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Epiphytic algae in Pentakli fresh water reservoir of Maharashtra, India

Shrikant R Ambhore[1], Sunita V Jawale[2*]
[1] Department of Botany, Maulana Azad College, Chhatrapati Sambhajinagar, Maharashtra, India
[2] Department of Botany, Yeshwantrao Chavan College Arts Commerce and Science, Sillod, Chhatrapati Sambhajinagar, Maharashtra, India

Abstract
Algae which occur on the surface of aquatic plants are called epiphytic algae. They are found attached and living on submerged aqutic plants. These algae are primary source of food for small fish and several invertebrates. While studying algal flora of Pentakli fresh water reservoir, authors came across some interesting taxa of epiphytic algae. Pentakli reservoir is located in Mehkar tehsil area of Buldhana district of Maharashtra. Algal samples were collocated at monthly intervals from four selected sites of reservoir for the period of two years i.e. June 2022 to May 2024. The algal samples were brought to the laboratory for further taxonomic study. A total of 27 taxa under are 20 genera of epiphytic algae were identified and recorded. Algae belonged to Class Chlorophyceae, Bacillariophyceae and Cyanophyceae were record during the present study. Gloeocystis gigas, *Oedogonium* moniliformae, *Oedogonium* sp., *Nitzschia* palea, *Aphanothece* nidulans, *Phormidium* molle and *Plectonema* gracillimum were found dominant. Chlorophycean algae dominated the epiphytic algal flora which is followed by Cyanophyceae and Bacillariophyceae. Data of present research work enriches the knowledge of epiphytic algae of Maharashtra.

Keywords: Epiphytic algae, Pentakli Reservoir

Introduction

Epiphytic algae are a group of algae that grow attached to partially submerged or fully submerged aquatic vegetation, including freshwater angiosperms and macroalgae. Among the common substrata for epiphytic algae, Charophytes are frequently reported. These algae typically grow on the surface of filaments and internodes of host plants and are sometimes associated with nodal regions. Aquatic angiosperms provide one of the most favorable habitats for epiphytic algal colonization. Epiphytic algae serve as a primary food source for small fishes and various invertebrates in the littoral zone. They play a significant role in maintaining ecological balance among aquatic organisms, particularly between macrophytes and their surrounding environment. Attachment to vegetation restricts their mobility and may limit their direct nutrient uptake from the water column; however, macrophytes provide structural support and may contribute nutrients, thereby facilitating their growth.

Several researchers have contributed to the study of epiphytic algae in freshwater ecosystems. Wetzel (1983) [19] investigated interactions between epiphytic algae and their substrata in freshwater systems. Fatma (1985) [8] studied epiphytic algal flora in freshwater ponds and reported the abundance of Chaetophorales. Poikolainen *et al*. (1988) [11] examined the relationship between the abundance of epiphytic green algae and nitrogen concentration in water. Tesolin and Tell (1996) [17] recorded epiphytic algae on floating macrophytes. Connell *et al*. (1997) [3] assessed water quality using epiphytic diatoms as bioindicators. Dere *et al*.
(2002) [4] studied population density and abundance of epiphytic algae in stream ecosystems.

Further studies include Saunders *et al*. (2008) [13], who investigated epiphytic algae associated with sea grasses, and Dunn *et al*. (2008) [5], conducted a survey of epiphytic algae on *Vallisneria americana*. Taporowska *et al*. (2008) [18] explored the allelopathic effects of aquatic plants on epiphytic algae. Talekar (2009) [16] examined epiphytic algae in lentic and lotic waters, while Ahmed (2010) [1] conducted a preliminary study on epiphytic microalgae associated with aquatic plants. Yadav (2010) [20] reported species such as *Charicium stipitatum* and *Stichosiphon sansibaricus* on aquatic angiosperms.

More recent contributions include Al-Hassany *et al*. (2015) [2], who documented epiphytic algae from marsh habitats, and Salman and Hadi (2015) [12], who studied epiphytic algae on *Potamogeton crispus* and *Eusine indica* from the Al-Abasia River in Iraq. Fawzy (2016) [9] analyzed spatial distribution patterns of epiphytic algae on aquatic macrophytes. Shal *et al*. (2016) [14] focused on epiphytic algae growing on Charophytes. Oterler (2018) [10] conducted a comparative study of epiphytic algae on *Typha latifolia* and *Phragmites australis*. Eldrin (2019) [6] systematically studied epiphytic algae on water hyacinth, and Eldrin and Rosario (2021) [7] examined algal epiphytes attached to aquatic macrophytes. While studing algal flora of Khelna reservoir of Maharashtra Sawdekar and Jadhav (2023) [15] reorted 10 taxa of epiphytic algae which blelong to class Chlorophyceae, Bacillariophyceae, and Cyanophyceae.

In the present study, a preliminary investigation of epiphytic algae was carried out in Pentakli reservoir, located in the Buldhana district of Maharashtra, India. This study aims to contribute to the understanding of epiphytic algal diversity and their ecological significance in this freshwater ecosystem.

Material and Methods

During the study of algal flora of Pentakli Reservoir, epiphytic algae associated with aquatic angiosperms were also collected and analyzed. Epiphytic algal samples were collected in acid-washed sampling bottles to avoid

contamination. Algal epiphytes attached to partially submerged and fully submerged aquatic plants were carefully separated by gently scraping the plant surfaces. The scraped material containing algal epiphytes was then washed thoroughly with sterile distilled water to remove debris and impurities. The cleaned samples were observed under a research microscope for detailed morphological examination. Identification of epiphytic algal forms was carried out using standard taxonomic keys and relevant literature. The study was conducted over a period of two consecutive years, from June 2022 to May 2024.

Results and Discussion

A total of 27 taxa under 20 genera of epiphytic algae were identified and recorded throughout the period of study (Table 1). Chlorophyceae found dominant followed by Bacillariophyceae and Cyanophyceae. It Is in confirmiti with the earlier report (Sawdekar and Jadhav 2023) [15]. Eldrin (2019) [6] reported dominance of Cyanophyceae whereas Tesolin and Tell (1996) [17] and Salman and Hadi (2015) [12] observed dominance of Bacillariophycean algae. Dere *et al*. (2002) [4] also reported abundance of diatoms in epiphytic algal flora. In present study *Gleocystis gigas*, *Oedogonium* sp., *Cymbella aspera*, *Nitzschia palea*, *Aphanothece nidulans*, *Phormadium molle* and *Plectonema gracillimum* were found dominant on aquatic vegetation. Tesolin and Tell (1996) [17] reported dominance of *Zygnema* sp., *Spirogyra* sp., *Mougeotia* sp., and diatoms, *Eunotia bilunaris* and *Eunotia monidon*. Dominance of *Oedogonium, Bulbochete* and *Fragilaria* on Charophytes was reported by Shah *et al*. (2016) [14]. Oterler (2018) [10] observed dominance of *Spirogyra affinis*, *Oscillatoria sancta*, *Gomphonem aaccuminatum* and *Rhopalodia gibba* on *Typha latifolia* and *Phragmites australis*.

Algae *Chara*, *Cladophora*, *Oedogonium* and *Spirogyra* are also served as substratum for epiphytic algae. Diatoms are commonly observed on these algae. Epiphytic algae are ideal indicator since they are sessile in nature and each species has its own set of environmental tolerance and preference (Dunn *et al*. 2008) [5]. Epiphytic diatoms may prove to be a useful biomonitor of water quality in different water bodies. Physicochemical parameters of water are significant in diversity and distribution of epiphytic algae. Water temperature, turbidity, conductivity, nitrogen, phosphorous, potassium and silica content are significantly related to diversity and distribution of epiphytic algae. Poikolainen *et al*. (1988) [11] found that slight rise in mean annual temperature, the long-term stability of nitrogen deposition and the clear fall in the amount of sulphur deposition have probably all increased the growth and abundance of epiphytic green algae. Epiphytic algae are significant in aquatic system and plays a major role in ecological balance between various groups of living organisms especially macrophytes and their environment. It is observed that some epiphytic algae species had a substrate preference. In India, little is known about taxonomy, diversity and distribution of epiphytic algae associated with aquatic vegetation. Data of present research work enriches the knowledge of epiphytic algae of Vidarbha region in Maharashtra.

Conclusion

The present investigation confirms that Pentakli Reservoir supports a considerable diversity of epiphytic algae. A total of 27 taxa were recorded, belonging to the classes Chlorophyceae, Bacillariophyceae, and Cyanophyceae. Among these groups, members of Chlorophyceae were observed to be dominant. Epiphytic algae play an important role in aquatic ecosystems, contributing to primary productivity and nutrient cycling. The study of algal communities associated with aquatic macrophytes is essential for understanding ecological interactions and the overall functioning of freshwater environments.

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Fig 1: Epiphytic algae on aquatic plants

Fig 2: Epiphytic algae attached to the stem of plant.

Table 1: Epiphytic algae of Pen Takali reservoir.

Sr. No.	Name of Algae	S1	S2	S3	S4
I.	Chlorophyceae				
1.	Gloeocystis gigas	+	+	-	-
2.	Gloeocystis major	+	+		-
3.	*Ulotrix* sp.	-	+	-	-
4.	*Stigeoclonium* lubricum	+	-	-	-
5.	Oedogonium moniliformae	+	-	-	-
6.	Oedogonium sp.	+	+	+	+
7.	*Chlorococcum* humicola	-	+	-	-
8.	*Trebouxia* humicola	-	+	-	-
9.	*Chlorella* vulgaris	-	+	-	+
10.	*Trochiscia* asera	-	-	-	+
11.	*Spirogyra* sp.	-	-	-	+
II.	Bacillariophyceae				
1.	*Fragilaria* brevistriata	+	+	-	-
2.	*Pinnularia* sp.	-	+	-	-
3.	*Cymbella* aspera	+	+	+	+
4.	*Gomophonema* sp.	+	+	-	-
5.	*Nizschia* palea	+	+	+	+
6.	*Nizschia* sp.	+	-	-	-
7.	*Hantzscnia* sp.	+	-	-	-
III.	Cyanophyceae				
1.	*Chroococcus* minor	-	+	-	-
2.	*Aphanothece* nidulans	-	+	-	+
3.	*Phormidium* jenkelianum	+	-	-	-
4.	*Phormidium* molle	-	+	-	-
5.	*Phormidium* mucosum	-	+	-	-
6.	*Microcoleus* paludosus	-	-	-	+
7.	*Microcoleus* sociatus	-	-	-	+
8.	*Microcoleus* subtouruloses	-	-	+	-
9.	*Plectonema* gracillimum	+	+	-	+
	Total Algal Taxa	13	17	4	10

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