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IMPACT OF PHYSICO-CHEMICAL CONDITIONS ON SEASONAL FLUCTUATION OF PLANKTON DIVERSITY IN CERTAIN WETLANDS OF TIPTUR TALUK, TUMKUR DIST, KARNATAKA, INDIA

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Abstract

The increasing human activities in addition to natural causes affect on the wetland ecosystem. Amongst the various water bodies, wetlands also play an important role in the biodiversity of this region. The present study documents the distribution of phytoplankton, zooplankton and their correlation with physico-chemical conditions of water of four wetlands of Tiptur Taluk, Tumkur District, Karnataka, during the period of two year from June 2010 to May 2012. All the selected wetlands are surrounded by coconut garden in all the sides and having a direct connection with the Hemavathi river channel. The result revealed that there are 114 species of phytoplankton and 32 species of zooplankton were recorded from the wetlands. Among these, Chlorophyceae was the most dominant class in phytoplankton (62) (54.38 %), followed by Bacillariophyceae (27) (23.68 %), Cyanophyceae (17) (14.91%) and Euglenophyceae (8) (7.01%), while zooplankton, Rotifers constitutes (14) (43.75%), followed by Protozoa (4) (12.50%), Copepod (6) (18.75 %) and Cladocera (8) (25.00 %). In all these wetlands, the diversity of plankton is more in pre monsoon compared to post monsoon and monsoon season. The results of the present investigations are compared with literature values and investigation reveals that there is a fluctuation in the physico-chemical characters of the water. This will be due to entry of rain water and also due to change in the temperature, PH, turbidity, CO_2, chloride, transparency, TDS, alkalinity and dissolved oxygen etc.

Key words: Wetlands, Biodiversity, Phytoplankton, Zooplankton, Physico-chemical parameter.

Introduction

Water is important component of all living beings. It also performs unique and indispensible activities in earth ecosystem, biosphere and biogeochemical cycles. The freshwater resource is becoming day by day at the faster rate of deterioration of the water quality is now a global problem (Singh Abujam et al., 2011). Intensive farming has led to severe disturbance of watersheds throughout the world, resulting in fundamental changes in the structure and functioning of stream ecosystems (Lavoie et al., 2004).

Being highly productive and having genetically diversified ecosystems, the wetland provides important benefits of both goods and services.The wetland provides important values of i) biological diversities in terms of both floral and faunal assemblages, ii) cultural and historic values to be designated as a heritage site, iii) aesthetic values in form of its excellence in natural beauty, variable landscapes and habitat types and iv) a large number of attractive wildlife (Chakrabarti,1991). Moreover, the wetland serves several functions like i) nutrient retention through persistent vegetation, restricted circulation through winding channels and creeks, seasonal flooding and high sediment organic content, ii) nutrient recycling with a high rate of primary productivity, with significant areas of submerged vegetation that dies seasonally. iii) Groundwater recharging through the permeable substrates IV) controlling biogeochemical cycles, v) the major source and sink of carbon, and, vi) breeding ground of waterfowls and other aquatic organisms (Selvam, 2003).The wetland plays a unique role to stabilization of climate which interalia, controls the life cycles of species and maintenance of ecosystems. In addition to its large wealth of alluvial soils, water resources, biodiversity, commercially exploitable species of shell and fin fishes (Bhattacharya and Sarkar, 2003).

Intensive studies concerning the pattern of colonization and succession of phytoplankton's from diverse sites of Indian subcontinent has earlier been highlighted (Mishra 2000; Mishra 2006).In the tropical country like India, highly seasonal rainfall and heavy discharge of water during monsoons results in high flushing rate of phytoplankton in the most of the reservoirs. Therefore, the consistency and productiveness of biotic component is variable. Plankton by virtue of drifting habit and short turnover period constitutes major link in the tropic structure and events in the reservoir ecosystem. A rich plankton community is the hallmark of Indian reservoirs that can be attributed to biotic factors and nutrient load variability (Goswami et al., 2012). Any increase in nutrient inputs leads to enhanced primary productivity; phytoplankton may serve as a relevant indicator of the trophic state in Indian lakes, as in other parts of the world (Szeląg-Wasielewska, 2006).

It is recognized that wetlands alone cannot solve all of our water pollution problems since every wetland has a finite capacity to assimilate pollutants and overloading it will reduce its ability to perform this and other functions. Nevertheless, wetlands have a key role to play in integrated catchment-based strategies to address water quality issues. (Donovan C. Kotze, 2000). Phytoplankton is one of the initial biological components from which the energy is transferred to higher organisms through food chain (Tiwari and Chauhan, 2006; Tas and Gonulal, 2007; Shashi Shekher et al., 2008).Earlier studies on lake phytoplankton diversity (Vaulot, 2001; Pongswat et al, 2004; Kendirim, 2001; Millman et al., 2005; Sridhar et al., 2006; Senthilkumar and Sivakumar, 2008; Ganai et al., 2010) revealed the importance of this type of study. Studies showed that most of the phytoplankton was a great deal sensitive to the varying environment condition.

Many workers have carried out hydrological studies on ecosystem. The significant contributions are of (Sugunan 1995, Sabu and Abdul 1998, 1999 and Krishnamurthy 2002). Many of the physical and chemical features of wetland and lake ecosystems depends on the depth of them, the amount of heat it absorbs from and releases to the atmosphere, the supply of nutrients to the lake and wetland from the watershed, and the retention time of water in them. (Waseemraja, Ansari, S. and Khan A.A. 2008), worked on the role of selected nutrient sources in the eutrophication of fresh water ecosystems of Aligarh.

Phytoplankton constitutes the very basis of nutritional cycles of an aquatic ecosystem. They form a bulk of food for zooplankton, fishes and other aquatic organisms. Phytoplankton is one of the initial biological component from which the energy is transferred to higher organisms through food chain(Rajesh et al., 2002, Ananthan et al., 2004, Tiwari et al., 2006).

Zooplanktons are ecologically and economically important heterogeneous group of tiny aquatic organisms that are present at the mercy of water currents, as they have weak power of locomotion. Zooplanktons are either herbivorous, feeding on phytoplankton or carnivorous, feeding on other zooplankton. They themselves are fed upon by fish and thus the vital transition between primary production (phytoplankton) and fish. Without these primary consumers, herbivorous and other levels of food chain would collapse (Wetzel, 2000). Among all the freshwater aquatic biota, zooplankton population is able to reflect the nature and potential of any aquatic systems (Kumar et al., 2010).

Materials and Methods

The present study was carried out in four wetlands of Tiptur taluk, from June 2010 to May 2012. Samples were collected on the basis of seasonal wise i.e. pre-monsoon (February-May), monsoon (June-September), post monsoon (October-January). The surface water samples were collected from selected sites during morning hours in two liters polythene bottles for physico-chemical parameters between 7:00 A.M. to 11:00 A.M. Atmospheric and water temperature, pH, turbidity, electrical conductivity, were determined on the sampling sites. BOD and DO were fixed on the site, while TDS, Cl, TH, Ca, Mg, Alkalinity, Acidity, NO3, PO4, Fe, Si, CO2, SO4, COD and DOM were analyzed in the laboratory by using standard methods of APHA, (2005). For the plankton analysis, the samples were collected by filtering 10 liters of water filtered through plankton net of 20µ pore size filtering cloth and concentrated up to 100 ml. The concentrated plankton samples were preserved immediately with the help of 4% formalin. The samples were observed under the microscope and identified phytoplankton and zooplanktons using standard keys and published literature. The phytoplankton species have been identified by using keys - Edmondson, W.T.(1959), Subrahmanyan, R.(1968) and. Subrahmanyan, R.(1971), Adoni, A. D. et al., (1985). The zooplankton species have been identified with the help of standard keys of Needham, J. G. and Needham, P. R. (1972). The quantitative estimation was done by using Sedge wick – Rafter Cell and expressed as numbers per liter.

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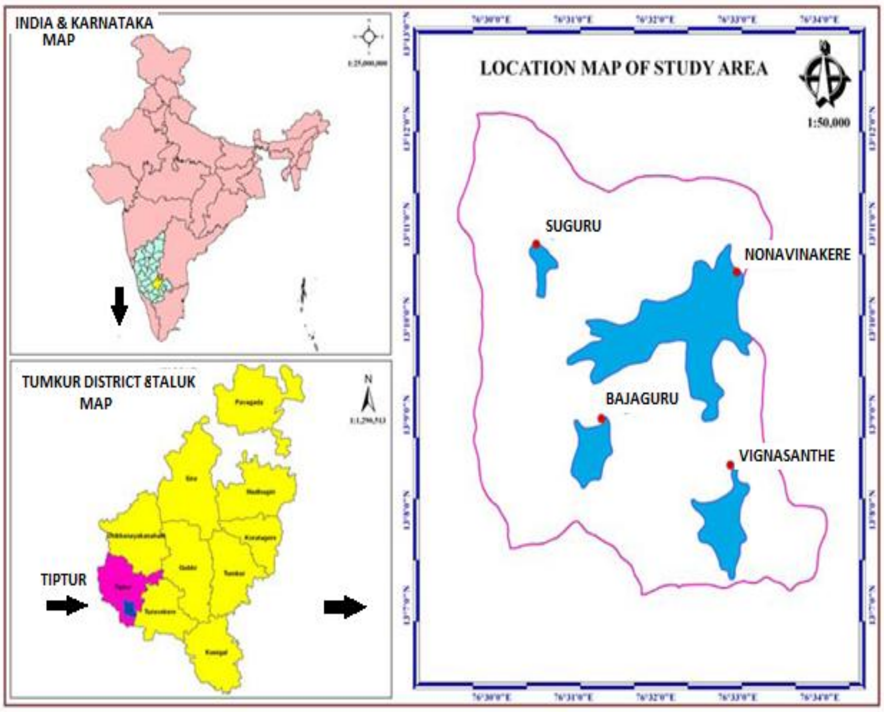

Fig.1.Map showing the study sites:

Results and Discussion

Distinct seasonal variations were observed in plankton diversity during the study period. In tropical waters, the seasonal changes are usually the result of wet and dry periods, rainfall playing a crucial role in renewing water and bringing nutrients from watershed (Mukhopadyay G.et al.,2004). In recent past, studies on phytoplankton in relation to environmental conditions have been made by (Demir and Kirkagac 2005. Moreno-Ostos et al., 2008) investigated spatial distribution of phytoplankton in a Mediterranean reservoir.(Cardoso and Marques 2009) determined the short-term patterns derived from the interactions of wind-driven hydrodynamics and the plankton community in a large, shallow lake

The plankton studies were noticed that a total of 114 species of phytoplankton belonging to 31 genera and 21 families under the 3 classes (Table -1). Among these Chlorophyceae comprised of 62 species (belonging to 19 genera, 12 family), followed by Cyanophyceae 17 species (12 genera, 5 family), Bacillariophyceae 27 species (16 genera, 4 family), Euglenophyceae 8 species, 2 genera has been recorded(Table-1). A total of 32 species of zooplankton belonging to 28 genera and 15 families under the 3 classes were recorded; 14 species of rotifera were belonging to 11 genera and 9 family, 6 species of copepod belonging to 6 genera and 3 families and 8 species of Cladocera belonging to 7 genera and 3 families, 4 species of Protozoans were recorded during the study period from the 4 study sites (Table-2).

Table.1. Seasonal variation of phytoplankton (Org/L) in the wetlands of Tiptur during 2010-12 .

Sl. No.	Parameters	June 2010 to May 2011			June 2011 to May 2012		
		Monsoon	**Post Monsoon**	**Pre Monsoon**	**Monsoon**	**Post Monsoon**	**Pre Monsoon**
Station-1	Cyanophyceae	2945.25	4460.75	9619.75	3114.5	4829.75	9754.5
	Chlorophyceae	3032.25	4858	5951.5	3232.75	4965.5	6438
	Baciliariophyceae	1487.75	2239	7688	2000.75	2277.75	8527.5
	Euglenophyceae	15.75	75.25	2569	8.0	69.5	2551.25
Station-2	Cyanophyceae	885.5	1212.5	2784	726.5	1523.5	3739.5
	Chlorophyceae	5402.5	8439.5	9021.5	6203.5	8855	9236
	Baciliariophyceae	4086.75	3687.25	8644.5	4366.5	4185.75	8815.5
	Euglenophyceae	0.75	1.75	11.75	4.0	1.5	13.75
Station-3	Cyanophyceae	1278.25	2899.5	4576.5	1741	2819.5	5096.5
	Chlorophyceae	4096.5	8107.25	8542.25	4458	8836.75	8088.5
	Baciliariophyceae	2980.75	4583.5	9990.5	3259.75	5018.25	10037.25
	Euglenophyceae	0.75	3.75	20.0	3.0	5.5	26.75
Station-4	Cyanophyceae	3177.25	3992.75	7645.5	3456.25	4111.25	8205
	Chlorophyceae	2365.25	7472.25	5349.5	2675.75	10128	6755
	Baciliariophyceae	1711	425.75	3569.25	1910.25	517.5	4129.5
	Euglenophyceae	6.75	43	2624.75	10.25	40.5	2652.25

Table .2. Seasonal variation of zooplankton(Org/L) in the wetlands of Tiptur during 2010-2012 .

Sl. No.	Parameters	June 2010 to May 2011			June 2011 to May 2012		
		Monsoon	**Post Monsoon**	**Pre Monsoon**	**Monsoon**	**Post Monsoon**	**Pre Monsoon**
Station-1	Rotiferies	106.25	45	135.25	97.75	54.75	142.25
	Protozoan	34	4	94	49	11	109.25
	Copepoda	16.25	38.5	100.5	20.75	46	114.5
	Clodocera	86.25	186.5	285	93.5	141.5	291.25
Station-2	Rotiferies	31	7.5	92.5	36.25	8.5	100
	Protozoan	22	4.75	71	31.75	15.75	91.75
	Copepoda	9	28.75	72.5	14.25	31.25	83.75
	Clodocera	50.75	156.25	242.5	54.75	149.25	238.5
Station-3	Rotiferies	39.5	50.75	267.5	50	44	344.75
	Protozoan	30.75	10	83	40.5	21.25	93
	Copepoda	13.5	34.5	69.5	18.75	38	84
	Clodocera	68.75	143.25	238.75	57.75	144.5	241.5
Station-4	Rotiferies	69	53.75	100	69.5	64.5	55.75
	Protozoan	35	12.5	87.75	49.5	26.75	103
	Copepoda	14.25	35.75	84.5	21.5	43.5	95.75
	Clodocera	65.5	112.5	279	77.25	134.25	284.75

Table.3. Average of physico-chemical characteristics of wetland water of Tiptur during 2010-2012.

Sl. No.	Parameters	Station-1	Station-2	Station-3	Station-4
1	Air temperature	26.96	26.82	26.45	27.14
2	Water temperature	25.31	24.53	24.31	25.03
3	PH	7.68	7.77	7.75	7.63
4	Turbidity	30.19	47.92	43.48	35.58
5	EC	276.42	496.04	520.25	265.96
6	TDS	122.37	302.21	304.54	154.42
7	Chloride	25.64	21.10	28.96	65.34
8	Total hardness	112.38	153.23	178.75	125.29
9	Calcium	21.79	32.80	37.79	22.17
10	Magnesium	18.11	27.20	31.65	19.37
11	Alkalinity	69.00	152.04	174.37	134.42
12	Acidity	16.96	43.81	11.90	14.58
13	Nitrate	0.22	0.14	0.13	0.21
14	Phoshate	0.26	0.20	0.18	0.25
15	Iron	0.20	0.17	0.14	0.11
16	Silicon	0.20	0.44	0.68	0.22
17	DO	5.07	6.13	5.63	5.17
18	BOD	5.05	3.37	4.03	4.71
19	Carbon dioxide	2.03	1.45	1.74	1.64
20	Sulphate	129.75	87.46	109.87	137.75
21	COD	40.34	22.62	28.45	29.85
22	DOM	1.27	1.05	1.30	1.76

Note: All the parameters are expressed in Mg/l, except pH, Water tempreture, Air tempreture (degree celcius), Electrical conductivity (micromhos per centimeter).

Table.4.The status of identified phytoplankton and zooplankton during June 2010 to May 2012 .

Sr. no	Family	Genera	Species	Sr no	Family	Genera	Species
1	Cyanophyceace	12	17	1	Rotifers	11	14
2	Chlorophyceace	19	62	2	Protozoans	4	4
3	Bacillirophyceace	16	27	3	Copepoda	6	6
4	Euglenophyceace	2	8	4	Cladocera	7	8
	Total	49	114		Total	28	32

Phytoplankton diversity

Phytoplankton the major producer of all aquatic ecosystems shows a great diversity. The most important advantage of biological methods is that they directly measure the results of pollution. Hynes stated that “pollution is essentially a biological phenomenon in that its primary effect is on living things”. Since biological methods assess changes in population structure, productivity, and other ecological parameters, they are more indicative of the overall consequences of pollution than any chemical methods.

Cyanophyceace

Phytoplankton studies and monitoring are useful for control of the physico-chemical and biological conditions of the water. Therefore, certain divisions of phytoplankton especially blue green or cyanophyta ,can degraded re-creationally value of surface water, particularly thick surface scum, which reduces the use of amenities for contact large concentrations which causes deoxygenating of the water leading to fish death (Whitton and Patts, 2000). A total of 17 species compresses to 12 genera and 3 species (table-4), such as *Anabeana crassa*, *Merismpedia glauca*, *Spirulina major* were presence in all the sampling stations, hence they have wild adaptation in wetland water bodies of Tiptur.

Among the four stations, in consideration of seasonal fluctuation, higher density 9619.75 Org/L was found during 2010-11 at station-1 in pre-monsoon and minimum density of 726.5 Org/L was found during 2011-12 in monsoon at station-2. A similar finding was recorded by (Altaf H. Ganai et al., 2013), (Nabila R. Hussein 2012), according to them the dominance of Cyanophyceae during warmer periods and peak density autumn. Nitrate is one of the key chemical factors which control the distribution of blue greens or cyanophyta in fresh water aquatic system. Higher the concentration of nitrate will trigger the abundance of Blue greens. The present observation revealed that the station-I is highly polluted, cyanophycean, member have shown positive relationship with temperature. Also the reasons behind this result may be not only moderate temperature, also alkaline pH, low water volume and bright sunlight which created favorable condition for better propagation of this group of phytoplankton. The present study revealed that in station-1, there a significant correlation between nitrates and cyanophyta, this finding was strongly supported by,(Eshwarlad and Angadi, 2003). Low density of cyanophyceae at station-2 indicates that there is a significant negative correlation between nitrates and cyanophyta, this finding was strongly supported by (Eshwarlad and Angadi, 2003).This is clear from the result that Cyanophyceae were lowest during monsoon months, when the water column was remarkably stratified to a large extent because of heavy rainfall, high turbidity caused by run-off, reduced salinity, decreased temperature and pH, overcast sky and cool conditions. Similarly,(Laskar and Gupta 2009) reported minimum density of phytoplankton during monsoon and maximum during summer in Chatla Lake, Assam.

Chlorophyceace

A total of 62 species of chlorophyceace were documented in all four wetlands and it belongs to 19 genera, (table-4). Among the 62 species only 10 species were shown their identity in all wetlands; such as Ankistrodesmis falcatus, Pediastrum simplex, Pediastrum duplex Meyen, Pediastrum tetras var. tetrahedron, Scenedesmus accuatus, Scenedesmus bijugatus var. irregularis, Scenedesmus platydiscus, Scenedesmus obliques var.tortus, Scenedesmus dimorphous, Scenedesmus tropicus. The periodicity and distribution of chlorophyceace as follows;

Seasonal density ranges from a highest of 8938.21 Org/L was found during 2011-2012 in post monsoon and minimum of 2365.25 Org/L was found during 2010-2011 in monsoon in the same station 4. Chlorophyceae is predominant in station 4 and showed two maxima one each in early in summer and early winter. This bimodal pattern of peak population was also reported by Guru 2008.The data shown that diversity of chlorophyceace in station-1is less compared to other wetlands and it implies that these members are very sensitive to pollution.(Hegde and Bharati, 1985)concluded that chlorococcales do not show any clear-cut relationship with dissolved oxygen. In the present study the concentration of dissolved oxygen was found to be relatively high (5.17 mg/l) in station-4, which supported moderate growth of cyanophyceace.

Bacillariophyce

Diatoms are a major group of algae and are one of the most common types of phytoplankton, belong to member of bacillariophyceae. These are sensitive to changes in the chemistry of the water in which they exist. Early researches realized this principle with respects to PH. Although some species were found to have wide ranges of pH tolerance, scientists noted that optimal development only occurs within a narrow range of hydrogen- ion concentrations. In more recent years phosphorus and nitrogen have been identified as components that typically limit the growth of diatoms under natural conditions. Experimental lake enrichment studies show that phosphorous loading amplifies diatom biomass and nitrogen to phosphorous ratios strongly influences diatom assemblages. Periodicity and distribution of bacillariophyceace in wetland bodies shown that 27 species and 16 genera found throughout study (Table-4). The common species were present in those wetlands viz., Cyclotella meneghiana (Kutz.), Fragillaria virescens, Pinnularia acrospheria, Pinnularia viridis, Synedra ulna, and Synedra rumpens.

Seasonally the density bacillariophyceae was found to be highest of 10037.25 Org/L during pre-monsoon in 2011-2012 at station-3 and lowest of 425.75 Org/L during post monsoon in 2010-2011 at station-4. (Munawar, 1974) study the direct relationship between concentration of silicates and the density of diatoms. In case of station-1and station-2, it was positive correlated and so it was supported above researcher. The concentration of silica is not the only parameter that regulates the diatomic population in the water body. Similar findings were also made Hosmani et al., 1999 and Ying Oxyang, 2005, except in case of station-4 and station-2, silicon not correlated.

Euglenophyceae

Just like blue greens euglenoids also prefer to grow in polluted water. In fact they grow luxuriantly and often develop in to water blooms in water, which are originally rich. These flagella exhibit brown color due to the presence of hemotochrome pigment and impart the same color to the water body when they develop in to blooms. In the current investigation a total of 8 species belongs to 2 genera were found in this water bodies. The common species found in these wetlands were Euglena acus and Euglena minuta.There was no significant differences in the species occurrence except station-1 has more species diversity compare to other wetland water bodies.

Seasonally the density was found to be highest of 2652.25 Org/L during pre-monsoon in 2011-2012 at station- 4 and lowest of 0.75 Org/L during monsoon in 2010-2011 at station-2. Euglenoids grow luxuriantly and often develop in to water blooms in water, which are organically rich. (Hassan et al., 2010), reported minimum density of phytoplankton during monsoon and maximum during summer in Euphrates river, Iraq. Similarly (Laskar and Gupta 2009), reported minimum density of phytoplankton during monsoon and maximum during summer in Chatla Lake, Assam. Very interestingly, dissolved organic matter (DOM) of all wetlands shown positive correlation with Euglenophyceace).It indicated that the presence of euglenophyceace there should be sufficient dissolved organic matter.

Zooplankton diversity

The zooplankton occurrence and distribution influence pelagic fishery potentials. The fishes mostly breed in areas where the plank tonic organisms are plenty so that their young ones could get sufficient food for survival and growth. The freshwater forms of zooplankton are generally smaller in size and are represented by fewer animal phyla than their marine counter parts. A total of 32 species of zooplankton were recorded (Table-4). It compressed in four major divisions namely Rotifers,Cladocera,Copepoda and Protozoans. Among these Rotifers (43.75%) , Cladocera (25.00 %), Copepoda (18.75 %) and Protozoans (12.50%).

Rotifers

Rotifers are the most important soft-bodied metazoans (invertebrates) having a very short life cycle among the plankton. Only 100 widely spread rotifer species are planktonic and their life cycles are influenced by temperature, food and photoperiod, (Dhanapathi 2000). In the present study a total of 14 species were belongs to 11 genera are recorded.

Seasonally, the highest average of 344.75 Org/L in pre-mansoon 2011-12 at station-3, while lowest average of 7.5 Org/L at station -2 in post mansoon 2010-11(Table-4). Several researchers such as (Bhagat and Meshram2007), have studied the dynamics of rotifers in Ansadi dam of Maharashtra and opined that alkalinity in the range of 8.5 to 9.5 is congenial for the proper development of rotifers and their abundance was in order of copepods> rotifers> cladocerans>protozoans.

Protozoans

Protozoa have a life process similar to animals because they can obtain their food by taking up food particles from the environment rather than making their own food by photosynthesis. Many types of protozoa are beneficial in the environment because they help make it more productive. They improve the quality of water by eating bacteria and other particles. The present studies recorded a total of 4 species come under 4 genera were found during in the study period. Seasonally, more density was found 109.25 Org/L in pre-mansoon 2011-12 at station -1, to a less density of 4 Org/L at same station in post-mansoon 2010-11. Seasonal variation of protozoans population showed lowest during post mansoon (winter) season and highest during pre-mansoon. It is observed that relatively higher amount of DO and low BOD is responsible for their distribution in station-1. A similar observation has been made by (Romana Akthar et al., 2007.)

Copepoda

Copepods occur in almost all freshwater habitats from the largest ancient lakes to subterranean waters, from pools of glacial melt water to hot springs, and from hyper saline lakes to phytotelmata. They are extremely abundant in freshwater and comprise a major component of most planktonic, benthic and groundwater communities, including semi-terrestrial situations such as damp moss and leaf litter in humid forests. (Geoff A. Boxshall Æ Danielle Defaye,2008). In the present investigation 6 species belongs to 6 genera of Copepoda were found in these water bodies.

Seasonally, higher concentration 114.5 Org/L was found at station -1 in pre-mansoon 2011-12 and minimum of 9 Org/L was found at station -2 in mansoon 2010-11 (Table-4). If the regularity is accounted for, it is observed that higher density of Copepoda in station -1, with high BOD and low DO important parameters that appear to be regulating the population of copepods. However it is rather difficult to point out a particular factor responsible for the distribution, a similar opinion has been represented by Sehgal, (1980).

Cladocera

Cladocera is an order of small crustaceans commonly called water fleas. Around 620 species have been recognized so far, with many more undescribed species. They are ubiquitous in inland aquatic habitats, but rare in the oceans. In the current studies there are 8 species belongs to 8 genera of Clodocera were found in these water bodies. In case of seasonal occurrence of Cladocera, numerical density varied from 285 Org/L in pre-mansoon 2010-11 at station -1, to lowest of 50.75 Org/L at station -2, in mansoon 2010-11(Table-4).Many zooplankton, particularly the Cladocera, exhibit marked diurnal vertical migrations. The adaptive significance of diurnal migrations is unclear but likely evolved as a mechanism to avoid predation by fish, much of which is a visual process requiring light.

Conclusion

Overall it is concluded that, the diversity of plankton depends upon the nutrient condition of water body, abiotic factors, DO, BOD, food chain, soil-water chemistry and temperature. Hence there is needed to conserve biotic and abiotic of water body. There was evidence from this study that human activities mostly the refuse dumping, domestic sewage, detergent run-off as a result of washing activities and changing environmental conditions might be responsible for the fluctuation of plankton abundance and seasonal succession in these wetlands. It can be concluded from the present findings that the fluctuation of plank tonic communities occurs seasonally and indicated that wetlands of Tiptur are similar like other tropical fresh water wetlands.

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