ALGAL DIVERSITY AND PHYSICO-CHEMICAL PARAMETERS OF THE AKKA TANGI HONDA KARNATAKA INDIA

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Abstract

This work was carried out to investigate the physico - chemical characterisation and phytoplankton diversity of lentic water-body. To analyse the physico - chemical and phytoplankton diversity, the water sample was collected from different locations akka tangi Honda which is located in Chitradurga fort . This study was carried out during Januvary -2019 to December-2019. Many physico-chemical parameters were studied such as Temperature, pH, acidity, alkalinity, chloride, DO, BOD, etc. Among the various paramaeters studied, DO and BOD plays significant role on phytoplankton diversitry. According to present investigation work the average DO and BOD were 7.48 mg/L and 3.6 mg/L respectively, it is concluded that BOD is not at all harmful to phytoplankton because DO is higher. During phytoplanktonic study, it is observed that bacillariophycean members were dominant over other groups. Phytoplankton study and monitoring are useful to control the physico-chemical and biological conditions of water.

Key words :- Akkatangi , Algal diversity, physico chemical paramrters, and ANOVA

Introduction

Water is one of the most important compounds of the ecosystem. Living things exists on the earth because of this is only planet that has the existence of water. It is necessary for the survival of all living things be it plant, or animal life. It is the most abundant commodities in nature but also the most misused one, Although earth is a blue planet and 80% of earth's surface (80%of the total 50,000 million hectares in area) is covered by water. Water is the most important resources for human existence and ensuring clean drinking water is emerging as one of the most difficult challenges of this county, the hard fact of life is that, about 97% of it's locked in oceans ,sea which is too saline to drink and for direct use for agricultural or industrial

purposes .2.4%is trapped in polar icecaps and glaciers from which icebergs breaks off and slowly melt at sea.<1%(i.e.33,400m3)water is present in ponds, lakes, rivers, dams etc.

Water pollution can be analyzed by the changes in physical, chemical and biological properties like colour, organic / inorganic contents and microbial load. Water quality is affected by a wide range of natural and human influences. Changes in the physico-chemical parameters may positively or negatively affect the biota of water-bodies in a number of ways such as their survival and growth rate and these may eventually result in disappearance of some species of organisms or its reproduction The phytoplanktonic study is a very useful tool for the assessment of water quality and productivity of any type of water-body and also contributes to understand of lentic water-body. Phytoplankton includes several thousands of microalgae belonged to Cyanophyta (Blue Green algae), Chlorophyta (Green algae), Bacillariophyta (Diatoms), Euglenophyta (Pigmented flagellate or phyto-flagellated) etc. They respond quickly to environmental changes and are used to assess the ecological status of water-body.

MATERIALS AND METHOD

Water samples were collected for the physico-chemical and phytoplankton studies from akka tangi Honda at the interval of 30 days for the three months from January-2019 to December 2019.Sample were collected in the black plastic car buoys of 2 liter capacity. For estimation of BOD, water sample was taken in 300ml of BOD bottle and fixed immediately using Winkler's reagent and brought to the laboratory for further analysis . Air, water temperature and pH, DO were recorded at the sampling station. For the estimation of remaining parameters, the sample was kept in a cold water. The final result was calculated by taking average of 3 consecutive readings.

The Physico-chemical parameters estimated are as follows

- pH
- Air temperature
- Water Temperature
- Colour
- Odour
- Turbidity
- Total dissolved solids(TDS)
- Electrical conductivity

- Chloride
- Total Hardness (TH)
- Alkalinity
- Dissolved oxygen Demand (DO)
- Biochemical oxygen Demand(BOD)
- Magnesium
- Free Carbon dioxide
- Total Acidity

TOPOGRAPHY OF STUDY AREA

ACCESSIBILITY

Chitradurga is district head quarter city. It is located in central part of Karnataka state, India. Pune - Bangalore Highway (NH-4) and NH-13 passes through the study area. Almost all the villages of the area are connected by un metalled roads and regular bus and train facility exist from Chitradurga to different places. Few pedal paths and cart tracts connecting the local villages provide accessibility to interior of the area.

LOCATION

The area falls in the survey of India topo map numbers 57 B/6 and 57 B/7 on 1:50,000 scale. The area is bounded by longitude 76 24" to 76 28" S" E and latitude 14 11" to 14 17" N.

TOPOGRAPHY

Topography of the area is generally undulating to rolling topography with frequent mound like features. Soils on the rolling topography are severely affected by erosion. Isolated hills and hill ranges are also seen.

GEOGRAPHY OF STUDY AREA

Geology of the study area consists of granites, schists, meta-volcanics, meta-sediments, pillow lavas and banded iron formation.

SOIL TYPES AND VEGETATION

Soil is natural aggregate, resultant of various physicochemical and biological processes operating under varied seasonal job conditions. The main factors for the formation of soils are

parent materials, climate, relief, vegetation, time etc. both red and black soils are found in the study area.

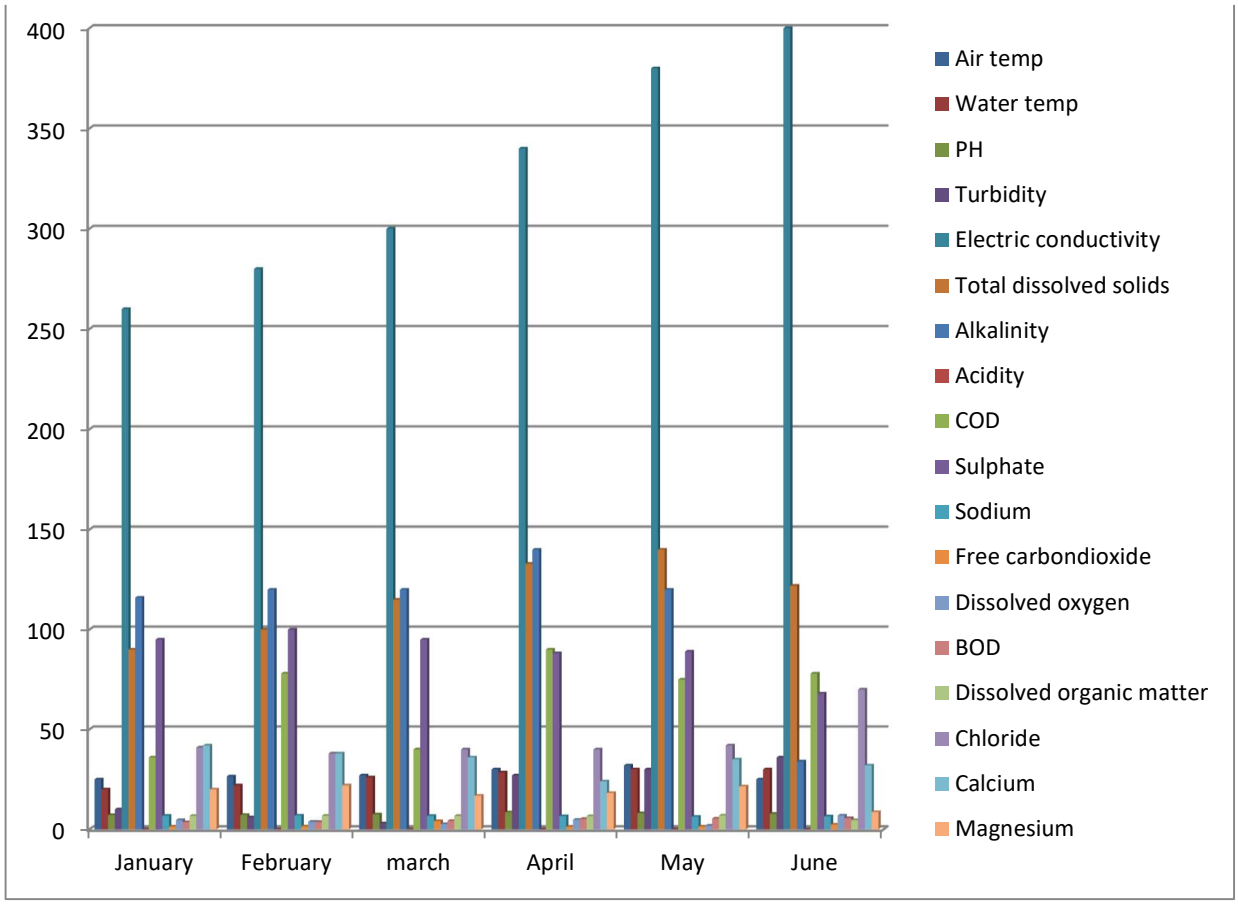
Chitradurga has tropical dry deciduous type of vegetation. The important species occurring in the study are both shrubs and trees. In the study area, variety f plant species are found , Co*cos nucifera, Tamarindus indica, Acacia arabica, Mangifera indica, Tectona grandis, Eucalyptus nilgirensis, Azardirachta indica, Euginea jambulina, etc.,* are the common species which occur on black and red soils respectively.

ANALYSIS OF PHYSICO-CHEMICAL CHARACTERSTICS

Water samples were collected from different sites of the water bodies during morning. Analysis for Physico-chemical parameters as per the standard procedure (APHA 23rd edition) were made and expressed in mg/l

Results and discussions :

Parameters	January	February	march	April	May	June	July	August	September	October	November	December
Air temp	25	26.5	27	30	32	25	18	19	24	20	22	26
Water temp	20	22	26	28.5	30	30	22	23	22	21	25	22
P^H	7.1	7.2	7.5	8.5	8.1	7.8	7.7	7.8	7.8	6.8	6.9	7.1
Turbidity	10	6	3	27	30	36	16.5	34	1	0.3	0.5	2.5
Electric conductivity	260	280	300	340	380	400	360	120	150	160	165	185
Total dissolved solids	90	100	115	133	140	122	118	95	100	110	150	120
Alkalinity	116	120	120	140	120	34	20	20	25	15	64	84
Acidity	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
COD	36	78	40	90	75	78	100	200	160	90	70	35
Sulphate	95	100	95	88.2	89	68	78	77	69.2	66	65.5	55.55
Sodium	6.8	6.9	6.7	6.6	6.3	6.5	6.8	7.0	7.1	13	15	18
Free carbondioxide	1.4	1.5	4.1	1.3	1.4	2.4	2.5	2.6	2.4	2.2	4.4	5.0
Dissolved oxygen	4.6	3.8	2.63	4.8	1.81	6.9	4.9	5.1	5.8	6.89	7.32	7.48
BOD	3.6	3.7	4.2	5.2	5.4	5.6	5.2	5.4	4.6	4.5	4.3	4.8
Dissolved organic matter	6.7	6.8	6.7	6.6	6.9	4.6	4.7	4.4	4.5	4.6	6.0	5.8
Chloride	41	38	40	40	42	70	65	50	40	45	42	48
Calcium	42	38	36	24	35	32	35	34	22	18	16	20
Magnesium	20	22	16.8	18.2	21.5	8.65	9.82	3.75	7.78	4.92	5.0	6.2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Alkalinity
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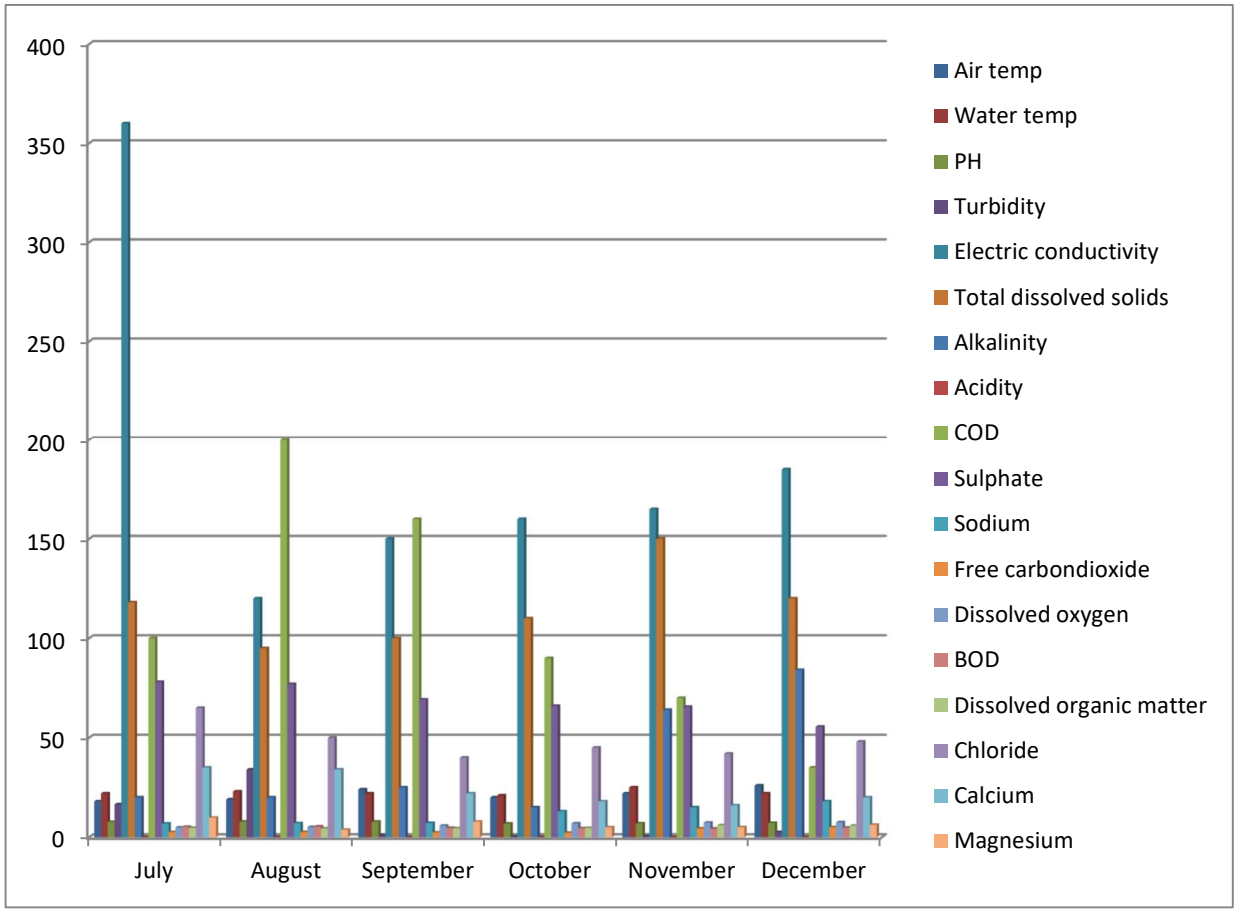
Free carbondioxide
Dissolved oxygen
BOD
Dissolved organic matter
Chloride
Calcium
Magnesium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Air temp
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Turbidity
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Total dissolved solids
Alkalinity
Acidity
COD
Sulphate
Sodium
Free carbondioxide
Dissolved oxygen
BOD
Dissolved organic matter
Chloride
Calcium
Magnesium

Now a days, the surface water-bodies have been put under severe environmental stress as a consequence of urbanization, industrialization and population explosion. It is a well - known fact that any kind of human activity on water -bodies results in the alteration of a natural quality of water. The physico-chemical properties of water-body are derived from atmospheric gases dissolved in it.

The study was carried out during January-2019 to December-2019.The results obtained during the study of s**akka tangi** have been presented in this section.

pH

pH is a term used to express the intensity of acidic or alkaline condition of a solution. Acidic condition increased as pH value. pH is an important parameter in assessing the water quality, it is used to calculate CO_3,HCO_3 and CO_2 concentration and stability index. In addition to calculate the hydrogen ion concentration and affords an indirect measure of water and determines the extent and the type of physical, chemical and biological reactions likely to occur with a water system or between the water and surrounding soil and rocks . The pH of most natural water falls within the range of 4 to 9 depending on the concentration of CO_3,HCO_3 and OH-ions. Alkaline water is more common than acidic water.

During study period, it was observed and that, minimum pH was **7.1** was minimum and max ph **8.5** during the period January to December According to BIS (1990) the minimum limit of pH ranged in between 7-8.5 and maximum limit of pH between 6.5-9.2. According to our observation pH value is within the range of BIS (1990).

Air Temperature

Temperature plays a significant role either in increasing or decreasing a particular chemical factors in water-bodies more specific the aeration (Dissolved oxygen and biodegradation process which determining the water quality to a considerable extent are temperature depends). Temperature variation are a part of the normal climatic regime and natural water-bodies exhibit seasonal and diurnal variations.

Air temperature of surface water influenced by various factors such as altitude, elevation, season ,time, rate of flow and depth of water.

The air temperature of akka tangi Honda ranged from **18°C to 32°C**

Water Temperature

Water temperature of surface water influenced by various factors like altitude, elevation, season, time, rate of flow and depth of water.

The water temperature of akka tangi honda ranged from a minimum of **20°**C in the month january -2019 and maximum of **30°**Cin the month of june-2019.

Electrical conductivity

Pure water is not good conductor of electricity.ordinary distilled water in equilibrium with carbon dioxide of the air has a counductivity of about (20 Ds/m).Because the electrical current is transported by the ions in solutions,the counductivity increases as the concentration of ions increases.

In the present investigation akka tangi recorded a minimum of **120m**g/L in august and maximum of **400mg**/L in june-2019 respectively.

Dissolved oxygen (DO)

All the living organisms are depend on oxygen to maintain metabolic processes, that produce energy for growth and reproduction. The amount of oxygen in water is called the dissolved oxygen (DO) and is influenced by water temperature. The cold water, the more oxygen it can hold because gases like oxygen are more easily dissolved in cold water.

Oxygen naturally diffuses from air into water at the air-water interface. Agitation of the water surface by wind and waves enhance this diffusion processes. Algae and water plants produced oxygen as by-product of photosynthesis.

In the present investigation akka tangi honda recorded a minimum of **2.6mg**/L in march and maximum of **6.89mg**/L in December 2019 respectively.

Dissolved oxygen is higher in winter and low in during monsoon and low atmospheric temperature in winter and high metabolic rate of organisms is mainly for secondary growth.

Low D.O mainly helpful level of organic matter started decomposing.

Biochemical oxygen demand (BOD)

The BOD test is widely used to determine The population load of wastewater and The degree of pollution in lakes, streams and rivers at any time and their self-purification capacity .The efficiency of waste water treatment methods, and also mainly helpful for the decomposes of organic wastes matter in water.

In the present investigation akka tangi honda recorded a minimum of **3.6mg/L in January** and maximum of **5.6mg/L in june** 2019 respectively

Calcium

Calcium may dissolved readily from rocks or be leached from soil. In the presence of CO_2 calcium carbonate in water is dissolved in such case. The resulting buffer system is likely to maintain the pH of most natural water between 6-9.The other sources of calcium includes industrial and municipal discharge.

The calcium amount in akka tangi honda ranged between **16to 42mg**/L during study period.

Alkalinity

Alkalinity is a measure of the water ability to neutralize acidity. An alkalinity test measures the level of biocarbonates,carbonates and hydroxides in water and test result are generally expressed in "ppm of calcium carbonate ($CaCo_2$).

Photosynthesis and denitrification etc main factor increase the alkalinity,where nitrification ,respiration are the main factor decrease alkalinity.

In present investigation the content of Alkalinity in akka tangi honda was minimum of **15mg/L** in November -2019 and maximum **140 mg/L** in april - 2019.

Free CO_2

In the current studies the free CO_2 of akka tangi honda minimum **1.4 mg/L** and maximum **4.4mg/L** during the study period

Chloride

Chloride is an important union found in variable amounts in natural water and waste water. Chloride content normally increased as the mineral l content increase Chloride is basically conservative parameter and may serves as an index of pollution, the chloride concentration largely depends on the domestic pollution, rainfall, humidity and evaporation.

Chloride mainly indicate the sewage pollution

In the current studies chloride content of akka tangi honda was between **16 to 42mg/L** during investigation period.

Magnesium

Dissolved magnesium concentration is lower than calcium for a majority of the natural water. Because of the high solubility of magnesium salt ,the metal tends to remain in solution and id less rapidly precipitated the calcium. Magnesium possess no major concern with regard to public health or the aquatic environment and limits of concentration set for water are based mainly palatability, corrosion criteria. largely the levels of Ca and Mg salt regulate the total hardness of water In the present work the magnesium amount was minimum **5.0 mg/L** in **Novamber** -2019 and maximum of **21.5mg/L in may** 2019.

Magnesium is a essential for the chlorophyll growth and acts as limiting factor for the growth of phytoplankton

Total dissolved solids

Solids refers to the suspend and dissolved matter in water they are very useful parameters describing the chemical constituents of the water and can be considered as edaphically relation that contributes to productivity within the water body.

The In the current studies total dissolved solids content of akka tangi honda was between **95 to 150mg/L** during investigation period

Turbidity

The turbidity refers to the decreased ability of water to transmit light caused by suspended particulate matter and phytoplakton

In the current studies turbidity content of akka tangi honda was between **0.3 to 36 NTU** during investigation period

Acidity

In the current investigation the acidity nil in all the 12 months of the year.

Chemical oxygen demand

COD is mainly helpful to the amount of oxygen required to oxidize all organic matter, biodegradable and non biodegradable by a strong chemical oxidant.

In the current studies COD content of akka tangi honda was between **36 to 200mg/L** during investigation period.

Biological oxygen demand

Is mainly helpful for the amount of oxygen taken up by the microorganisms that decomposes organic waste matter in water.

In the current studies BOD content of Akka tangi honda was between **3.6 to 5.6mg/L** during investigation period

Calcium

Calcium is important for shell construction and bone building and plant precipitation of lime during monsoon

In the current studies calcium content of akka tangi honda was between **12to 42/L** during investigation period

DISTRIBUTION AND PERIODICITY OF PHYTOPLANKTON

The species composition and abundance of phytoplankton population in a biotope is altered by any change in the prevailing environmental conditions. The magnitude and dynamics of phytoplankton become an essential parameter to assess the state of population as the biodiversity in stressed environment becomes poor.

Aquatic life is characterized in communities and a complex web of mutual competition as well as help becomes operative. Among these, phytoplankton float passively in the and spread uniformly, although sometimes they may extend down to various depths where light is

available for photosynthesis. These phytoplankton varies considerably in distribution with respect to different seasons and pollution loads. During the present investigation, phytoplankton population in akka tangi honda composed of the following group of organisms. Bacillariophyceae, Desmids, Euglenoids, chlorophyceae, cyanophyceae, chlorococcus.

Bacillariophyceae

Frustalia jogensis,Pinularia aerosheria, Cymbella amphoraovalis,Fragilaria construens, Gamphonema subtile, Fragilaria rumpens, Fragilaraia species.

Desmids

Synedra ulna, Syendra tabulater,Surillela linearis,Stautoneisphoenii contron, pinulariavirids,Cymbella amphicehala,Cymbella powiana,Cymbella tumida,Cymbella afinis, Hormoscillafeldmanii,Gomphonemasubtile,Closteriumactum,Cosmarium,cosmariumacerosu m, cosmariummagnificum

Euglenoids

Euglena formisproxima,Euglena linophylla,Euglena spirogyra, Euglena species,Phacus longicuda,phacus orbicalaris,Astena klebsii,Tetrallantos lagerheinil , tetrallantos suterba

Chlorophyceae

Closterium, Ankitodesmus, Pediastrum, Coelastrum microsporum, spirogyra, spirogyranotabilis chlorella, Rivalaria

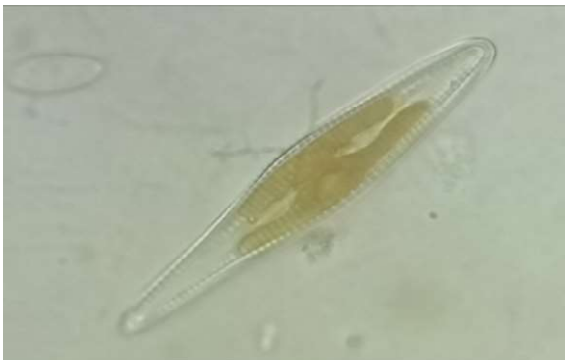
Cyanophyceae

Nostoc spp,Spirulina gigantae, Oscillaotoria subrevis, cosmarium, Anabena, Microcystis icthyobena linkia, Planktophascia gelatinosa, Microcystis auerginosea, Cydandrosperum lichniformae

Chloroccales

Chloroococus microsporum,chlorococcusinfusum maneghii, chlorococcus turgids

Bacillariophyceae



Frustalia jogensis

Pinnularia aeroshaeria

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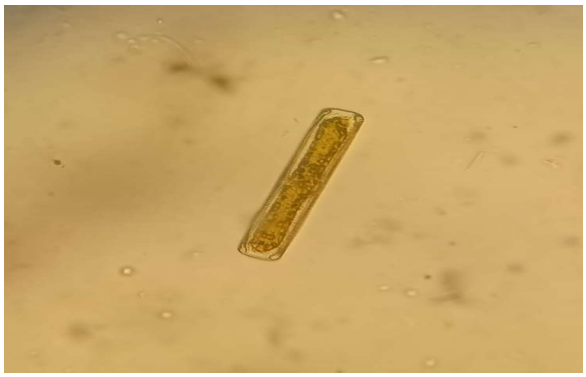
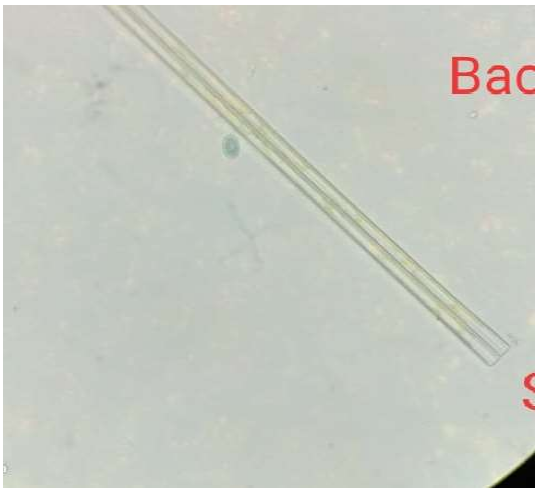
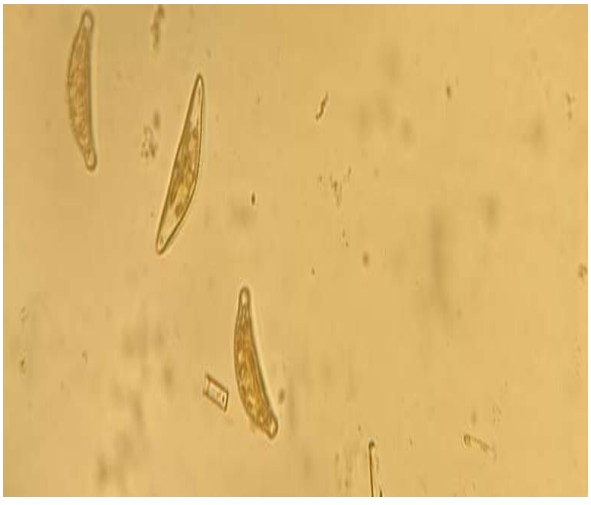
Cymbella



Amphora ovalis



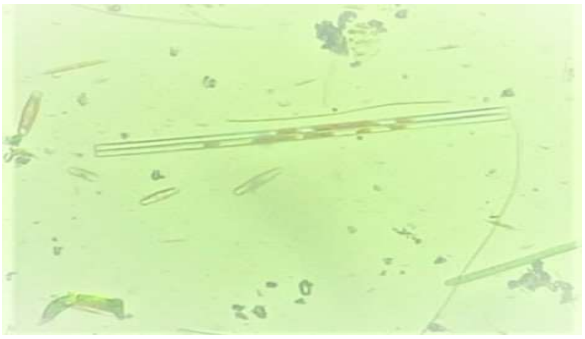
Fragilaria construens



cymbella amhicephala

Gamphonema subtile

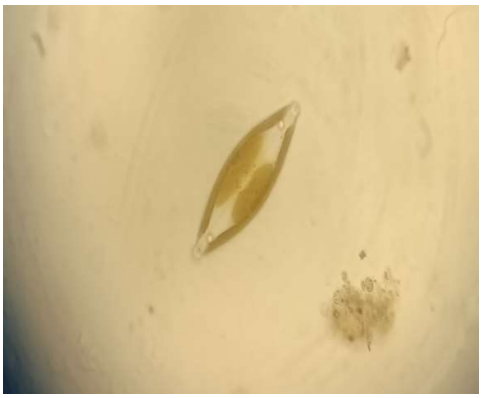
Fragillaria rumpens



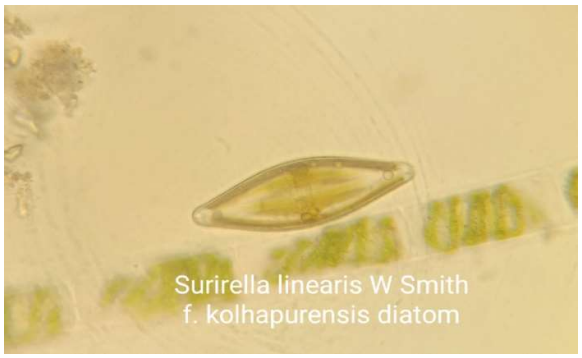
fragillaria species

Desmids

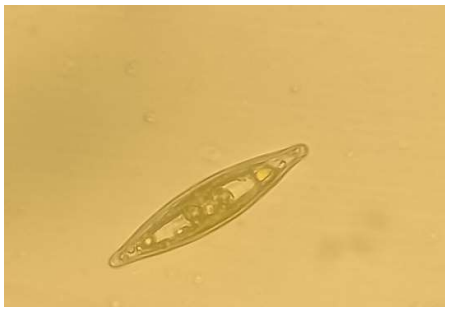
Syendra ulna



Syendra tabulater kutez



Surirella linearis



Stautoneisphoeni centeron

Pinularia virids

Cymbella amphicehala

Cymbella powiana

Cymbella tumida

Cymbella amphicehala

Cymbella afinis

Hormoscilla feldmanii

Gomphonema subtitle

Closterium acctum

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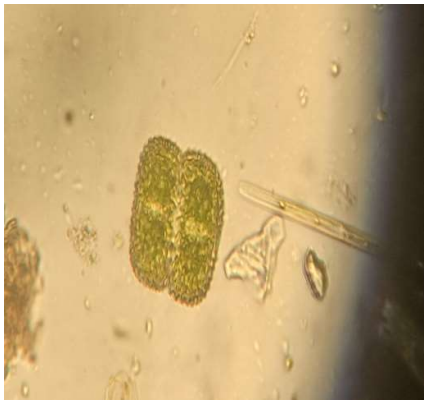


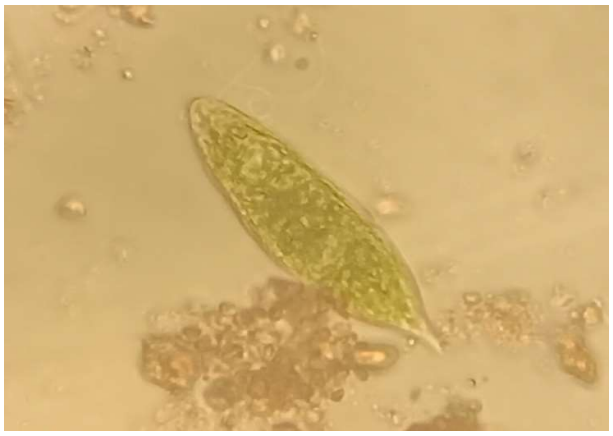
Cosmarium

Frustulia jogenesis

Closterium acerosum

Cosmarium magnificum

EUGLENOIDS



Euglena formisproxima

Euglena limnophylla

Euglena spirogyra

Euglena species

Phacus longicuda

Phacus orbicularis

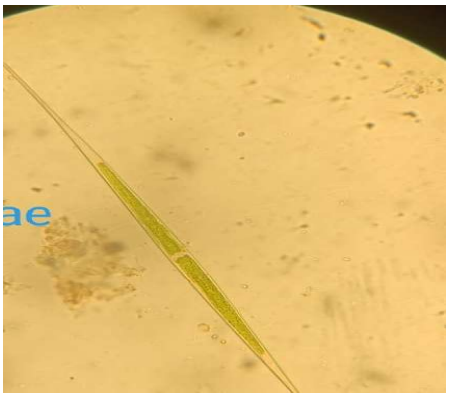
Astesia klebsii

Tetrallantos lagerheimii

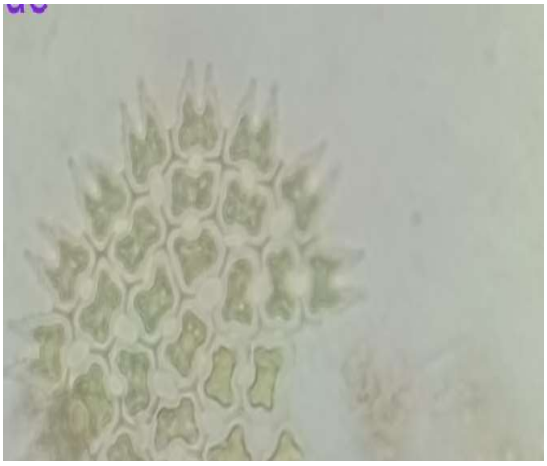
Teterllantos sutrerbsa

Chlorophyceae

Clostorium



Ankitodesmus



Pediastrum

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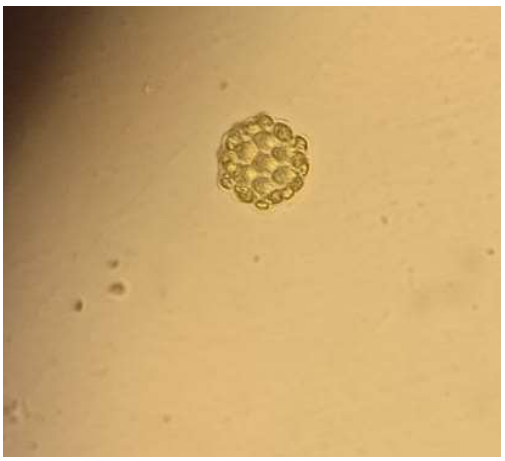
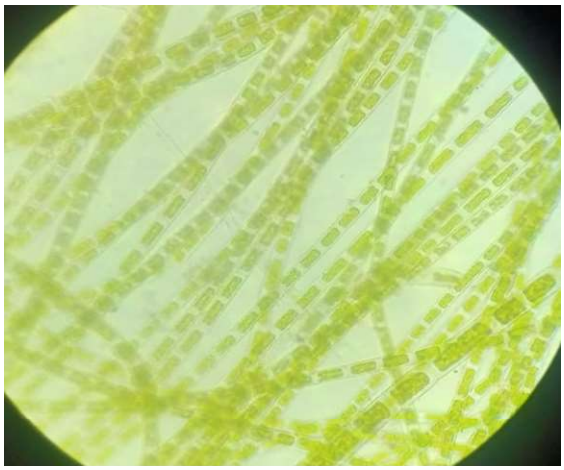


Coelastrum microporum



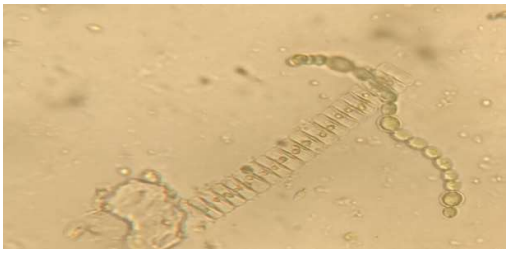
Spirogyra

Spirogyra notabi

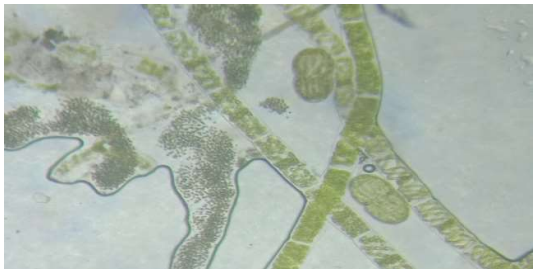
Rivalaria

Chlorella

Cyanophyceae

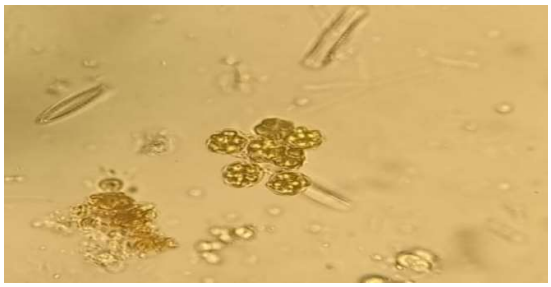


Nostoc spp

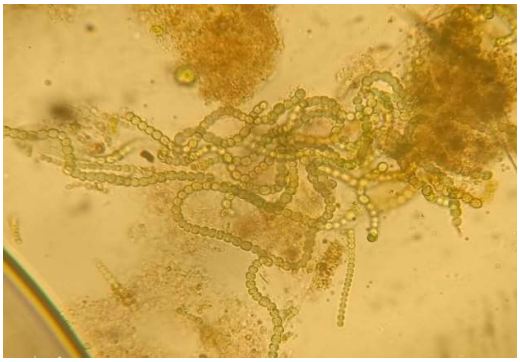


Spirulina gigantae

Oscillotoria subbrevis



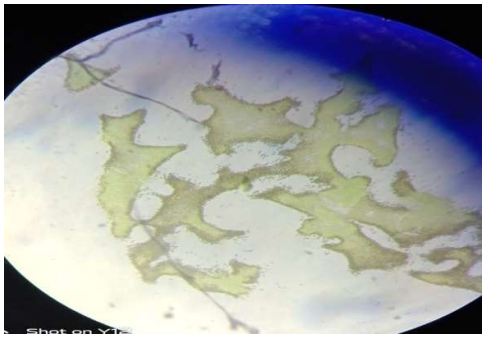
Casmarium



Anabena

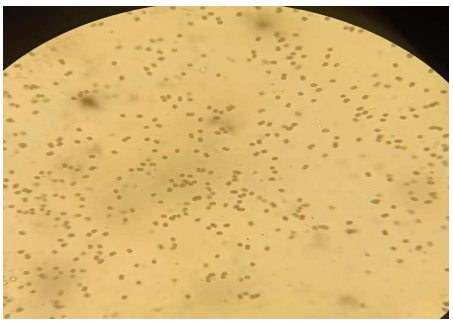
Microcystis icthyoblade

Nostoc linkia



Microcystis icthyoblabe

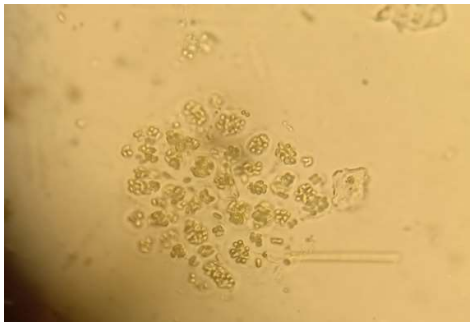
Planktosphaeria gelatinosa



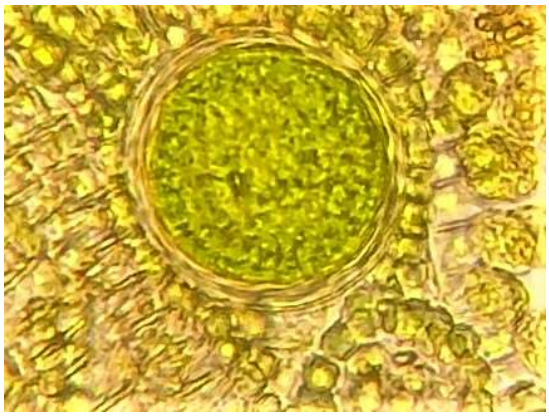
Microcystis aureginosa

Cylandrosoermum licheniforme

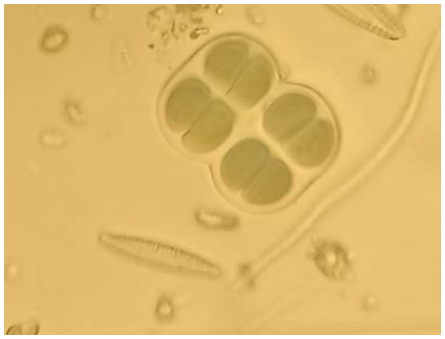
Chlorococcales



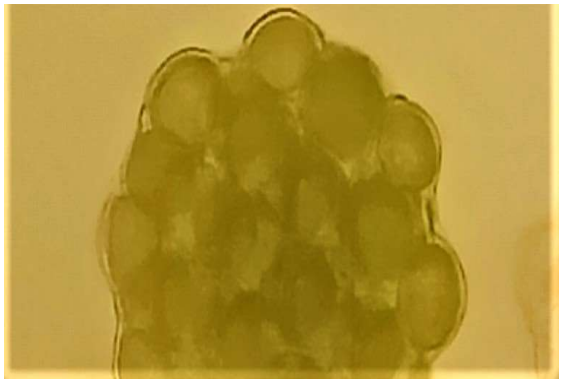
Chroococcus microsporum



Cholorococcus infusion meneghini



Chroococcus turgidus



chlorococcum nageli

Conclusions

Water is one of the most important natural resources for all the living beings, whether unicellular or multicellular. About 73% of earth is covered with marine or fresh water, which is present in ponds, tanks, lakes, oceans, glaciers etc. Out of the total global water content 3% is suitable for human use. The increase in world's population resulting in urbanization, industrialization, agriculture etc has put tremendous pressure on limited fresh water resources there by threatening the fresh water bodies with pollution. Present algal diversity and physic chemical parameters of the varies from month to month in a season to season in the study period 2019 january to 2019 december of akka tangi honda. This water is highly potable for drinking water of both animals and human beings after filteration and purification of water and this pond water eradicate many skin disease and this water used olden days for traditional practise festival time King madakarinayaka iv and madakarinayaka iv wife both are sucide in this pond hence akka tangi honda my research reveals in akka tangi honda meant for only growing some bacillariophycean and desmids was more dominant over the group cyanophycean and chlorophycean members than that of chlorococcales group.

References

Arylmurugan.P, Nagaraj. S and Anand.N (2011), " Biodiversity of fresh water algae from Guindy campus of Chennai, India". Journal of Ecobiotechnlogy.ISSN: 2077- 0464, Vol-(3): 19-29.

Banakar A. B and Thirumala.S (2013), "Physico-chemical analysis of Rangayyanadurga water reservoir, near Molakalmuru, Chitradurga Distict,Karnataka, India". International research journal of environmental science. ISSN: 2319- 1414, Vol- 12(10): 49- 57.

Baruah P.P and Bhaswati Kakati(2012), " Water qualilty and Phytoplankton diversity of Gopeswar temple fresh water pond in Assam, India". Bangladesh journal.,ISSN : 0253- 5416 Vol- 41(2): 181- 185.

Bidisha Bhattacharyya (Nee) Ghoseh (2018)," Physico-chemical analysis of pond water in Purba Bardhaman, West Bengal, India". International Research journal of envir6 science. ISSN 2319-1414, Vol-7(2), 54- 59.

Crosseti, LO.Bicudo, DC. Bicudo, C E M, and Bini, LM, (2008) " Phytoplankton biodiversity changes in a shallow tecopicalreservioring during the hyper trophication process". Journal by Phytoplankton biological. ISSN: 1334- 9271, Vol-6(2), pp. 84- 97.

Douglas Henrique cavalcanti dis Santos, Marissa Gloria Gondavessilva - cunha, Marlene Felipe Santiago and Jose Zanon de Oliveira paesavante (2019)," Characterization of ohytop5 biodiversity in tropic soipwraks off the coast of pernambuco, Brazil". Journal by Acta bot, bras. ISSN: 9214- 9342. Vol-24(4): pp. 214- 342.

Dushyant Dharma (2013) ,"An assessment of Phytoplankton diversity of Tighra Reservoirs, Gwalio, Madhya Pradesh, India". International letters of natural sciences . ISSN: 2300- 9675, Vol-16: 145- 156.

Elayaraj, B. Selvaraju . M. (2014), " Studies on some physico-chemical parameters, Cyanophycean members and corealatiin co- efficiency of Eutrophic ponds in Chidambaram, Tamil Nadu, India". International letter of natural sciences. ISSN: 2300- 9675, Vol-16:145-156.

Gunjanmotwani, Mini Raman, Matondkar. Sushma Parab, Suresha Pednekar and Hitesh Solanki (2014) "Comparison between Phytoplankton biodiversity and varius indices for winter monsoon and inter monsoon periods in North- Eastern arosian sea". Journal by Gew-marine Sciences. ISSN: 1513- 1518 Vol- 143(8),pp.151- 178.

Hemalatha Bhavimani and E. T Puttaiah, " Fish culture and Physico-chemical characteristics of Madikoppa Pond, Dharwad Tq/ Dist, Karnataka". Hydrobiology: current research,ISSN: 2157- 7587.

Nagamani. C et.al.,(2015), " Physio-chemical analysis of water sample". International journal of scientific and engineering research,ISSN: 2229- 5518, Vol-6: 32- 39.

Narasimha. N(2013), " seasonal variation and diversity of zooplankton in Karkala,Udupi, Karnataka, India". International journal of herbal medicines,ISSN: 2321- 2186, Vol- 1(4): 35-43.

Palkeyi. S , Kar. R. N; panda, CR(2011)" Influence of water quality on the biodiversity of Phytoplankton in Dharma river estuary of odisha river estuary of odisha East, 13 of Benga". Journal by Tasem. ISSN: 119- 8362, Vol- 15(1),pp; 69- 74.

Priyanka Sharma and Nilima Bharadwaj (2017), " Algal biodiversity in some water bodies of Kota, Rajasthan, India". International research journal of biological sciences, ISSN: 2278-3202, Vol- 6(9): 7-14.

Rashmi B. S. And Somashekar Mallammanavar G.(2013) " Diversity of Phytoplankton of lakkinakoppa pond shivamogga Dist, Karnataka, India". Indian journal of plant sciences,ISSN: 2319- 3824, Vol-2(3) ,pp.87- 91.

Sunil M. Khristi, Dhwanu H. Later, Arvnabh Mishra(2017),"phytochemical evaluation of selected marine algae collected from Okha coast of Gujarat,India". International journal for innovative research in multidisciplinary field, ISSN: 2455- 0620, Vol-3.

Shiddamallaya. N,Angadi. S and patil. P.C(2013) "Algal community in Papnash pond, Bidar, Karnataka, India". International journal of pharmacology and life science, ISSN: 0976-7123, Vol- 4(12): 107-122.

Yoshio Ogawo and Shrun-ei,Ichimura(1984)," Phytoplankton diversity in Inland waters if different tropical status". Japan journal Limnology, ISSN: 2318- 2689, Vol-12(6): 235- 242.