



Diversity Of Phytoplankton In Rice Fields Of Honnali Taluk Davanagere District Karnataka India

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Abstract

The present study was conducted in Honnahalli Taluk Davanagere district of various region of paddy. The analysis of the phytoplankton diversity of various locality of paddy field at Honnahalli Taluk davanagere district Karnataka. A slandered procedure was used to conducting to complete this experiment and samples are collected at different regions of paddy fields near Tungabhadra River. Through a field survey, six species of Phytoplankton were recorded namely Spirogyra, Chara, Euastrum, Ankistrodesmus Falcatus, Euastrumspinulsoum, Odegonioium and also order of the species is Zygnematales, charales, Zygnematales, Oedogoniales, Desmidiales. The mentioned species were observed light intensity, light nutrients and more water availability appears to be better condition for algal growth in paddy fields. This study reveals that maximum diversity of phytoplanktons present in the rice field in Ujjanipur as compare to other locality of paddy field.

Keywords: Diversity, Phytoplankton, Paddy fields, Honnali region

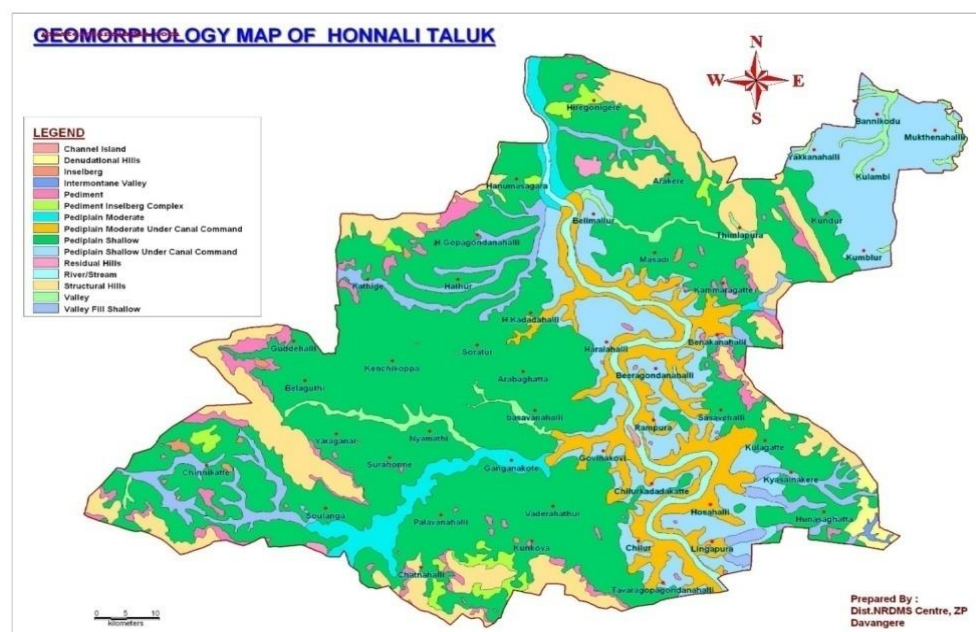
INTRODUCTION

Algae are numerous in forms; reflecting genetic-molecular and morphological diversities. Their ecological distribution cuts across many habitats, of algal diversities, the phytoplankton are the largest and the most common group in the paddy field. Honnali-577217 is situated in Davanagere District, Karnataka State. And further its Latitude = 14.2625177 and Longitude = 75.3598953. paddy field receive the water from thunga river near Honnali, Tunga canal and waste water from Honnali Thaluk. It is located in Honnali taluk, 43 km away from Shivamogga city. In India, In the year 1939,

De [1] was first time introduced blue green algae used as biofertilizer for paddy crop. Algalization seems to have little effect on the physical properties of the soil and it may improve soil aggregation [2] and algae fertilizer used as source of nitrogen [3,4]. Rice is an exclusive crop plant of aquatic habitat, largely raised in an anaerobic or partially anaerobic submerged environment. Diversity of paddy fields provides favourable environment for the growth of various group of algae with respect to their requirement of light, water, temperature and nutrient availability. The chemical properties which undergo changes on submergence are

essentially the complex transformation of various components. These components depend on various physico-chemical factors [5]. Cyanobacteria are an ancient group of unique prokaryotic organisms with the ability to perform mutually compatible functions like 'N' fixation and photosynthesis. Diversity of blue green is essential to understand the algal dynamics and interaction with other microorganisms and have gained much importance especially after the recognition of their role in the natural environment with their ability to provide an alternate source of energy. The capacity of several cyanobacteria to fix the atmospheric nitrogen is a significant biological process of economic importance [6]. The green algae play the important role acting as primary producer and also increase the fertility of the soil in paddy fields. Algae has been used as cheap sources of animal and plant nutrients, industrial exploitation of enormous of value added products has already been initiated, medicinal potential of many of these being exhaustively explored

for application. Many algae has been identified as bioindicator of the type and extent of pollution and their involvement in bioremediation of the problem has far reaching implication in protecting the water bodies. Thus, it is essential to study algal community in fluctuating physico-chemical properties of paddy fields area to conserve and to maintain the ecosystem. There are many paddy fields that remain unexplored, at various locations of paddy fields in Honnali Taluk, Davangere district of Karnataka. Hence, the present work has been made to study the diversity of cyanobacterial population and their nitrogen fixing potential. Keeping these views in mind an attempt has been made during the year 2021 to survey the distribution of the green algae in particular paddy field in and around are Ujjanipura, Sadashivapura, Hotypura, Kambarghatte etc Honnali Taluk, Davangere district, Karnataka [16] which has been reported for the first time.



Source: <https://download.masterplansindia.com/maps/karnataka/davanagere/geomorphology-honnali-taluk-map.jpg>

MATERIALS AND METHODS

Study Area

Honnali is situated in Davangere District, Karnataka. Honnali PIN-577217 With Latitude = 14.2625177 and Longitude =

75.3598953. Honnali lake is an annual water body receiving water from the adjacent paddy fields, Tunga canal and waste water from Honnali village. It is located in Honnali taluk, 43 km away from Shivamogga city. In India, there are enormous numbers of natural and manmade water bodies used for various purposes, mainly for drinking and agriculture.

Materials and Methods

Study area

The study area has been divided into two different sites i.e., Road side paddy field area and Rice fields of various spots around Honnali Taluk (Ujjanipura, Hotypura, Beeragondanahalli, Sadashivapura, Rampura, Chickbasuru, Kambaraghatte and Benakanahalli). The algal sample materials were collected randomly from various paddy field soil surfaces in wide mouthed bottles. The collected specimens were stored in the laboratory, University department of Botany, Sahyadri science college Kuvempu University Shivamogga. The algal sample materials

carefully preserved in 2% of Lugol's iodine solution. The slides prepared by staining with saffranine for detailed studies were made by examining specimens under the compound microscope and a photographic attachment. The strains were identified based on their morphological features and cell structure by using monographs. Lugol's Iodine solution photographs from were used for Algal Identification after microscope examination using light Binocular microscope [8].

Sample Collection and Analysis

Sample collection started at different sites of Honnahalli Taluk. The samples were randomly collected in various spots of paddy field. This was done in the month of July-2021. Samples were collected and preserved immediately with Lugol's iodine solution. Photographs from were used for Algal Identification.

After microscope examination using light Binocular microscope

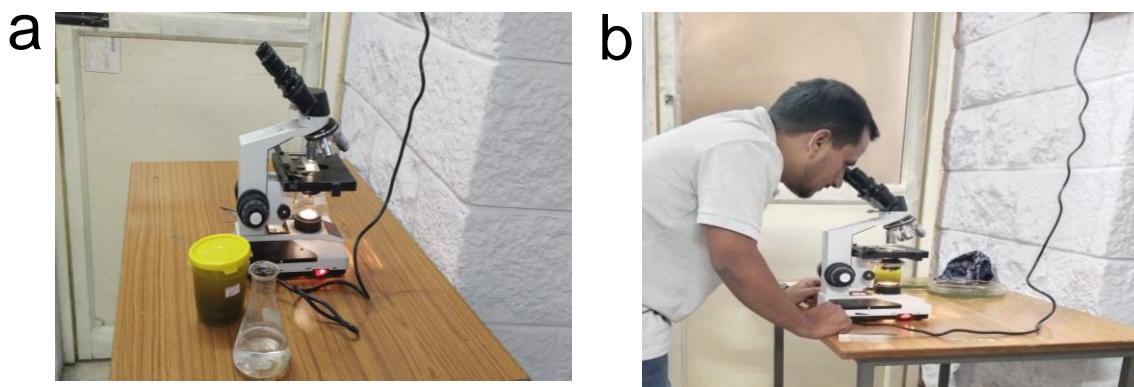


Figure 1. (a) The binocular microscope with samples and (b) Analysis of Phytoplankton using binocular microscope

Result and Discussion

Spirogyra (Figure 2a)

Order: Zygnematales

Family: Zygnemataceae

Spirogyra species of which there are more than 300 are commonly found in rice field habitats. Spirogyra measures approximately 30 to 120 μm in width and may grow to several centimetres in length. It

is often observed as spiral shaped chloroplast. Small rounded or spherical structures present in chloroplast and greenish in colour patches on the paddy field [7].

Chara (Figure 2b)

Order: Charales

Family: Characeae

Chara is a genus of charophyte green algae in the family characeae. They are multicellular and superficially resemble land plants because of leaf-like and stem like structures. They are found in rice field, particularly in red soil areas throughout the southern temperate zone, where they grow, attached to the surface of rice field. They prefer less oxygenated and hard water and are not found in waters where mosquito larvae are present. They are covered with calcium carbonate deposits and are commonly known as Stoneworts. Cyanobacteria have been found developing as epiphytes on the surfaces of Chara, where they may be involved in fixing “N”, which is important to plant nutrient.

Morphology

The plant body is a gametophyte. It consists of the main axis (differentiated into nodes and internodes), dimorphic branches (short branches of limited growth, and bigger branch of unlimited growth), rhizoids (multicellular with oblique septa) and needle-shaped (stipulodes) structures at the base of secondary laterals)

Ankistrodesmus falcatus (Figure 2d)

Order: Zygnematales

Family: Chlorophyceae:

Cells minute, smooth, elongated, aggregated numerous, forming fasci or families, each family resulting from the self-division of a single cell, which commence by the formation of a somewhat oblique septum at the middle, continually rendered more and more oblique form the young cells growing alongside one another longitudinally until they each attain the length of original parent cell [9].

Euastrum spinulosum (Figure 2C)

Order: Zygnematales

Family: Chlorophyceae

They are semi-terrestrial habitats, a good number of desmids occur in planktons. The legums or seaweeds covers are silt or granular like shape take control of on the cell wall help in adapting to planktonic life. The cell wall is

smooth without pores on never saturate with Fe(II) compounds[13].

Oedogonium

Phylum: Chlorophyta

Subphylum: Tetraophytina

Class: Chlorophyceae

Order: Oedogoniales

Family: Oedogoniaceae

Single filament, unbranched and attached or free-floating; vegetative cell single nucleate, small knob like termination, thread like structure, cylindrical, nodulose or undulate and anterior end with caps or ring-like scars formed by cell division; basal cell having holdfast; frontal cell obtuse, short sharply pointed or hyaline; chloroplast parietal, reticulate with numerous pyrenoids. Oedogoniales was separated into two clades according to the shape of the basal cell (elongated or thread and sub-hemispherical) with a good supported value

In the first clade, the taxa possessed elongated basal cells, and in the second clade, they possessed spherical or sub-hemispherical basal cells (Figure 2). Hence, we recommended that the genus Oedogonium can be divided into two sections based on the two kinds of basal cell shapes, namely section Globosum and section Elongatum, representing the species with spherical or sub-hemispherical basal cells and elongated basal cells, respective [10-11]

Staurastrum

Class: Zygnematophyceae

Order: Desmidiaceae

Family: Desmidiaceae

The genus staurastrum is initially differentiated by the radical symmetry of the cells as seen in granular spots. It embraces species of rich differentiated character than by other genus of desmids.

“All kinds of spine of spine forms occur in the genus, from those in which the whole

surface of the cell is covered with spines. All gradations occur from smooth to granulate species. From granulate to asperulate and from these to coarsely spine forms [12].

“All Attempts to split up this genus on natural principles have entirely failed. The relationships of the different species are too complex and close, so that only arbitrary lines of demarcation can be drawn. The means of physico-chemical character results measured in paddy field in various regions. This explains the low conductivity. The highest temperature was recorded in paddy field is March 2021 (38 °C). The lowest temperature

was recorded in paddy field is July 2021 (22.1°C). Conductivity values are between 25 and 155 $\mu\text{s/m}$. After chemical analyses, many minerals intervene in an aquatic ecosystem. But some statistics revealed that pH, Ca, NaNO_3 , Mg, P, K. The identification of species was carried out using a BM-8bi(C) binocular microscope (Micro Measures and Instruments AN ISO 9001 Company). The observation and photograph were accomplished with 400 \times : ocular with 40 \times objective. The description of species genera with pictures were given out for each subject [14-15].

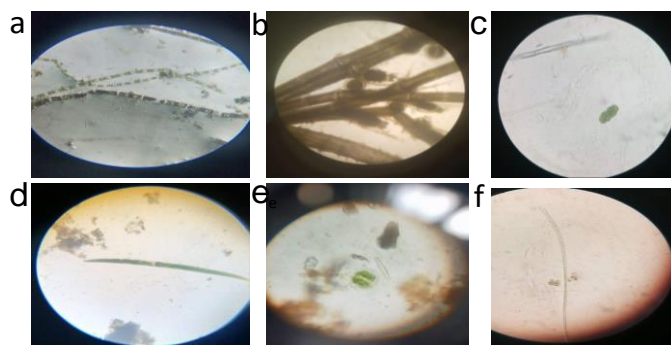


Figure 2: Inset images are (a) Spirogyra, (b) Chara, (c) Euastrum, (d) Ankistrodesmus falcatus, (e) Euastrum spinulosum and (f) Oedogonium

Conclusion

The presence of cyanobacteria which fix atmospheric nitrogen in paddy fields and also enhances the micro and macronutrients. So, it is necessary to conserve algal genetic resources of local habitat and to do more systematic work on it which is possible only after understanding the ecology and habitats of different algal forms. The present study concluded that the maximum diversity of phytoplankton's present in the rice fields in Honnali paddy fields in around Honnali Taluk.

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Declaration of interests.

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Conflicts of Interest

The research authors declared no conflict of interest.

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