



RESEARCH ARTICLE

A REVIEW ON SEASONAL VARIATION OF PHYTOPLANKTON IN LOTIC WATER

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ABSTRACT

Phytoplanktons are microscopic free floating animals which play a vital role in aquatic ecosystem. Phytoplanktons are highly sensitive to environmental variation, as a result change in abundance, species diversity or community composition can provide important indication of environmental health. Phytoplankton diversity is controlled by seasonal variation. In the present paper an extensive review of the literature available on seasonal variation of Phytoplanktons in lotic water of India have been made which is a long felt necessity in this field.

Key words:

Diversity, Seasonal Variation,
Phytoplanktons, Lotic water,
Environment.

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INTRODUCTION

Lotic refers to flowing water, it includes river, spring, streams etc. In lotic water flow is unidirectional and there is a state of continuous physical change and the biota is specialized to live with flow condition. Rivers are important system of biodiversity and are among the most productive ecosystems on the earth because of the favourable conditions that supports number of flora and fauna (Gupta et al., 2005). Phytoplankton are the minute organism and are effective tools in environment biomonitoring of aquatic ecosystem. Unplanned urbanization, rapid industrialization, indiscriminate use of artificial chemical in agriculture causing aquatic pollution, which deteriorating quality and depletion of aquatic biota (Yeole and Patil, 2005). In all kinds of aquatic eco-systems phytoplankton act as a good bio-indicator to reflect the quantity of water and is the important primary producers and control the dynamic of productivity. Phytoplankton forms the very basic link in the food pyramid of all aquatic animals (Rajagopal et al., 2010). Phytoplankton diversity is controlled by seasonal changes as well as by the rate at which plant nutrients are supplied. Nitrogen, Phosphorus and Silica are three main nutrients needed for the phytoplankton to grow at different times and in different ratio (Pilkaityte, 2003).

Planktonic population on which whole aquatic life depends is directly or indirectly governed by many biological conditions and tolerances of organisms to variations in one or more of these conditions. Very limited information is available on the Phytoplankton status and seasonal variation of phytoplankton in lotic waters. Thus the present paper deals with the review of seasonal Phytoplankton diversity.

Review

Venkateswarlu (1969) observed maximum population of chlorophyceae during winter in Moosi River, Hyderabad. Singh (1990) reported that Plankton population showed bimodal, pattern of fluctuation with one peak in pre winter and other in summer. The assessment of water quality using phytoplankton diversity and their association as biological indicators has been carried out by many workers (Chaturvedi et al., 1999). Different species of plankton vary in different seasons due to the changes in Physico-chemical nature of water. The phytoplankton community shows high diversity with the seasonal fluctuation which indicates the diversity in ecological niches. Species richness was high in summer and winter and it was minimum during monsoon (Khanna et al., 2012). Similar study was made by Carter et al., (1980), Chakrabarty et al., (1959). Baghela (2006) observed the dominance of Chlorophyceae in Oligotrophic Lake Jawai Dam. McHugh (2003) reported Bacillariophyceae as dominant life forms in phytoplankton and largest group of biomass producer on earth. The total quantity of plankton present in waters may

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undergo marked and rapid variation, so that in the course of a year a number of pulses may succeed after each other. (Hutchinson and Bowen 1947) Seasonal variation of algal forms in lakes and rivers is presented by many researchers (Kaur *et al.*, 2001, Jarousha 2002, Tiwari and Chouhan 2006.) Dube *et al.*, 2002b studied ecobiology of seasonal water bodies in south eastern plateau of Rajasthan. Assessment of physico-chemical and biological parameters serves a good index in providing particular status to a water body. Recently Phytoplankton of fresh water rivers have been studied in detail (Annalakshmi and Amsath 2012, Mishra *et al.*, 2002, Jafari and Gunale 2006). Diatom diversity is the best indicator of altered water quality (Szczeponka and Szula 2009). Thirugana moorthi and Selvaraju (2009) has reported the maximum density of Cyanophycean members during summer and minimum during winter and rainy seasons. It was noticed that density of Phytoplanktons was maximum in summer, minimum in rainy season and intermediate in winter season. He reported abundant count of Bacillariophyceae in monsoon season which was lowered in premonsoon.

Dube *et al.*, (2009a) have studied the occurrence and seasonal variation of the plankton in Kishore Sagar Tank, Kota, Rajasthan and twenty four species of phytoplankton were recorded. In warm climates, Cyanobacteria dominance is most pronounced during the summer months, which coincides with the period when the demand for recreational water is highest (Srivastava *et al.*, 2010). Hasan *et al.*, (2010) observed minimum density of Phytoplankton during monsoon and maximum during summer. Shinde *et al.*, (2012) have noticed maximum number of Chlorophyceae in summer and minimum during monsoon season. He recorded maximum genera of Euglenophyceae and Bacillariophyceae during summer and minimum during monsoon. Alam (2013) reported 30 species of different groups of Phytoplanktons from the Yamuna River at Kalpi. Population of Chlorophyceae were maximum during summer and minimum during monsoon season. Sarwade and Kamble (2013) stated Plankton diversity and seasonal variation in Krishna River, Maharashtra. He reported 5 groups of phytoplankton i.e. Cyanophyceae, Bacillariophyceae, Chlorophyceae, Hydrocharitaceae and Desmidiaceae including 53 species. This study showed that planktonic population was maximum in post monsoon season as compared to premonsoon season. Pancholi *et al.*, (2013a) stated mathematical modeling of nutrient quantity of a fresh water pond, Kota, Rajasthan with special reference to seasonal variation of planktons.

Bhatnagar and Bhardwaj (2013) reviewed algal biodiversity status in Chambal River at Kota Barrage. They studied the presence of a total 65 algal species including Chlorophyceae, Cyanophyceae, Bacillariophyceae and Euglenophyceae. Class Cyanophyceae were dominant showing seasonal variation with maximum taxa in summer season and minimum in rainy season. Seasonal distribution of members of Bacillariophyceae followed maximum in winter and minimum in monsoon. This is in accordance with the observations made by Nautiyal (1996) and Pareek *et al.*, (2011). Sharma *et al.*, 2013 d studied on benthic fauna of Kishore Sagar reservoir, Kota, Rajasthan. Pancholi *et al.*, 2014 given mathematical model for phytoplankton growth. Kumar and Khare (2015) studied diversity and seasonal variation of Phytoplanktons in the Yamuna River at Kalpi. They reviewed 35 species of 25 genera of Phytoplanktons belonging to Chlorophyceae, Euglenophyceae, Bacillariophyceae and Cyanophyceae.

Belkhole and Sitre (2016) studied Phytoplankton diversity of Dham River in Wardha. He reported 36 different species of phytoplankton represented by 6 different classes chlorophyceae, Euglenophyceae, Desmidiaceae, Cyanophyceae, Bacillariophyceae and Hydrocharitaceae. The density of phytoplankton is abundant in summers due to prevailing and suitable water conditions in Dham river. Solanki and Shukla (2016) studied Phytoplankton diversity and their seasonal variation in Narmada River Valley of Jabalpur Region. He identified 30 algal taxa belonging to 16 genera including Chlorophyceae, Euglenophyceae, Bacillariophyceae, Trebouxiophyceae, Ulvophyceae, Zygomatophyceae and Cyanophyceae. The maximum phytoplankton population found in post monsoon. In monsoon season the population was low. Species of Chlorophyceae were maximum in early summer and the species of Cyanophyceae were highest in late summer. Few species of Euglenophyceae were observed in early winters and Bacillariophyceae were dominated during late winter (Mathur 1990). Meena and Dube 2017 studied important role of microorganisms in dealing Environment Problem.

Conclusion

Concluding the above account we can state that Phytoplanktons are popular organisms found in fresh water resources. They are important part of aquatic food chain and food webs and proves to be very good indicators about the water quality. In the above account it has been observed that studies were reported regarding their diversity and seasonal variation. Thus seasonal variation of phytoplanktons study is a very important tool in limnology.

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