgaon District of North Maharashtra, serves as a key source of drinking water and irrigation for the local population. However, limited scientific attention has been given to its algal biodiversity, especially to the genus *Navicula*. This lack of data creates a significant gap in understanding the ecological dynamics and bioindicator potential of the region's freshwater habitats.

The present study aims to fill this gap by conducting a detailed taxonomical investigation of the genus *Navicula* from Jambhora Dam. In addition to contributing to the regional floristic knowledge, this research also serves as a baseline for future ecological and water quality studies.

Material and Method:

Algal samples were collected from Jambhora Dam near Jambhora village from Dharangaon Taluka, District Jalgaon. Collections were made from epilithic, epiphytic habitat. Collection was made in month of January 2024. The samples were preserved in 4% formalin.

The micro photographs of algal taxa were taken under 100X oil immersion through digital camera at the stage level micrometry is use for the taxonomical study's the measurements with the ocular and stage micro meter were recorded. Micro photographs of algal taxa were identified by mono graphs and recent algal taxonomical literature.

Collection Method:

Algal samples were collected manually using a brush and scalpel. Samples were transferred to clean, labelled plastic bottles. Native dam water was added to maintain cell structure.

Preservation:

All samples were preserved in 4% formalin solution immediately after collection.
Microscopic Examination: Samples were settled and a drop was placed on a clean glass slide.
Observations were carried out using a compound microscope under 100X oil immersion.
Measurements were performed using an ocular micrometre calibrated with a stage micrometer. Cell dimensions such as length, width, and shape were recorded in micrometers (µm).

Identification of Algae:

Identification was based on morphological features observed under the microscope. Reference to standard algal monographs and recent taxonomic literature was made. Special focus was given to identifying the genus *Navicula* and its species.


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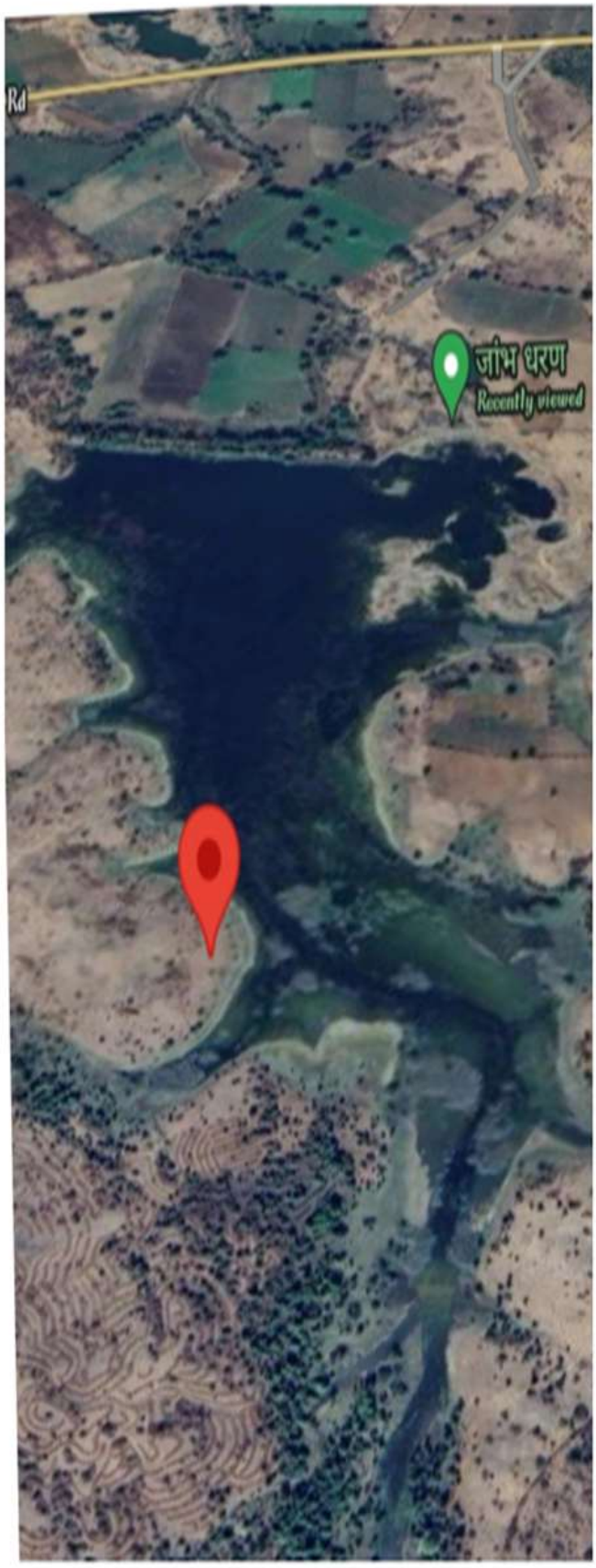
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1. ***Navicula bacillum*** **Ehr.** **(Pl. 1, Fig. 1)**

Hustedt 1930, p. 280, f. 465 a-c

Valves 30.9- 38 µm long, 8.3- 10.22 µm broad; linear with straight or slightly convex margins and broadly rounded ends; raphe thin and straight; axial area wide; central area large, rounded; striae 21-22 in 10 µm, slightly distantly placed in the middle.

Distribution in India: Umred (Sarode and Kamat, 1983a).

Locality: Station –I Jambhora Dam, Satation –II Jambhora Dam.

***2. Navicula cuspidata* Kuetz.** **(Pl. 1, Fig. 2)**

Hustedt 1930, p. 268, f. 433

Valves 57.7- 99.22 µm long, 14.6- 33.8 µm broad, rhombic lanceolate with acutely rounded ends; raphe thin and straight with hooked unilaterally bent central pores and large terminal fissures; axial area narrow, linear, slightly widened in the middle; central area very small; striae transverse, 14-16 in 10 µm, parallel, slightly convergent at the ends, longitudinal striae about 25 in 10 µm.

Distribution in India: Bombay (Gonzalves and Gandhi, 1954); Kolhapur (Gandhi 1956b, 1958b, Sarode and Kamat, 1984); Panhalgad (Gandhi, 1959c); Lonavala (Gandhi, 1962b); Sav, Rajapur (Thomas and Gonzalves 1965); Aurangabad, Bhir, Osmanabad, Pali (Sarode and Kamat, 1980b); Gangapur (Sarode and Kamat, 1983a); Bhusaval, Jalgaon, Dhule (Sarode and Kamat, 1984); Midnapore (Pal and Santra, 1990).

Locality: Station –I Jambhora Dam, Satation –II Jambhora Dam

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***3.Navicula dicephala* (Ehr.) W. Smith** **(Pl. 1, Fig. 3)**

Hustedt 1930, p.302, f. 526

Valves 39.42- 40 µm long, 8.7- 9 µm broad, valves broad linear with less convex almost parallel, often slightly wavy margin and beak like headed ends. Valves at least 15 stripes in 10 µm, valves more or less depressed poles. Middle stripes in all generally equally long or uniformly diminished; central area not stauroid, stripes throughout radial valves without long hyaline lines.

Locality: Station –I Jambhora Dam, Satation –II Jambhora Dam.

***4.Navicula heufleriana* (Grun.) Cleve** **(Pl. 1, Fig. 4)**

Hustedt 1930, p. 274, f. 452

Valves 32.12 µm long, 8.7 µm broad, valves elliptic lanceolate transverse striae radial 16 in 10 µm, fine, punctate, ends broader, raphe thick, middle area form.

Locality: Station –I Jambhora Dam, Satation –II Jambhora Dam.

***5.Navicula mutica* Kuetz.** **(Pl. 1, Fig. 5)**

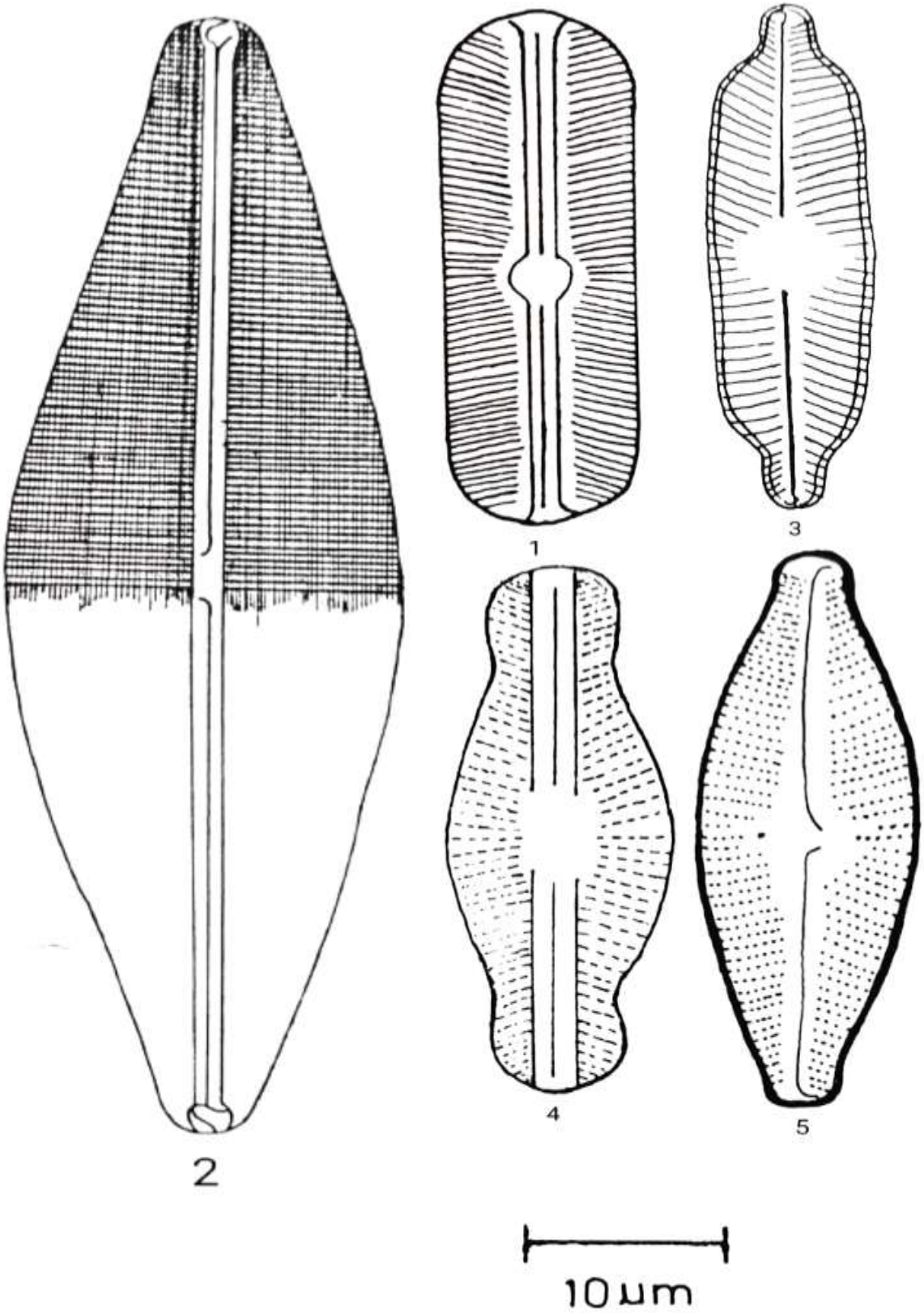
Hustedt 1930, p.274, f. 453 a

Valves 13.6- 20.8 µm long, 5.6- 6.5 µm broad**,** elliptic lanceolate with very slightly constricted, broadly rounded ends; raphe thin and straight; axial area narrow; central area large, rectangular, with an isolated puncta on one side; striae 20-24 in 10 µm, radial, clearly punctate and somewhat closer at the ends.

Distribution in India: Kolhapur (Gandhi, 1956b, 1958b, Sarode and Kamat, 1984); Panhalgad (Gandhi, 1959c); Bombay (Gandhi, 1962a); Lonavala (Gandhi, 1962b); Aurangabad (Sarode and Kamat, 1980b); Amaravati (Sarode and Kamat, 1983a); Akola (Sarode and Kamat, 1984); Midnapore (Pal and Santra, 1990).

Locality: Station –I Jambhora Dam, Satation –II Jambhora Dam.

Plate No.1



Results:

A total of five species of the genus Navicula were identified from Jambhora Dam during the present investigation. These were collected from epilithic and epiphytic habitats and examined under 100X magnification. The identified species are:

1. Navicula bacillum Ehr. – Elongated cells with fine parallel striae; found in clean, oxygen-rich water.
2. Navicula cuspidata Kuetz. – Linear with pointed ends; common in both habitats; indicator of slightly eutrophic water.
3. Navicula dicephala (Ehr.) W. Smith – Narrow, slightly beaked cells; found in nutrient-rich waters.
4. Navicula heufleriana (Grun.) Cleve – Lanceolate shape with radiate striae; found on aquatic plants.
5. Navicula mutica Kuetz. – Broad elliptical cells with dense striae; associated with slightly alkaline conditions.

These findings contribute valuable baseline data on Navicula diversity from the unexplored freshwater ecosystem of Jambhora Dam.

References:

Desikachary, T.V. (1959). Cyanophyta. Indian Council of Agricultural Research, New Delhi.
Prescott, G.W. (1978). How to Know the Freshwater Algae. Wm. C. Brown Company Publishers.
Patrick, R. & Reimer, C.W. (1966). The Diatoms of the United States, Volume 1. Academy of Natural Sciences of Philadelphia.
Patrick, R. & Reimer, C.W. (1975). The Diatoms of the United States, Volume 2. Academy of Natural Sciences of Philadelphia.
Round, F.E., Crawford, R.M., & Mann, D.G. (1990). The Diatoms: Biology & Morphology of the Genera. Cambridge University Press.
Hustedt, F. (1930). Bacillariophyta (Diatomeae). In: Pascher, A. (Ed.), Die Süßwasser-Flora Mitteleuropas, Vol. 10.
Hustedt, F. (1931-1959). Die Kieselalgen Deutschlands, Österreichs und der Schweiz.
Anand, N. (1998). Indian Freshwater Microalgae. Bishen Singh Mahendra Pal Singh, Dehradun.
Adoni, A.D. (1985). Work Book on Limnology. Indian Society of Ecology, Rewa.
Komárek, J. & Anagnostidis, K. (1999). Cyanoprokaryota I. Elsevier GmbH.
Bellinger, E.G. & Sigee, D.C. (2015). Freshwater Algae: Identification and Use as Bioindicators. Wiley-Blackwell.
Wehr, J.D. & Sheath, R.G. (2003). Freshwater Algae of North America: Ecology and Classification. Academic Press.
Kociolek, J.P. & Stoermer, E.F. (1988). Taxonomy and ultrastructure of some Gomphonema species. Diatom Research, 3(2): 265–275.
Taylor, J.C., Harding, W.R., & Archibald, C.G.M. (2007). An Illustrated Guide to Some Common Diatom Species from South Africa.
Gupta, A. & Agrawal, S.C. (2009). Freshwater algae of Jhansi, Uttar Pradesh, India. Phykos, 39(1-2): 1–10.
Pandey, R.S. & Kashyap, A.K. (1993). Algal flora of fresh water bodies of Gorakhpur. Phykos, 32(1-2): 42–52.
Singh, R.N. (1954). Algae in the soil of India. Indian Council of Agricultural Research Bulletin.
Kamat, N.D. (1963). A contribution to the freshwater algae of Poona (India). Hydrobiologia, 22(1): 137–160.
Sarode, P.T. & Kamat, N.D. (1984). Freshwater Diatoms of Maharashtra. Saikripa Prakashan, Aurangabad.
Venkataraman, G. (1939). A systematic account of the marine algae of the Madras Presidency. Indian Academy of Sciences.
Karthick, B. & Thomas, S. (2012). Diatoms of India: A preliminary check-list. J. Threat. Taxa, 4(4): 2473–2485.
Tyagi, B., Sharma, P. & Tripathi, S. (2015). Diatom flora of river Gomti. Int. J. Appl. Res., 1(9): 989–993.
Misra, P.K. (2011). Freshwater algal diversity of Kol Dam Reservoir, Himachal Pradesh. Indian Hydrobiology, 13(2): 137–144.
Rao, P.V. (1981). Ecology of algae in the river Ganga. Indian J. Ecol., 8(1): 101–104.
Trivedy, R.K. & Goel, P.K. (1986). Chemical and Biological Methods for Water Pollution Studies. Environmental Publications, Karad.
Pandey, K.D. & Sharma, H. (2014). Algal flora and water quality of River Ganga at Kanpur. Biolife, 2(1): 238–245.
Das, S.M. & Srivastava, V.K. (1956). A quantitative study of phytoplankton population of river Ganga near Patna. Indian J. Bot., 27: 163–170.
Kamat, S.D. (1965). Studies on the ecology of algae in Poona river. Phykos, 4(1): 20–28.
Agrawal, S.C. (2009). Factors affecting algal growth. Botanica, 59: 99–112.
APHA (2017). Standard Methods for the Examination of Water and Wastewater, 23rd Edition. American Public Health Association, Washington, D.C.