# Identification of Fresh Water Algae from Sahastrakund Waterfall, Nanded [MH]

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**Abstract:** Large variety of macro and micro algae in selected study area are described. In present investigation we reported 20 macro and micro algae belonging to six 6 classes of algae i.e. Chlorophyceae, Bacillariophyceae, Cyanophyceae, Charophyceae Xanthophyceae and Euglenoids. Chlorophyceae has 10 algae, Bacillariophyceae has 4, Cyanophyceae has 3, Charophyceae has 1, Xanthophyceae has 1, and Euglenoids has 1 in selected study area. The algae from class Chlorophyceae are *Oedogonium, Chlorella, Volvox, Hydrodictyon (water net), spirogyra, Chlosterium, Ulthrox, Zygnema, Cosmarium and Chlymadonus* species. The class Cyanophyceae reported *Oscillatoria, Nostoc, and Anabaena species.* And class Bacillariophyceae reported species *pinnularia, Navicula, Frastulia and Didymonous.* The class Charophyceae contains *Chara,* Xanthophyceae contain *Vaucheria* and Euglenoids contains *Euglena.* Existing of 20 algae's 15 algae's are dominant in the study area while 5 algae's are rare have been reported. There is an urgent need to evaluate this area for algal biodiversity.
[Narwade K.B., Mulani R.M., Bhosle A.B., Yannawar V.B. **Identification of Fresh Water Algae from Sahastrakund Waterfall, Nanded [MH].** *Rep Opinion* 2015;7(4):9-15]. (ISSN: 1553-9873). http://www.sciencepub.net/report. 2

**Keywords:** Bacillariophyceae, Cyanophyceae, Charophyceae Xanthophyceae, Euglenoids

## Introduction

Among around 5000 species (the number is still rising with recent advances in technology) of extant marine phytoplankton (Sournia et al., 1991) approximately 300 species including diatoms, *dinoflagellate, raphidophytes, prymnesiophytes, cyanophytes and silicoflagellates* can at times cause algal blooms. However, they simply drift with the current of water and cannot move against the direction of flow. Plankton consisting of plant part is called phytoplankton while which are of animal origin are called as zooplankton. Plankton occurs in all natural water bodies like ponds, rivers, tanks, dams, seas and oceans. High rate of organic production results in rapid multiplication of phytoplankton. Taking advantage of the food thus available zooplankton multiplies and this in turn attracts primary and secondary carnivore. Production of phytoplankton and zooplankton plays a vital role in the growth and overall production of fishes which feed on plankton. Hence knowledge of the extent of plankton production helps to ascertain the level of fish production likely to be achieved (Edmondson, 1965).

Diversity of plankton population is fairly dependent on water quality and climatic factors. Various physical, chemical and biological circumstances must be simultaneously taken into consideration for understanding the fluctuations of plankton population (Davis, 1955). Phytoplankton constitutes the very basis of nutritional cycle of an aquatic ecosystem. They form bulk of food for zooplankton, fishes and other aquatic organisms. The maintenance of a healthy aquatic ecosystem is dependent on the abiotic properties of water and the biodiversity of the ecosystem (Hutchinson, 1957).A direct method for the evaluation of the potentiality of an aquatic biotope is the estimation of the rate of its primary production, wherein begins the primary fixation of energy and its subsequent transfer to higher tropic levels. They act as the primary producers in the aquatic ecosystems. Hence, the quality and quantity of phytoplankton population bear much influence on the production potential of an aquatic ecosystem.

Moreover, the role of phytoplankton in regulating the earth's temperature is worth mentioning (Wetzel, 1983).Information on algal diversity is important to understand the factor influencing rise, fall and change in algal population and to study the effect of anthropogenic pressure upon aquatic habitats (Round, 1981 and Kumar, 1990). Certain groups of phytoplankton, especially blue green algae can degrade recreational value of surface waters and in higher densities can cause deoxygenation of water (Whitton and Patts, 2000). Plankton, particularly phytoplankton are used as water quality indicators. Some grow in highly eutrophic waters while others are very sensitive to organic or chemical wastes. Some species develop noxious blooms, sometimes creating offensive tastes and odours or anoxic or toxic conditions resulting in animal deaths or human illness (Harris and James, 1974). Certain taxa often are useful in determining the origin or recent history of a given

water mass. Because of their transient nature and often patchy distribution, however, the utility of plankters as water quality indicators may be limited (Stoermer. and Yang, 1969). The epithelic and epiphytic algae are excellent indicators of water pollution (Round, 1965).

The foremost aim of the present investigation is to record the algal resources of this area to understand the pattern of floristic changes in algal population as compared to old literature.

## Materials and Methods

### Study Area

The Sahastrakund waterfall on the Painganga river in taluka Kinwat of District Nanded in Maharashtra. Height of this waterfall is about 40-50 feet. The geology of this site is showing besalt rock. This site is developed as a tourist place. The rocks at this site having hundreds (sahastra) of 'pot holes' means 'kund' so, it is called as 'Sahastrakund'. Kinwat taluka is located at 18º - 50' N latitude and 77 - 20'E longitude. The average temperature of Kinwat is ranged between 20-40 ºC (Shaikh et al. (2013).

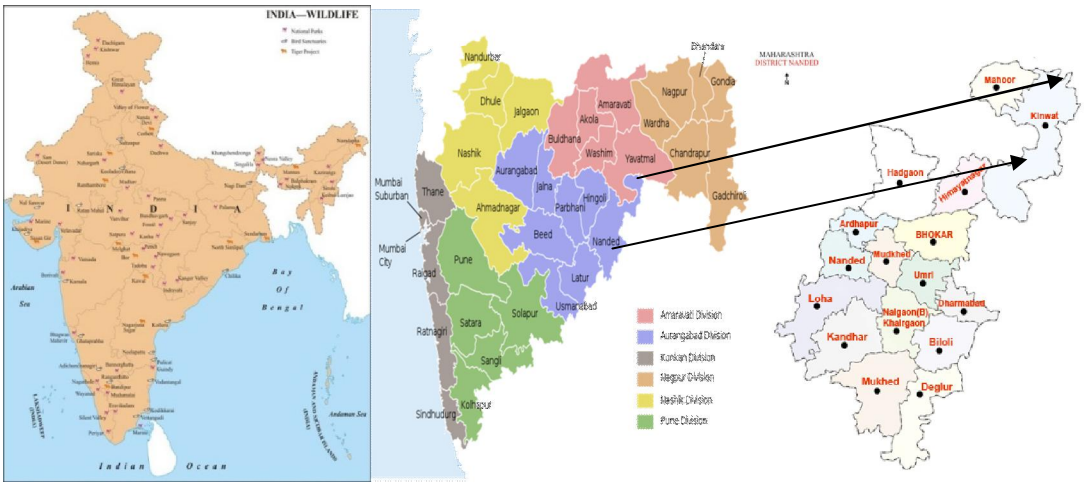



Fig. 1: Showing location of Kinwat taluka in Nanded district.

**Table 4.2**: Macro and micro algal Genera reported from Sahastrakund waterfall.

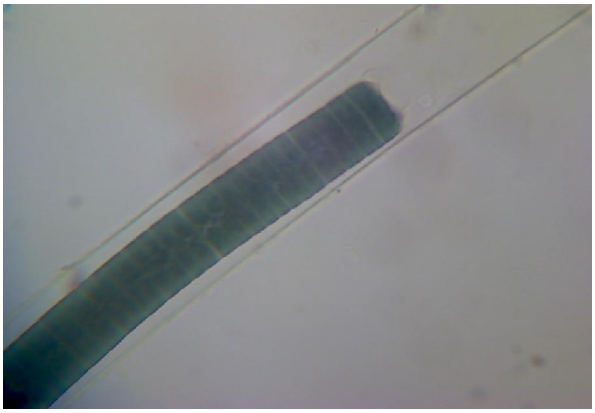
| Division | Class | Order | Family | Genus |
|---|---|---|---|---|
| Cyanophyta | Cyanophyceae | Oscillatoriales | Oscillatoriaceae | *Oscillatoria,* |
| | | Nostocales | Nostoceae | *Nostoc,* |
| | | | | *Anabaena* |
| Chlorophyta | Chlorophycae | Volvocales | Chlamydomonadaceae | *Chlamyadomonas* |
| | | | Volvocaceae | *Volvox,* |
| | | Chlorococcales | Chlorellaceae | *Chlorella,* |
| | | | Hydrodictyaceae | *Hydrodictyon* |
| | | Ulitrichales | Ulotrichaceae | *Ulthrox,* |
| | | Oedogoniales | Oedogoniaceae | *Oedogonium,* |
| | | Chlorophyceae | Zygnemoideae | *Zygnema* |
| | | | Spirogyroideae | *Spirogyra,* |
| | | | Desmidiaceae | *Chlosterium* |
| | | | | *Cosmarium,* |
| Charophyta | Charophyceae | Charales | Characeae | *Chara,* |
| Euglenophyta | Euglenoidea | Euglenales | Euglenaceae | *Euglena* |
| xanthophyta | Xanthophyceae | Heterosiphonaleas | voucheriaceae | *Vaucheria* |
| Bacillariophyta | Bacillariophyceae | Pennales | Naviculoideae | *Pinnularia,* |
| | | Naviculales | Naviculoideae | *Navicula,* |
| | | | Amphipleuraceae | *Frastulia* |
| | | Cymbellales | Gomphonemataceae | *Didymosphenia* |

**Sampling and Phytoplankton analysis**

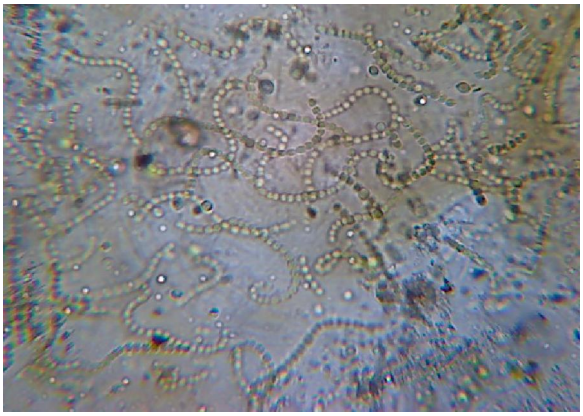
Filamentous algae were collected from mass growth by hand. The collected samples were observed fresh by preparing wet mounts within 48 hrs. Then the samples were further preserved in 4% formaldehyde solution separately for detailed study Trivedi and Goel (1986). Bacillariophycean forms were studied after cleaning the frustules using acid digestion technique recommended by Taylor et al. (2005). Identification of algal forms was done with the help of standard keys using monograph and relevant available literature viz. Prescott (1995), Edmondson (1995), Palmer (1980), Anand (1998) & Perumal (2008). Quantitative estimation of phytoplankton was found out by employing Sedgewick-Rafter counting cell. Species identification was done employing Nikon E200 light microscope using standard identification keys (Desikachary, 1959).

**Results and discussion**

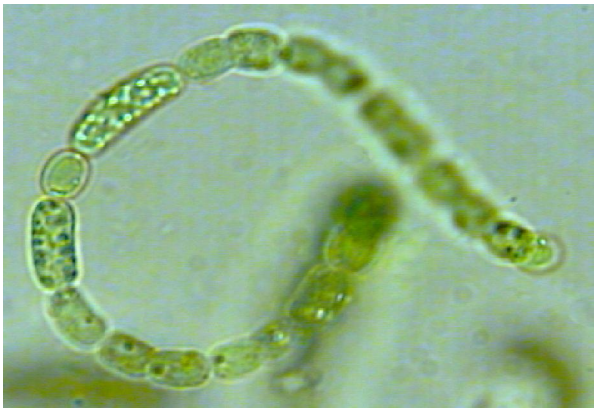
The present investigation, 6 groups of algae was verified from study areas. In present study algal taxa of *Chlorophyceae, Bacillariophyceae and Cyanophyceae* were dominant as compared to other groups of algae. The groups of phytoplankton included in class Chlorophyceae are *Oedogonium, Chlorella, Volvox, Cosmarium, Hydrodictyon (water net), spirogyra, Chlosterium, Ulthrox, Zygnema and Chlymadonus* species. The class Cyanophyceae *Oscillatoria, Nostoc, and Anabaena species* were observed class Bacillariophyceae species reported was *Pinnularia, Navicula, Frustulia and Didymonous*. All twenty taxa of phytoplankton were found during the study period. Out of which ten taxa belong to *Chlorophyceae*, four to *Bacillariophyceae,* three to *Cyanophyceae,* one to *Charophyceae, Xanthophyceae* and *Euglenoids*. The most important results of the study area have been described according to his class and identified species of it are shown below:



(A) *Oscillatoria*



(B) *Nostoc*



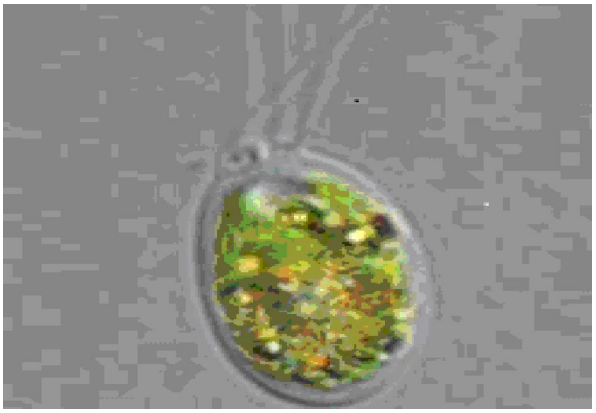
*(C) Anabaena*

*D) Vaucheria*

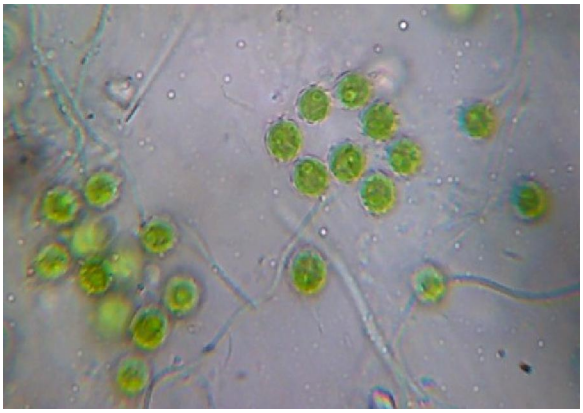
It is remarkable that the class Chlorophyceae, Cyanophyceae and Bacillariophyceae is the most abundant in selected study area. The class Charophyceae contains Chara, Xanthophyceae contain Vaucheria and Euglenoidea contains Euglena. On the basis of their abundance their occurrence classified as dominant i.e. *Chlorophyceae, Bacillariophyceae*,

*Cyanophyceae* and rare i.e. *Charophyceae, Xanthophyceae* and *Euglenoids*.

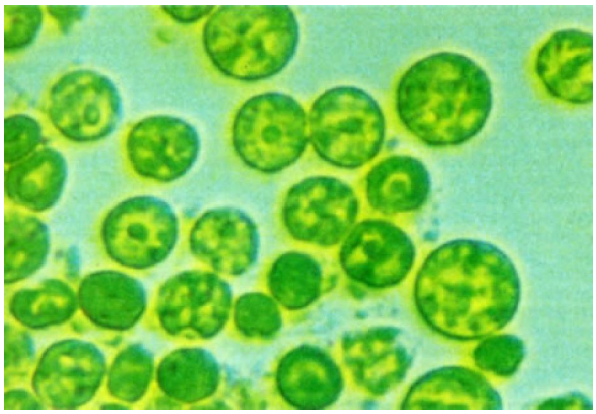
The *Chlorophyceae* are a large and important group of freshwater green algae. They include some of the most common species, as well as many members that are important both ecologically and scientifically Palmer (1980). This occurs in large free floating submerged mats, freshwater ponds, ditches and slow moving streams. The Genus Spirogyra is considered to be inhabitant of unpolluted waters Bold & Wynne (1978). The diversity founded of phytoplankton belonging to *Cyanophyceae, Chlorophyceae* and *Bacillariophyceae* classes from Girija Kund and Maqubara pond, Faizabad, India during May 1999-June 2000. The seasonally distribution of algal diversity shows dominance nature as *Cyanophyceae* > *Bacillariophyceae* > *Chlorophyceae* Dwivedi and Pandey (2002).



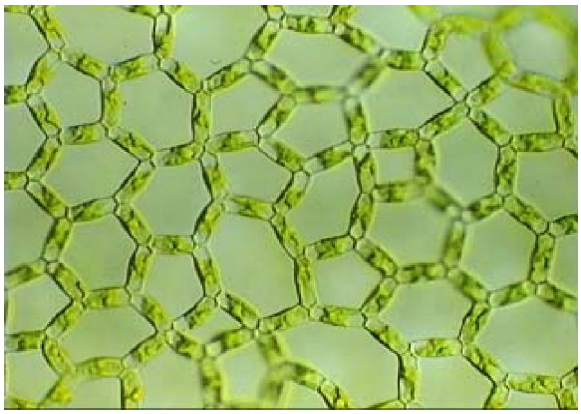
(E) *Chlymadomonous*



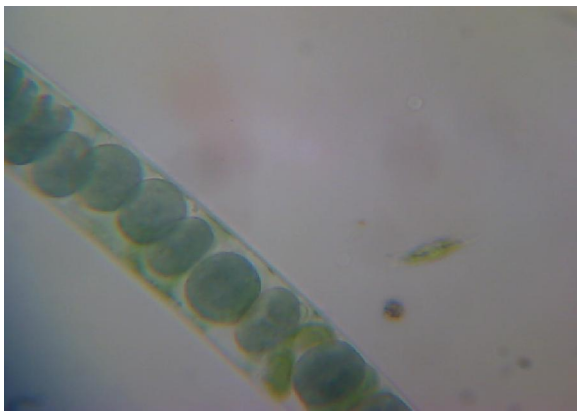
*(F) Volvox*



(G) Chlorella



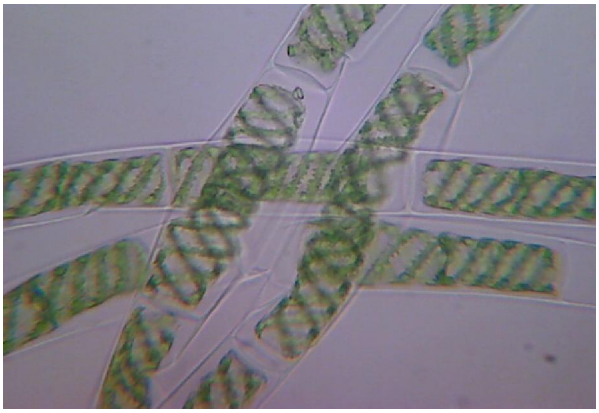
(H) Hydrodictyon



(I) Ulothrix

(J) Oedogonium

(K) Zygnema



(L) Spirogyra

*(M) Closterium*

*(N)Cosmarium*

*(O) Chara*

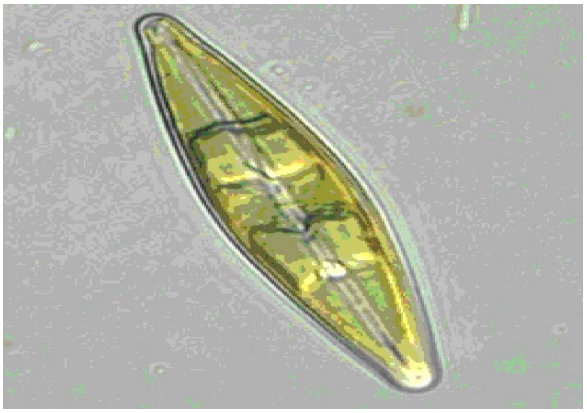
*(P) Euglena*

The species occupied in the Lonar lake water *Spirulina* and other members of *Chlorophyceae, Cynophyceae* and *Bacillariophyceae* also invent Yannawar and Bhosle (2013). The average observed phytoplankton in Dona Paula Bay, Goa during month of March 2007. They noted that the 26 different species/genera of phytoplankton and also large majority of theme belonged to diatom Ravi et al. (2009). The observed biological assessment of river Mutha Pune, India during 2005 they recorded that the blue green and diatoms like, Oscillatoria and Anabena throughout the investigation occur abundantly and frequently Jafari and Gunale (2006). The comparative study of phytoplankton communities in Niger delta area during 1999, they recorded that the higher cell density of diatoms (phytoplankton) in the dry season while lower cell density in the wet season for green-algae. Diversity and composition of algae in the Niger delta water bodies varies seasonally with peak in dry season Yakubu (2000).

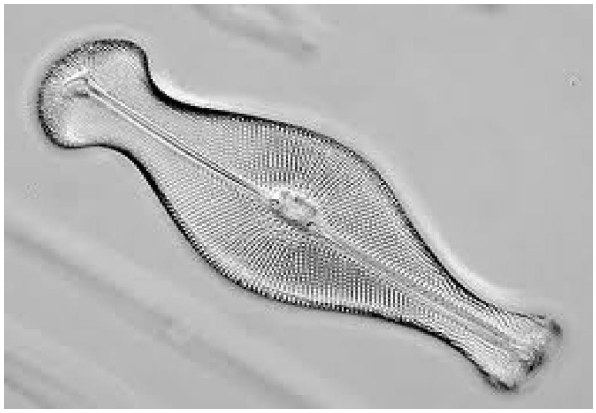
Pulle and Khan (2003) studied the seasonal changes in phytoplankton population in Isapur dam during during year 1998 to 1999. They reported that the maximum population of *cynophycrae* was observed in summer and minimum in winter. Ravi et al (2009), observed the average phytoplankton in Dona Paula Bay, Goa during month of March 2007. They noted that the 26 different species/genera of phytoplankton and also large majority of theme belonged to diatom. Yannawar V.B. et al., (2014), are investigated a mainly ten genera of phytoplankton namely *Hydrodictyon (water net), Oedogonium, Anabaena, Oscillatoria, Spirogyra, Zygnema, Diatoma, Chlorella, Chara* and *Closterium* species observed in Sahastrakund Waterfall, Nanded, Maharashtra.

(Q) Pinnularia

(R) Navicula



(S) Frustulia



(T) Didymosphenia

Fig.2 Phytoplankton genera observed and identified from Sahastrakund Waterfall [A-T]

**Conclusions**

Large diversity of macro and micro algae in selected study area are reported. In present investigation we reported 20 macro and micro algae belonging to six 6 classes of algae i.e. Chlorophyceae, Bacillariophyceae, Cyanophyceae, Charophyceae Xanthophyceae and Euglenoids. Chlorophyceae has 10 algae, Bacillariophyceae has 4, Cyanophyceae has 3, Charophyceae has 1, Xanthophyceae has 1, and Euglenoids has 1 in selected study area. The algae from class Chlorophyceae are *Oedogonium, Chlorella, Volvox, Hydrodictyon (water net), spirogyra, Chlosterium, Ulthrox, Zygnema, Cosmarium and Chlymadonus* species. The class Cyanophyceae reported *Oscillatoria, Nostoc, and Anabaena species*. And class Bacillariophyceae reported species *pinnularia, Navicula, Frastulia and Didymonous*. The class Charophyceae contains Chara, Xanthophyceae contain *Vaucheria* and Euglenoids contains *Euglena.*

**Acknowledgement**

We are thankful to the School of Life Sciences and school of Earth Sciences, Swami Ramanand Teerth Marathwada University, Nanded for providing laboratory and library facilities.

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