



Diversity of Fresh water Algae in river Narmada at Jalud (Mandleshwer) Indore, India

Sohani S.

Govt. Holkar Science College, Indore, MP, INDIA

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Abstract

Phytoplanktons are elemental factor of aquatic community as they are major sources of biologically significant and organic carbon, situated at the base of the food chain. The productivity and density of the phytoplanktons are majorly influenced by different physico-chemical characteristics of water. Algae are very useful for eutrophication estimation. Quality and distribution of algal flora in river have been carried out systematically to evolve algal indices of pollution. The present paper deals with the assessment of water quality and phytoplankton diversity of river Narmada at Jalud. Phytoplankton of the River Narmada consisted mostly of Chlorophyceae (green algae) Bacillariophyceae (Diatoms). In river Narmada the temporal series of phytoplankton groups is remarked as Chlorophyceae > Bacillariophyceae > Cyanophyceae > Euglenophyceae. The species distribution, abundance and composition of phytoplankton community are governed by various physico-chemical elements of the water body. The population of Plankton varies in different seasons and months.

Keywords: Freshwater algae, eutrophication, phytoplankton, water quality.

Introduction

The term algae refer to small microscopically, unicellular organisms, some of which form colonies and thus reach sizes viewable to the nude eye as tiny green particles. Human activities (e.g., inadequate sewage treatment, runoff from roads, agricultural runoff) have led to enormous fertilization of various water bodies. This has led to the excessive generation of algae and cyanobacteria in fresh water and thus has had a huge impact upon recreational water quality¹. In warm climates, cyanobacterial dominance is most pronounced during the summer months, which coincides with the period when the demand for recreational water is highest. In India, the fresh water constitutes reservoirs, lakes, streams, and rivers. These fresh water bodies directly help in the improvement of human civility. Fresh water resources are being polluted day to day at the faster rate, so the water quality is now a global problem. There is an extensive literature, which stresses deterioration of water quality but recently² have worked on fresh water bodies.

Material and Methods

Study Area: The Narmada River is also called Maikalsutha or Rewa in central India and fifth largest river in the Indian subcontinent³. The Narmada River, bounded between Vindhya and Satpuda ranges, extends over an area of 98,796 km². And lies between east longitudes 72 degrees 32' to 81 degrees 45' and north latitudes 21 degrees 20' to 23 degrees 45' lying on the northern extremity of the Deccan Plateau. The basin covers large areas in the states of Madhya Pradesh (86%), Gujarat (14%) and a comparatively smaller area (2%) in Maharashtra. There are 41 tributaries, out of which 22 are from the Satpuda

range and the rest on the right bank are from the Vindhya Range⁴.

Phytoplankton sample collection and methods: For the biological analysis both quantitative and qualitative plankton samples including their identification. Each of the 1Ltr samples collected was centrifuged to concentrate the plankton organisms. Every one of these samples was made up to 100 ml after removing the surface water in the centrifuge tube. General phytoplanktons were studied for quantitative and qualitative details. The phytoplanktons were identified using the standard keys provided by Fritsch and Desikachary⁵⁻⁶.

Results and Discussion

In the present work nearly forty eight genera of phytoplankton were reported which contain twenty Chlorophyceae, nineteen Bacillariophyceae, eight Cynophyceae and one Euglenophyceae. The maximum density of chlorophyceae, 1725 No/l was observed in May at Jalud (I). Diatoms were representing by 19 genera and dominant the phytoplankton population throughout the study in fresh water. In present investigation the maximum density of Chlorophyceae 1725 No/l and Bacillariophyceae 1805 No/l were recorded in May. The maximum density of blue green cynophyceae, 317 No/l was recorded in Jun and Euglenoids were represented in the water 38 No/l in month of April. Other Indian rivers possessed the same algal groups as reported by Biswas B.K⁷ in river Damidar, Nanda S.N.⁸ in river Bhat; Nanda S.N.⁹ in river Mausam.

A list of Phyto planktonic population of Narmada River.

Table-1
Showing monthly variation of Chlorophyceae (No/lit) at Jalud during June 2012- May 2013

Name of Genus	Month											
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
<i>Chlorella sp</i>	132	24	-	-	30	49	93	97	108	120	128	118
<i>Gonium sp</i>	36	-	-	-	-	-	13	-	19	42	48	45
<i>Pandorina sp</i>	20	-	-	-	-	21	37	28	22	31	28	23
<i>Endorina sp</i>	34	-	-	-	-	18	23	27	-	38	43	62
<i>Ulthrix sp</i>	59	41	38	18	65	79	82	85	80	78	69	64
<i>Geminella sp</i>	40	-	-	-	-	16	18	-	13	28	43	48
<i>Oedogonium sp</i>	147	27	22	26	40	87	121	108	119	124	136	158
<i>Cladophoroa</i>	37	-	-	-	-	-	21	24	18	26	27	43
<i>Pediastrum sp</i>	59	18	-	5	17	42	28	19	26	39	43	54
<i>Ankistrodesmus sp</i>	54	-	-	-	-	28	31	22	33	43	37	61
<i>Coleastrum sp</i>	28	-	-	-	-	19	28	41	24	33	36	42
<i>Crucignia sp</i>	38	22	-	-	-	38	44	40	52	47	45	51
<i>Scenedesmus sp</i>	153	49	-	-	-	83	89	121	132	141	167	187
<i>Mougeotia sp</i>	84	31	-	-	21	18	38	53	47	59	53	108
<i>Zygnema sp</i>	128	52	36	10	38	43	45	59	38	45	67	129
<i>Spirogyra sp</i>	102	41	18	7	72	81	112	138	148	134	127	118
<i>Closterium sp</i>	73	-	-	-	-	53	72	89	73	69	65	70
<i>Cosmarium sp</i>	190	37	22	10	62	84	168	178	163	153	207	243
<i>Euastrum sp</i>	30	-	-	-	-	31	39	38	44	33	43	38
<i>Staurastrum sp</i>	43	-	-	-	-	23	27	32	28	36	41	63
Total	1487	342	136	76	345	813	1129	1199	1187	1319	1453	1725

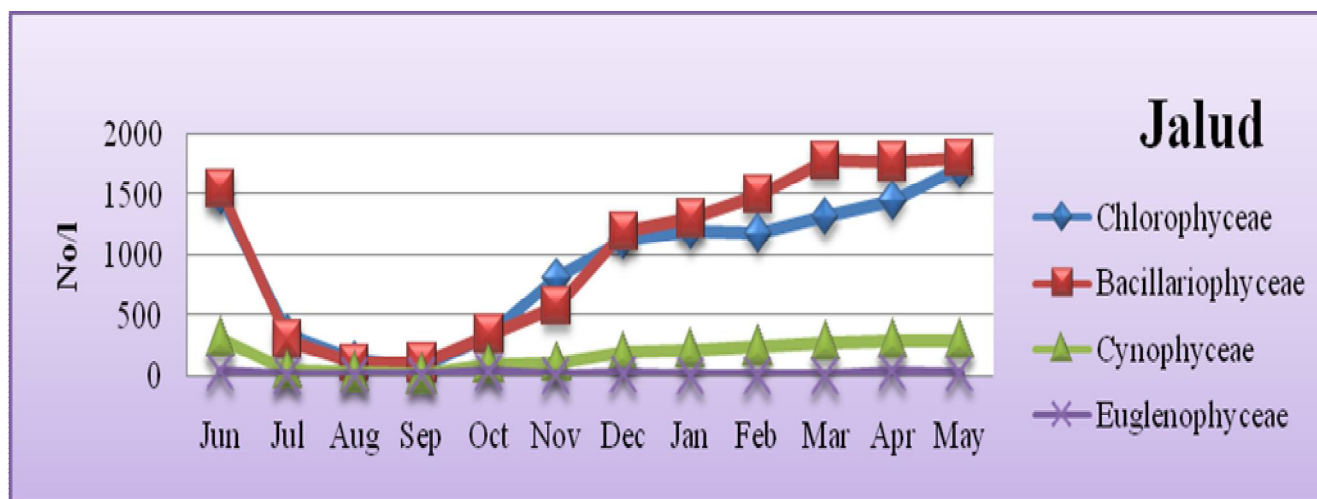


Figure-1
Showing monthly variation in phytoplankton groups in Narmada at Jalud

Table-2
Showing monthly variation of Bacillariophyceae (No/lit) at Jalud (I) during June 2012- May 2013

Name of Genus	Month											
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
<i>Amphora sp</i>	142	29	-	-	-	-	24	27	82	120	124	135
<i>Achnathes sp</i>	25	-	-	-	-	-	-	-	28	31	28	35
<i>Cymbella sp</i>	71	18	-	-	20	37	38	36	48	79	87	68
<i>Coeconeis sp</i>	16	-	-	-	18	24	-	-	20	28	32	34
<i>Diploneis sp</i>	12	-	-	-	-	-	32	34	-	24	22	20
<i>Epithemia sp</i>	36	-	-	-	-	-	27	53	48	52	63	48
<i>Fragilatia sp</i>	84	19	12	24	25	21	30	57	62	123	131	120
<i>Gomphonema sp</i>	102	25	17	27	30	37	52	58	67	112	110	112
<i>Novicula sp</i>	375	49	39	18	48	100	326	375	390	398	442	410
<i>Nitzschia sp</i>	188	37	-	-	43	58	189	217	228	235	210	218
<i>Pinnularia sp</i>	197	32	-	-	38	78	158	167	208	215	218	221
<i>Synedra sp</i>	61	28	-	-	48	43	54	55	52	78	63	80
<i>Frustulya sp</i>	21	-	-	-	-	23	31	28	21	30	28	27
<i>Tabellaria sp</i>	63	35	27	20	27	49	62	58	63	68	49	67
<i>Diatoma sp</i>	18	-	-	-	-	12	18	24	23	27	22	28
<i>Melosira sp</i>	28	--	-	-	-	18	26	28	29	34	22	31
<i>Pleurosigma sp</i>	12	-	-	-	-	15	27	24	31	33	19	28
<i>Asterionella sp</i>	28	15	18	22	32	30	37	-	42	45	31	42
<i>Surirella sp</i>	68	12	-	-	19	32	67	67	58	52	72	81
Total	1547	299	113	111	348	577	1198	1308	1500	1784	1773	1805

Table-3
Showing monthly variation of Cynophyceae (No/lit) at Jalud (I) during June 2012- May 2013

Name of Genus	Month											
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
<i>Microcystis sp</i>	48	-	-	-	-	-	39	42	56	47	54	42
<i>Merismopedia sp</i>	70	16	-	-	17	21	47	52	62	61	58	60
<i>Oscillatoria sp</i>	73	21	18	-20	24	22	32	39	52	68	65	62
<i>Lyngbya sp</i>	26	-	-	-	18	21	24	28	22	19	26	24
<i>Spirulina sp</i>	38	-	-	-	22	28	39	40	37	36	34	40
<i>Nostoc sp</i>	16	-	-	-	-	-	-	-	-	18	22	27
<i>Anabena sp</i>	28	18	15	-	18	22	20	24	20	16	24	22
<i>Aphanizomenon sp</i>	18	-	-	-	-	-	-	-	-	20	24	28
Total	317	55	33	20	99	114	201	225	249	285	307	305

Table-4
Showing monthly variation of Euglenophyceae (No/lit) at Jalud (I) during June 2012- May 2013

Name of Genus	Month											
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
<i>Euglena sp</i>	37	-	-	-	30	-	20	-	-	-	38	25
Total	37	0	0	0	30	0	20	0	0	0	38	25
Grand total of all algal groups	3388	696	282	207	822	1504	2548	2732	2936	3388	3571	3860

Conclusion

Light and temperature influence the quality and quantity of phytoplankton. Considering plankton as a whole the present observation showed peak period between April and June. It is probable that the gradual increase in temperature in water promoted optimum condition for growth and reproduction of algal population. Prescott G.W.¹⁰ reported that for fresh water the optimum temperature is between 20-25°C. An increase in temperature may affect the net growth of phytoplankton positively or negatively depending upon the type of species. Low density of phytoplankton in monsoon in the surface water was due to high turbidity and fast current of water. Prescott G.W.¹⁰ also reported that the adverse effect of turbidity on phytoplankton was blanketing effect of suspended material, which interferes with photosynthetic activity.

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