



A Seasonal investigation of phytoplankton from Saikheda Dam district Yavatmal (M.S.), India

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Abstract: Assessing the seasonal distribution quantitative analysis of phytoplankton from Saikheda dam was the primary objective of the current research during July 2023 to June 2024. Chlorophyceae, Bacillariophyceae, Cyanophyceae, and Euglenophyceae are the four groups of phytoplankton that could be recorded in this research and their respective classifications. Among them, the Chlorophyceae family was shown to be the most dominating group in terms of the number of species, and the highest number of species was recorded during the summer season. In addition, families Cyanophyceae and Bacillariophyceae chose the winter season to record their maximum numbers, but families Chlorophyceae and Euglenophyceae favoured the summer season over the winter season.

Keywords: *Phytoplankton, quantitative, species, dominating group.*

Introduction

Important bioindicators of reservoir health include phytoplankton in the reservoir waters of the water bodies in Maharashtra. These populations shed light on the hydrodynamics, nutrient dynamics and human induced pressures on the very important irrigation-fishery system. The trophic status of the reservoirs in Maharashtra can be known only through phytoplankton research. This is because despite the growing demands of humans, phytoplankton play an essential role in sustaining healthy food webs, clean water and multifunctionality. Research on phytoplankton in the waters of dams in Maharashtra has revealed that there are a number of different groups responsible for ecosystem functions. These services are of fundamental importance to control eutrophication of irrigation-controlled reservoirs and are wide-ranging from primary production to bioindication of pollution.

There are two major groups of organisms in a plankton community, primary producers or phytoplankton and secondary producers or zooplankton (Battish, 1992). Gupta and Dey (2012) states that phytoplankton is important since it is food for other species and is the primary creator of most aquatic life. Phytoplankton is extremely important for aquatic creatures since it helps to keep the water clean and maintains the biological balance. Seventy to ninety-five percent or more of the primary production in inland catch fisheries is from phytoplankton.

Materials and Methods

Surface water samples were collected with the help of a satin net (pore diameter 4.5 μ) fitted to an aluminum frame between 7:00 and 8.00 am for a period of one year during July 2023 to June 2024 in Saikheda dam water from the four selected station S1, S2, S3 and S4 respectively. Collection was done on a monthly basis. Collected samples analysed monthly and seasonal basis, July to October is denoted monsoon season, from November to February considered winter season, and March to June considered summer season during July 2023 to June 2024. The Sample were immediately transferred to glass containers for later microscopic analyses. Lugol's solution was also added as a preservative. Care was also taken to observe some fresh samples. The counting of algae was done using a Sedgwick-Rafter Counting cell (Saxena, 1987). Samples were isolated and identified by standard methods (Pennak, 1978; Prescott *et al.*, 1982; Adoni and Vaishya, 1985; Trivedy *et al.*, 1987; Sridharan 1989).

Results and Discussion

In the current study, four groups of phytoplankton were identified: eight species of Chlorophyceae, six species of Bacillariophyceae, five species of Cyanophyceae, and one species of Euglenophyceae, all gathered from samples taken over one year at Saikheda Dam in Yavatmal District. The quantitative seasonal variation was identified by statistical data analysis. The highest number of samples and values were obtained at stations S1, S2, and S3, whereas the lowest were collected at station S4 (tables and figures no. 1 to 4). The most Chlorophyceae and Euglenophyceae group species were seen in the summer, and the least were seen in the winter and monsoon seasons. Bacillariophyceae and Cyanophyceae exhibited peak prevalence in the winter season and minimal presence in the summer season. In the current study, Euglenophyceae exhibited the highest count throughout the summer season year during July 2023 to June 2024.

Khune et al., (2020) found that there were 43 different species of phytoplankton at two sites. There were fewer species of class 10 species of Bacillariophyceae, 18 species of Chlorophyceae, 7 species of Cyanophyceae, and 8 species of Myxophyceae. During the summer, blue-green algae are the most common type of algae. Rawat and Trivedi (2018) obtained the same results for Chlorophyceae from Dholawad Dam in Ratlam District. Chavan et al., (2021) conducted a similar experiment in Rajura Lake in the Amravati district. The confirmed seasonal changes of Bacillariophyceae align with the findings of Telkhade et al., (2013) and Mohan et al., (2022). Similar results regarding Cyanophyceae were reported by Durairaju and Sivakami (2021) from a water pond in Kumbakonam, Tamil Nadu. Sultana et al., (2024) noted that the findings of Euglenophyceae variation were the same as those in the current study.

Table no. 1: Table Shows Seasonal Average Mean Values of Phytoplankton at station – S1 from Saikheda dam water district Yavatmal during July 2023 to June 2024.

Sr. no.	Seasons → Phytoplankton ↓	Monsoon		Winter		Summer	
		1	Chlorophyceae	26.8	8.07	59.5	5.12
2	Bacillariophyceae	54.5	17.9	132	14.7	52.8	19.4
3	Cyanophyceae	24	10.4	77	12.9	18.8	6.09
4	Euglenophyceae	8.25	1.55	19.3	3.35	3.25	1.31

Table no. 2: Table Shows Seasonal Average Mean Values of Phytoplankton at station – S2 from Saikheda dam water district Yavatmal during July 2023 to June 2024.

Sr. no.	Seasons → Phytoplankton ↓	Monsoon		Winter		Summer	
		1	Chlorophyceae	9.25	5.91	31.5	3.07
2	Bacillariophyceae	49.5	21.8	109	18	57	4.69
3	Cyanophyceae	22.5	11.6	37	11.7	21	6
4	Euglenophyceae	0	0	3.75	1.03	7.25	1.11

Table no. 3: Table Shows Seasonal Average Mean Values of Phytoplankton at station – S3 from Saikheda dam water district Yavatmal during July 2023 to June 2024.

Sr. no.	Seasons → Phytoplankton ↓	Monsoon		Winter		Summer	
		1	Chlorophyceae	13.25	6.142	36.75	4.91

2	Bacillariophyceae	33.25	14.00	85.5	17.6	40	5.73
3	Cyanophyceae	19.5	9.069	36	10.8	18.3	3.84
4	Euglenophyceae	0	0	1.75	0.85	5	1.47

Table no. 4: Table Shows Seasonal Average Mean Values of Phytoplankton at station – S4 from Saikheda dam water district Yavatmal during July 2023 to June 2024.

Sr. no.	Seasons → Phytoplankton ↓	Monsoon		Winter		Summer	
		1	Chlorophyceae	6.5	4.291	24.75	3.198
2	Bacillariophyceae	43.75	19.22	98	17.33	49	4.564
3	Cyanophyceae	20.25	10.39	33.25	10.94	16.75	5.764
4	Euglenophyceae	0	0.000	3	0.913	6.5	0.645

Fig. no. 1: Showing Station -S1 Seasonal variation of Pytoplankton from Saikheda dam water district Yavatmal.

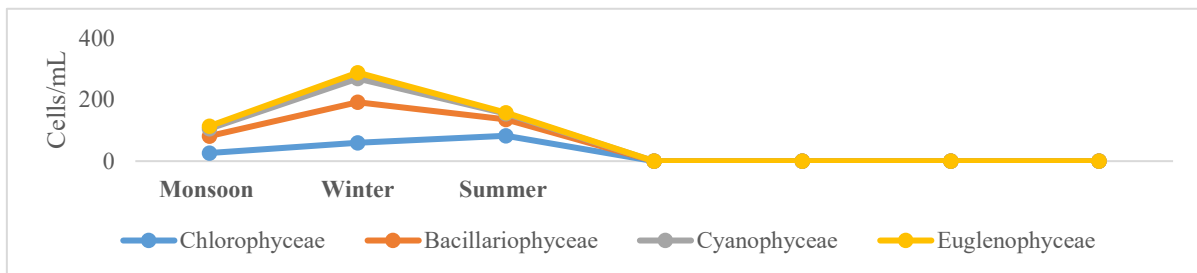


Fig. no. 2: Showing Station –S2 Seasonal variation of Pytoplankton from Saikheda dam water district Yavatmal.

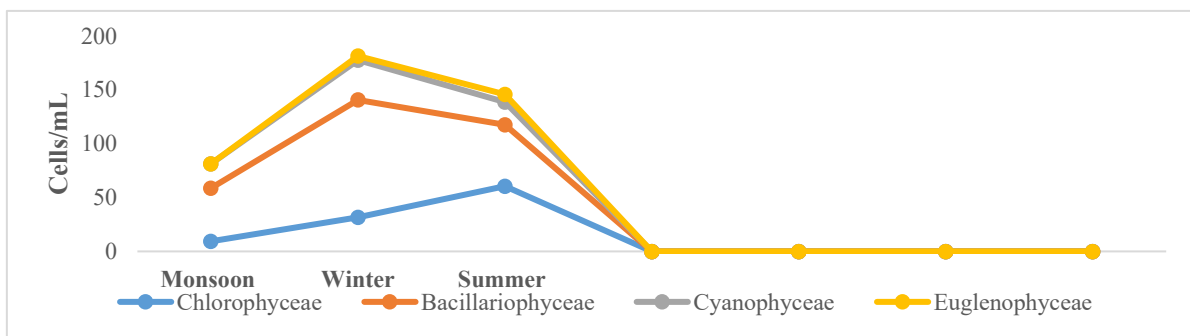


Fig. no. 3: Showing Station –S3 Seasonal variation of Pytoplankton from Saikheda dam water district Yavatmal.

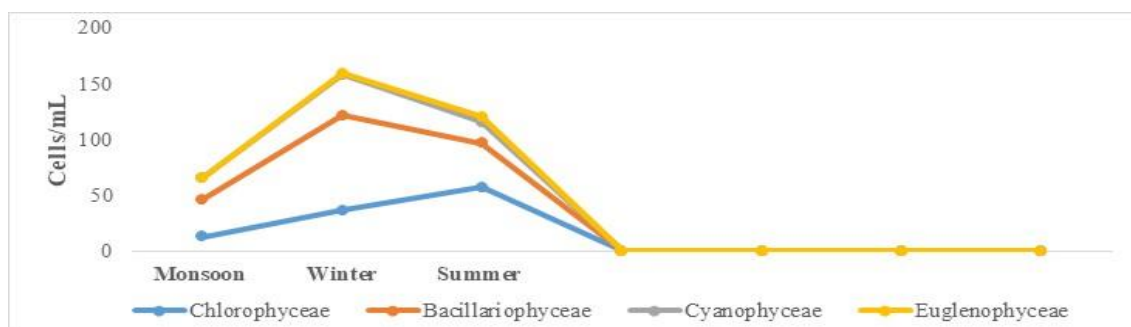
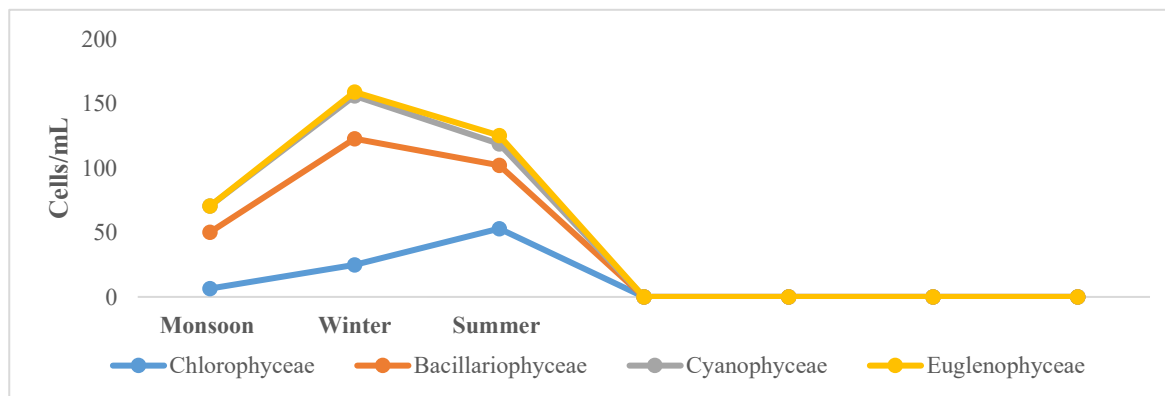


Fig. no. 4: Showing Station –S4 Seasonal variation of Pytoplankton from Saikheda dam water district Yavatmal.

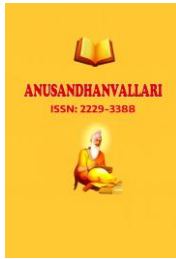


Conclusion

The current investigation sheds light on the significant seasonal shifts in phytoplankton density that occur at Saikheda Dam, which is located in the Yavatmal District of Maharashtra. Most importantly, the investigation confirms that Bacillariophyceae winter maxima are caused by isothermal mixing resuspending and optimally low temperatures, which establish them as indicators of clean water. Phytoplankton quantitatively track anthropogenic forcing and climate signals, which in turn informs sustainable irrigation and inland fisheries contribution. Cyanophyceae display anomalous winter maxima, which reflect it. In order to prevent irreversible eutrophic changes that jeopardize biodiversity and multifunctionality in the water infrastructure of Saikheda Dam, it is still essential to conduct long-term monitoring that is ongoing.

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