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Profile of phytoplanktonic composition of Matashya Beez Prachhetra water body of Dighra, Muzaffarpur, Bihar, India

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Abstract: Although, the Matashya Beez Prachhetra water body of Dighra, Muzaffarpur is a fresh water low dimension pond used for fisheries yet its profile of planktonic composition has not been looked into so far. The planktonic composition of any water body is made up of both phytoplanktons which are the members of autotrophic group & zooplanktons as members of heterotrophic group of organisms. They construct the fundamental biotic framework upon which higher order organization of aquatic plants & animals rest. One way or the other, the planktons behave as food resource for the higher order fauna like annelids, mollusks, amphibians & fishes. They are also indicators of pollution level in the water body & hence treated as bioindicators. In the present investigation, the profile of phytoplanktons has been developed from the microscopic examination of stirred or agitated water samples in the laboratory under high resolution microscope & the numbers have been counted with Sedgewick Rafter plankton counter slide. Water samples have been randomly but punctually taken from different corners & mid points of the pond. For collection of phytoplanktons, special mesh of 50-80 µm size plankton net has been used. As many as three species Chrysophytes, three Chlorophytes (green algae), two Cyanophytes & have been isolated from these water samples as phytoplanktons.

Key words: phytoplanktonic composition, Chrysophytes, Chlorophytes (green algae), Cyanophytes, Matashya Beez Prachhetra pond, Dighra, Muzaffarpur, Bihar

INTRODUCTION

Plankton community is a heterogeneous group of floating plants (phytoplanktons) and animals (Zooplanktons) adapted to suspension in the sea and fresh coaler & usually forms directly or indirectly food for fishes & bigger animals. Fresh water planktons include representatives from the photosynthetic algae, bacillariophyceae (diatoms), myscophyceae (blue- green algae), chlorophyceae (green-algae) and occasionally other from the non-photosynthetic bacteria, and other fungi and among zooplankton, all classes of protozoa, (except sporozoa), rotatoria, entomostraca, some immature diptera, the gemmules of bryozoans and sponges and occasional aquatic termites, Gantrotridis and others.

Phytoplankton are a flora of freely floating, often minute organisms, autotrophic (self-feeding) components of the plankton community and a key part of oceans, seas and freshwater basin ecosystems that drifts with water current. The name comes from the Greek words (phyton), meaning "plant", and (planktos), meaning "wanderer" or "drifter".[1] Most phytoplankton are too small to be individually seen with the unaided eye. Various studies have been carried out since 1930s & probably it is even being continued today.[2]

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Like land vegetation, phytoplankton uses carbon dioxide, releases oxygen, and converts minerals to a form animals can use. In fresh water, large numbers of green algae often colour lakes and ponds, and cyanobacteria may affect the taste of drinking water.Phytoplankton is a predominant type of plant found in most fish pond. The quality and quantity of phytoplankton is a good indicator of water quality. The high relative abundance of chlorophyta is a indicator of productive water. Zooplanktons form an intermediate step in grazing food chain in aquatic bioloop and an ecosystem.[3] The primary object of this investigation is to get a general idea of phytoplankton composition of Matashya Beez Prachhetra water body of Dighra.

The different species of planktons vary in their occurrence with respect to seasonal changes in water temperature and physico-chemical properties as well as the number of generations of planktons produced per year in time and space.[4] Every organism of water body whether plant or animal or whether small or large is a link in food chain or food web and thus play an important role in the flow of energy in the system.

MATERIAL & METHODS

The study was seasonally planned and samples were collected during the winter, autumn, summer & rainy season. Water samples were collected from four different corners viz. east, south, west, north of standing water body (fishery pond) of Matashya beez prachhetra from Dighra of Muzaffarpur district, Bihar India. The samples were collected from each site once a day with the help of special mesh of 50-80 µm size planktonic net has been used. For the statistical analysis of these phytoplanktons the standard methods given by different scientists were used.[5-7] Some of the parameters were analyzed in the field while for most of the parameters the samples were preserved using the suitable preservatives. The samples were collected in two liter polythene bottles during the morning hours between 8.00 am to 11.30 am.

After concentrating the samples by sedimentation method 1 ml of the sample was taken & examined with a sedgewick rafter, a counting chamber under a compound microscope with different magnification.

Fig 1 :-Phytoplankton net (mesh size:50-80 µm)

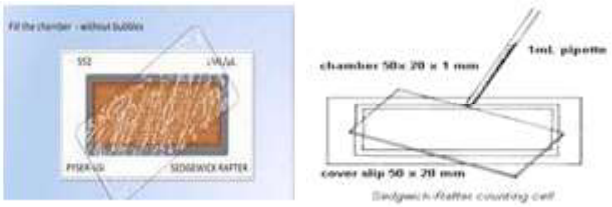


Fig2: Sedgewick Rafter plankton counter

Identification of sampled phytoplanktons:

The water sample containing the phytoplanktons were examined under high resolution stereoscopic microscope (MSZ 20) & the numbers per sample were counted in the plankton counter Sedgewick Rafter slide.

The numbers of each group of phytoplanktons were recorded in the observation Table no.1 also showing the seasonal variation.

Statistical Analysis

Analysis of relative abundance of phytoplanktons with respect to various numbers of sampling being the observation number of collected data had also been done by using the relative abundance statistical formula, pi = n/ N x 100, where pi is i^{th} number of phytoplanktonic species found, n = number of individuals of a species, N = total number of individual of all the species. The statistical result has also been reflected in bar diagram or histogram as shown in graph 1.

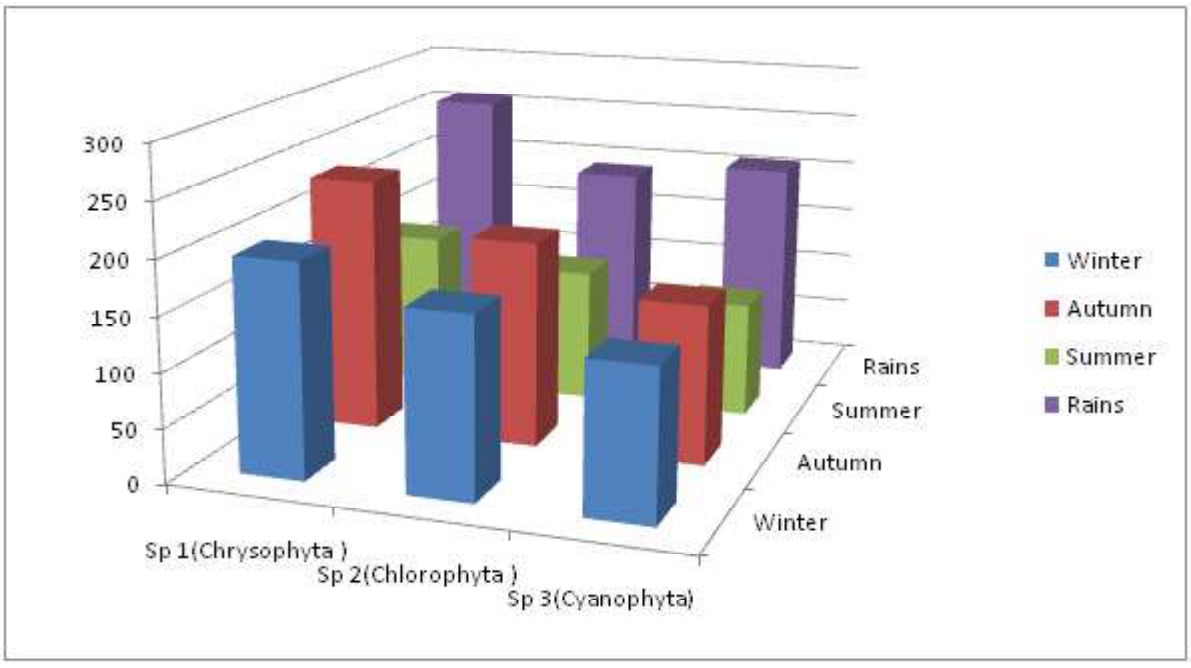
RESULTS & DISCUSSION

The phytoplankton communities of the Matashya Beez Prachhetra were represented by three groups of species namely chrysophyta, chlorophyta and cyanophyto, of which three of the taxa belonged to chrysophyta (Navicula sp., Diatoma sp, Nitzschia) 3 belonged to chlorophyta (Spirogyra, Pediastrum, Cosmarium) and 2

Table 1: Seasonal mean population & relative abundance of phytoplanktons sampled from Matashya Beez Prachhetra water body of Dighra

Seasons	Winter		Autumn		Summer		Rains	
Group & genus	Individual sample population per SNS	Relative abundance %(N/n*100)	Individual sample population per SNS	Relative abundance %(N/n*100)	Individual sample population per SNS	Relative abundance %(N/n*100)	Individual sample population per SNS	Relative abundance %(N/n*100)
(A) Chrysophyta								
(i) *Navicula sp.*	28	14.21	35	14.89	20	13.69	37	14.34
(ii) *Diatoma sp.*	69	35.02	80	34.04	48	32.87	91	35.27
(iii) *Nitzschia*	100	50.76	120	51.06	78	53.42	130	5.38
Total	197		235		146		258	
(B) Chlorophyta								
(i) *Spirogyra*	58	34.93	62	32.63	35	28	65	34.03
(ii) *Pediastrum*	32	19.27	40	21.05	22	17.6	38	19.89
(iii) *Cosmarium*	76	45.78	88	46.31	68	54.4	88	46.07
Total	166		190		125		191	
(C) Cyanophyta								
(i) *Oscillatoria sp.*	69	50	75	51.02	52	48.59	102	49.27
(ii) *Microcystic sp.*	69	50	72	48.97	55	51.40	105	50.72
Total	138		147		107		207	
Grand total	501		572		378		656	

Graph 1: Phytoplantonic composition of Matashya Beez Prachhetra water body of Dighra



belonged to the cyanophyta (*Oscillatoria* sp. & *Microcystic* sp.).

Thus from the above finding it is clear that the overall seasonal mean population density of phytoplanktons was found to be higher during the rainy season followed by autumn & winter season but minimum during the summer season. And the reason behind it may be high temperature as well as ponds physicochemical property dependent nutrient depletion and increasing zooplankton grazing that typically causes breakdown of spring blooms and maintain

low phytoplankton biomass during summer in nutrient-rich systems grazing-resistant algal species can give rise to a second bloom of phytoplanktons later in the year.8 Group wise composition revealed maximum contribution of Chrysophyta followed by Chlorophyta & then Cyanophyta.

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