



SEASONAL VARIATION IN WATER QUALITY AND PHYTOPLANKTON PRODUCTION IN JOHILA RESERVOIR, LALPUR, AMARKANTAK (M.P.)

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ABSTRACT Present study has been undertaken in order to assemble knowledge regarding physicochemical parameters analysis from June 2021 – May 2022 in relation to the abundance, composition and seasonal variation in the phytoplankton of Johila reservoir Lalpur Podki, Amarkantak (M.P.). It is interiorly located at Latitude 22°46'20", Longitude, 81°44'39" in Lalpur and no study regarding hydrobiology in general and phytoplankton abundance in particular has yet not been conducted. Johila reservoir has its origin from Jwaleshwar temple kund of Amarkantak, hill located in Makel velly. It starts flowing opposite site to the Narmada River after 15 Kilometre and finally joins the river Sone at Dasrathghat of Umaria District of Madhya Pradesh. Total area of Johila reservoir is 86 hectare (216 acers). Since no study yet has been done on phytoplankton production in relation to its physico-chemical characteristic hence present study has been undertaken. Phytoplankton population were dominated by Chlorophyceae, Myxophyceae and Bacillariophyceae in decreasing order. Chlorophyceae members revealed dominance over Myxophyceae and Bacillariophyceae.

KEYWORDS : Johila reservoir, Phytoplankton, Chlorophyceae, Myxophyceae, Bacillariophyceae, Physico-Chemical Parameters.

INTRODUCTION:-

Plankton constitute the major source of energy in the food-web of aquatic ecosystems. Their populations fluctuate depending on the hydrological regime and saprobiotic condition of the water. Phytoplankton of a reservoir are dependent on several interrelated physical, chemical and biological factors. The measurement of plankton population helps to understand the conservation ratio of various levels and serves as an essential input for proper management of a water body. As reservoirs contribute a major share in inland fishery (Kathia, 2002), study of their ecosystem dynamics is necessary for optimum utilization and conservation.

Water is the life of animals and plants and is referred to as "Gold of Life". It is important to study the natural conditions which are helpful in propagation of aquatic flora and fauna. Radiant energy is fixed both by phytoplankton and macrophyte communities in aquatic bodies (Mohar, 2011; Saxena and Uchariya, 2012; Shukla and Shukla, 2012c and 2013b). Phytoplankton constitute the major source of energy in the food web of any ecosystem and are regarded as biological wealth of water for fishes and constitute a vital link in the food chain. The real picture of productivity of any aquatic system may be judged by phytoplanktonic biomass. The population of phytoplankton fluctuates depending upon the hydrobiological regime, pollutional stress and saprobiotic condition of the water. Phytoplankton in an aquatic body are dependent on various interrelated physical, chemical and biological factors.

The measurement of plankton population assists in understanding the conservation ratio of various trophic levels and serves as an essential input for proper management of an aquatic body (Panday and Shukla, 1982; Kulshrestha et al., 1991; Sinha and Jha, 1997; CIFRI, 2000; Das, 2002; Hosami, 2002; Hussain and Ahmed, 2002; Kathia, 2002; Pallui and Jha, 2003; Chavan et al., 2004; Lendhe and Yeragi, 2004; Keshervani et al., 2005; Angadi et al., 2005; Mukerjee et al., 2006; Paul et al., 2006; Keser et al., 2007; Kumar et al., 2007; Pandey et al., 2007; Tripathi et al., 2008; Gabrella and Alessendra, 2008; Shukla et al., 2008; Singh et al., 2009; Mishra et al., 2009; Ellen Van Donk et al., 2010; Kumar, 2010; Mohar, 2011; Shukla et al., 2011a,b; Misra et al., 2011, 2013; Gupta and Gupta, 2012; Bhadula and Joshi, 2012; Kanwal and Pathani, 2012).

Present study has been undertaken in order to assemble knowledge regarding physicochemical parameters analysis in relation to the abundance composition and seasonal variation in the phytoplankton of Johila reservoir Lalpur Podki, Amarkantak (M.P.). It is internally located at Latitude 22°46'20", Longitude, 81°44'39" in Lalpur and no study regarding hydrobiology in general and phytoplankton abundance in particular has yet not been conducted. Therefore, present study has been undertaken.

MATERIALS AND METHODS:

East, West, North, and South site of the reservoir were selected for analysis of physico-chemical parameters namely, A, B, C, and D, respectively. Average value of all four sampling stations were analysed during three different seasons namely Pre- Monsoon, Monsoon and post Monsoon during the year June 2021, May 2022.

The Physico-chemical characteristics of all sampling stations were analysed using the methods of APHA (2009) and identification of phytoplankton was done following the methods outlined by Trivedi and Goel (1984); Adoni (1985) and Wetzel (2001).

RESULT AND DISCUSSION:-

The result of various physicochemical parameters in freshwater reservoir has been cited in Table 1 and biological parameters viz., phytoplankton population were observed quantitatively and qualitatively in fig 1, Table 2 and 3.

The ecology and diversity of planktons in different freshwater bodies of India has been studied by number of workers notably; Pallui and Jha, 2003; Sharma and Sarang, 2004; Chavan et al., 2004; Mukherjee et al., 2006; Kumar et al., 2007; Shukla et al., 2008; Tripathi et al., 2008; Shukla et al., 2008; Shukla and Shukla, 2009; Sharma, 2010; Singh and Singh, 2011; Shukla et al., 2011a, b; Saxena and Uchariya, 2012; Shukla and Shukla 2012c; Shukla and Shukla 2013a, b c). However, the studies are not correlative with the status of the zonation in the aquatic bodies.

Present study has, therefore, been undertaken to record. Phytoplankton diversity in terms of qualitative and quantitative alterations in Johila reservoir, Lalpur, Amarkantak (M.P.) divided in to four sampling sites namely site A, B, C and D.

Table 1: Physicochemical Parameters Of Johila Reservoir, Amarkantak, Anuppur (M.P.) During June 2021 To May 2022.

Water Parameters	Pre-Monsoon	Monsoon	Post-Monsoon	Average ±SD
Temperature	26.18	22.14	20.18	22.83 ± 3.05
P ^H	7.06	7.10	7.8	7.32 ± 0.41
Transparency (Cm)	54.18	60.36	44.35	55.83 ± 8.07
Dissolve O ₂ (mg/L)	6.32	6.84	7.02	6.72 ± 0.36
Free Co ₂ (mg/L)	2.98	3.84	3.12	3.31 ± 0.46
TDS (mg/L)	132.14	160.28	148.22	146.88 ± 14.11
Total Hardness (mg/L)	130.32	124.18	116.12	123.54 ± 7.12

Calcium Hardness (mg/L)	22.62	28.22	25.60	25.48 ± 0.36
Nitrate (mg/L)	10.24	9.58	9.46	9.76 ± 0.88
Chloride (mg/L)	31.12	33.64	28.46	31.07 ± 0.08
Phosphate (mg/L)	3.92	3.98	3.78	3.89 ± 3.48
Sulphate (mg/L)	46.46	56.44	40.48	47.79 ± 8.06
Fluoride (mg/L)	0.59	0.55	0.65	0.59 ± 0.12
Total alkalinity (mg/L)	242.44	248.28	236.62	242.44 ± 5.83
BOD (mg/L)	4.36	3.88	3.02	3.15 ± 0.18
COD (mg/L)	46.13	43.42	35.22	41.59 ± 2.84

The physicochemical parameters of an aquatic ecosystem reflects the quality and density of flora and fauna. Trivedi and Goel, 1984; Adoni, 1985; Jha, 1989; Singh and Jha, 1997; Singh et al., 2002; Kathia, 2002; Pallui and Jha, 2003; Surve et al., 2004; Mukherjee et al., 2006; Srivastava et al., 2006; Tripathi et al., 2008; APHA, 2009; Shukla et al. 2011a, b). Such knowledge provides a good understanding about the nature and productivity potential of any aquatic body. In our study Johila reservoir clearly indicates good productive values as physico-chemical parameters are limited to normal values as shown in Table 1.

Table 2: Seasonal Variation In The Phytoplankton Population Of Johila Reservoir, Amarkantak, Anuppur (M.P.) During June 2021 To May 2022.

Classes	Pre-Monsoon	Monsoon	Post Monsoon	Average
Mysxophyceae	582 ± 40.24	368 ± 36.24	342 ± 28.28	430 ± 34.92
Chlorophyceae	598 ± 28.26	482 ± 28.32	604 ± 36.22	561 ± 30.93
Bacillariophyceae	302 ± 22.62	288 ± 22.14	242 ± 22.14	277 ± 22.3

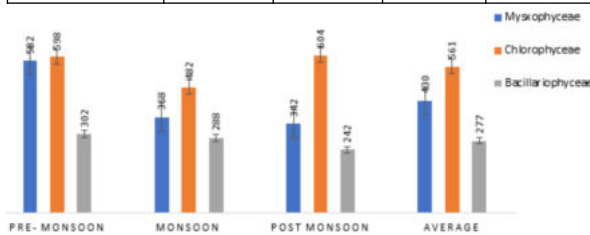


Fig. 1: Graph Showing Phytoplankton Population Of Johila Reservoir, Podki, Lalpur Amarkantak (M.P.) During June 2021 To May 2022.

Table 3: Phytoplankton Diversity In Johila Reservoir, Amarkantak, Anuppur (M.P.) During 2021-May 2022

Bacillariophyceae	Myxophyceae	Chlorophyceae
Diatom sp.	Anabena cardinals	Falcatus
Fragilaria sp.	Nostoc sp.	Chlorella sp.
Naviculla gracilis	Oscillatoria sp.	Chaetophora
	Gloeocapsa sp.	Closterium sp.
	Chlorococcum sp.	Comsrium sp.
	Pediastrum sp.	Euglena
	Coelastrum sp.	Elkatothrix sp.
	Scenedesmus sp.	Microcystis
	Closterium	Oedogonium sp.
	kuetzingii	Spirogyra sp.
	Euasterium s.p.	Volvox sp.
	Micrasterias sp.	Staurostrum gracile
	Anthrodesmus curvatus	Microsteras
	Saturastrum gracile	Pleuraetanium
		ehrenbergii
		Desmidium swartzii

The parameters especially total alkalinity, BOD and COD was recorded significant increase in the site-A, B stations which contain varieties of pollutions present in domestic sewage and detergents used by washermen. These factors to a much degree become responsible for the quantitative and qualitative alteration in the phytoplankton species diversity and abundance. Somewhere the planktonic blooms have been observed due to increase in the free CO₂ as shown in Table 1.

Chloride content may be regarded as limiting factor for prevalence of certain species of phytoplankton, phosphate through little, it is essential for the fertility and is regarded as a key nutrient for the productivity of any aquatic body.

Planktonic bloom appearance at certain point especially site-A and site -C, may be due to additional phosphate present in some detergents. Since the potential of fish production of the rate of primary productivity hence, proper management of aquatic body become essential and our case, the johila reservoir.

Acknowledgement

One of us, Suresh Kumar Kol is grateful to the Head, Dept. of Zoology and EVS., IGNTU, for providing laboratory facilities.

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