International Journal of Botany Studies
www.botanyjournals.com
ISSN: 2455-541X
Received: 25-10-2021, Accepted: 11-11-2021, Published: 26-11-2021
Volume 6, Issue 6, 2021, Page No. 1583-1586

A study on local water bodies using laboratory approach: Phytoplankton analysis for the students of 1st microscope handling groups to increase their interest

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Abstract
Phytoplankton is the primary producer of the food chain in any aquatic ecosystem, and plays a crucial role in maintaining fishery resources. Shyamsundar rail station Nala waters was investigated area. Water samples were collected and carried to the laboratory for the study. Sample after collection is properly fixed by the laboratory method. The light microscope shows different microorganisms namely Euglena, Merismopaedia, Cosmarium, Docidium, Closterium, etc. and from the species diversity calculation, we said the water body is moderately polluted.

Keywords: phytoplankton, species diversity, moderately polluted water

Introduction
Phytoplankton is chlorophyll-containing suspended microscopic organisms. The term is used for the assemblage of microscopic free-floating organisms in the water [1]. A distinctive challenge in climate change research in phytoplankton is to more difficulties to understand the multiple factors, which force ecological changes in phytoplankton communities. Phytoplankton is dominated by sinking algae, the primary causes of biomass limitation shift with increasing mixing depth from sinking loss limitation to nutrient limitation to light limitation [4]. Nature has a contribution to a good quality of life that was often come to realized is valuable by People in strong difference and often conflicting ways. Phytoplankton has the base of aquatic food webs and global importance for ecosystem functioning and services. Phytoplankton constitutes the most important constituent of an aquatic ecosystem. Phytoplankton is minute organisms and highly sensitive to environmental conditions. Species composition and species diversity of a particular water body not only reflect the biotic composition of water but also the limnological condition and pollution status of water condition. The locality Nala besides the Shyamsundar rail station) selected for investigation and taken water from this Nala in a plastic bottle. Examination of waterbody was made in laboratory and calculation of planktonic species diversity and density it is clear that water body is moderately polluted.

Materials and Method
The locality (Nala or canal beside the Shyamsundar rail station) is selected for investigation, mostly samples were taken in 500ml amber color bottles. Lugol's Iodine was used as fixatives in a 1:100 ratio. The samples were then kept overnight for sedimentation. The supernatant water was pipetted out and the sample was concentrated in 10ml for analysis. The collection of water is an amber-colored bottle rather prevent the discoloration of the phytoplankton.
Composition of Logul's Iodine:
Pure Iodine-10gm
KI-20gm
Distilled Water-200cc
Glacial Acetic Acid-20gm

Phytoplankton Density
Plankton density is calculated by the microtranscent method (Lachey1938) and also modified by Edmondsons 1974.
The methods are as follows

1. The concentrate of plankton is thoroughly mixed and then 1 drop is put on the slides by pipette (1 drop= 0.1ml), covered with 22x22mm glass coverslip.
2. Count the microorganisms are made along the length or breadth of the coverslip under a compound microscope.
3. 3 such drops were examined.

Each field will point out a definite numerical quantity of plankton under the coverslip Hence a definite volume of such sample is obtained.
The number of phytoplankton drops can be calculated as follows:

$$\text{Total no. per drop} = \frac{\text{Area of coverslip X average no. of plankton}}{\text{Area of transcent}}$$

The volume of water filtrate through the net can be calculated by the using following formula
$V = \pi r^2 l$ [V= volume of plankton filtrate,
R=volume of plankton netting,
L=column of water filtrate]

Since plankton nets have scarcely been used 3 drops of such sample are examined as follows 5 ml of Lugol's Iodine added to 500 ml water samples, then the sample is then kept on disturbed for 24 to 48 Hours as the phytoplanktons settle down to the water, the water was carefully drawn out with the help of a pipette without disturbing the bottom. The sample was concentrated to 10 ml. From such concentrate 5ml, drops of water were examined by following the above-mentioned method for quantitative and qualitative exclamation

Species diversity index

A species diversity index is computed Shannon and Weaver 1963 with the help of the following formula

Species diversity index (H) = - (Ni/N) log (Ni/N)

[Where Ni= no. of individuals (each species)
N=total no. of individuals]

William and Darnis 1966 have proposed a relationship between species diversity and population status of the sample as follows:

Species Diversity	Condition
>3	clean water
1-3	moderatey polluted
<1	heavily polluted

Algal pollution index

Besides species diversity the algae can be used for pollution index as per the method described by planner a score of 20 and above of pollution index is taken for high organic pollution has a score of 15 to 19 represents probable evidence of medium organic pollution and lowest score indicate low pollution level.

Results and Discussions

Plankton density per litter calculation

Table 1

Sl No.	Material taxon	1st drop	2nd drop	3rd drop	Total	Average (ni)	Summation of a total of average (n)
1	Euglena	1535	1630	1602	4767	1589	2574.01
2	Merismopaedia	732	830	786	2348	782.67	
3	Staurastrium	87	100	102	289	96.33	
4	Cosmarium	8	6	10	24	8	
5	Docidium	0	42	24	66	22	
6	Closterium	0	2	0	2	0.67	
7	Cylindrocystis	0	2	1	3	1	
8	Ankistrodesmum	0	8	0	8	2.67	
9	Anthrodesmus	8	11	16	35	11.67	
10	Selenastrum	4	10	16	30	10	
11	Xanthedium	4	0	2	6	2	
12	Coelestrum	0	16	24	40	13.33	
13	Micrasterius	24	42	32	98	32.67	
14	Euastrum	3	0	3	6	2	

As this 2574.01 number of algae get from 0.1ml water which is taken from 10ml water. This 10ml water is the 500ml water of Nala(canal). So,
1 drop i.e.,0.1ml contain 2574.01 species
Conc. Of test tube=10ml contain
2574.01x10/0.1=257401 species

500ml is concentrated into 10ml
500ml contains 257401 species
1000ml [1lit.] contains=257401x2=514802 species So, plankton density=514802 per lit.

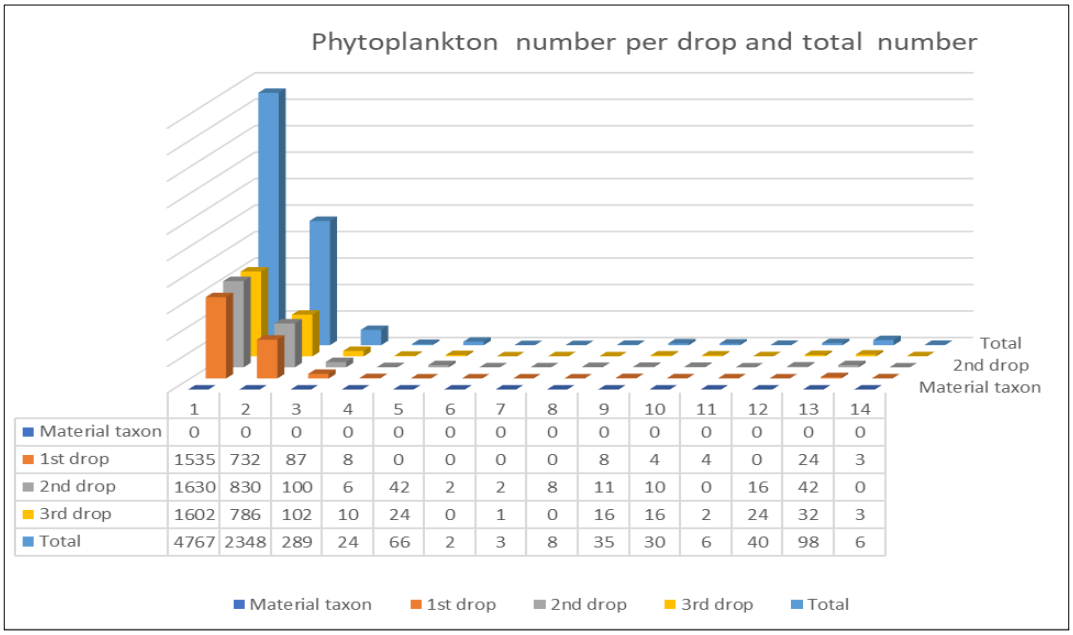

Fig 1: Phytoplankton present number per drop and total number chart

Table 2: Species Diversity Index (H)

Sl. No.	Average (Ni)	Total of Average(N)	$\overline{H}$ = -∑(ni/n)log2(Ni/N)=-∑(ni/n)X ln(ni/n) X1/ln2 [ln=0.693147]
1	1589	2574.01	0.4229595
2	782.67	2574.01	0.522246
3	96.33	2574.01	0.17739
4	8	2574.01	0.025889
5	22	2574.01	0.05872
6	0.67	2574.01	0.00309
7	1	2574.01	0.00440
8	2.67	2574.01	0.01283
9	11.67	2574.01	0.0353
10	10	2574.01	0.03111
11	2	2574.01	0.00803
12	13.33	2574.01	0.03932
13	32.67	2574.01	0.079
14	2	2574.01	0.008

So, the species diversity = 1.43

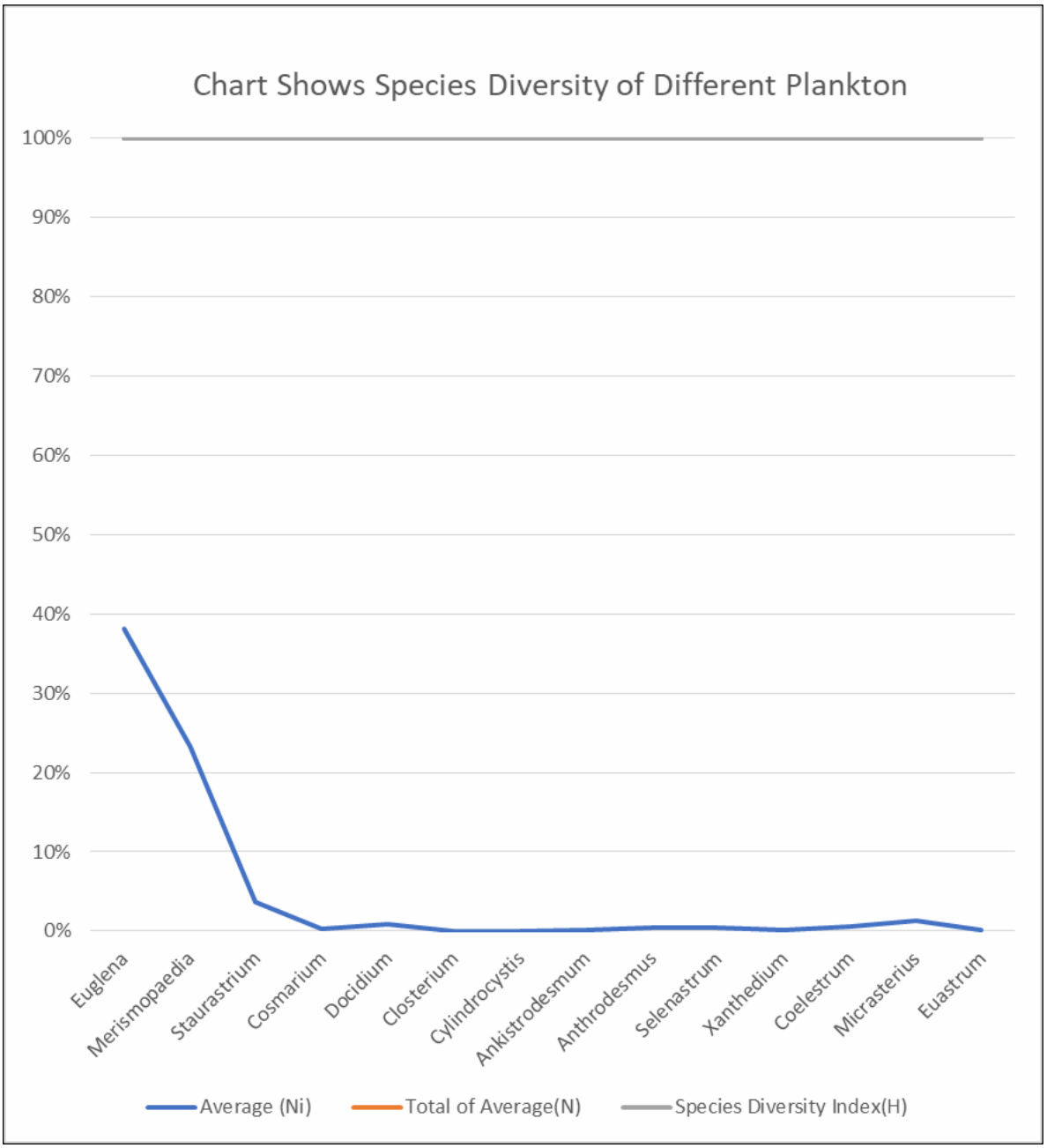

Fig 2: Chart Shows Species Diversity of Different Plankton

Conclusion

Diversity measures are more useful in the Canal Ecosystem, which harbors a large variety of phytoplankton species in general and species diversity within genera. It put forward the standing of water quality a principle by the evaluation of biological conditions existing in the canal. The composition of a water benthic community may be determined clearly and briefly in diversity indexes derived from such kinds of experiments. From the above diversity calculation of plankton, it is clear that the water of the study area is moderately polluted.

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