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Monthlies Variations in Phytoplankton Density in Alwara Lake of District- Kaushambi (U.P.)

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ABSTRACT

Alwara Lake is located in Kaushambi district of Uttar Pradesh. This lake is one of the perennial wetland (water logged area), biota of which is influenced by several physico-chemical parameters. The said lake has a vast dynamic landscape which is created by annual flooding of adjacent river Yamuna. In this water ecosystem, phytoplankton is major producers which fix energy and transfers to the land. Present investigation is an attempt to assess some phytoplankton families and monthlies variations in their density. Present study will not only attract the biologists for further study but also help to frame appropriate strategy for the development of Wetland (Alwara Lake).

KEYWORDS : Wetland, Phytoplanktons, Chlorophyceae, Physico-chemical parameters, Alwara Lake.

INTRODUCTION

The lake under investigation is situated in the Yamuna basin of district Kaushambi, Uttar Pradesh which is a part of Gangetic Plain of India (northern region). The lake is a marshy riparian type wetland, covering an area of several hectares and locally called as Alwara taal.

Physiographically it is situated under the sub tropical region of north- Indian of Indo – Gangetic plain near to Yamuna basin. The annual floods of adjacent river Yamuna bring about the vast openness of agricultural land in winter and summer season around the lake. It also turned out into an open land form and many irregular shapes of marshy wetland under non-flooding periods

In this water ecosystem, phytoplanktons are the major producers which fix energy and transfers to the land. For example, vast openness around the lake provides habitat for threatened birds (now vulnerable) Sarus Crane (Prakash *et al.*, 2014) and phytoplanktons directly provide fabricating material for the nest of this bird and indirectly provides food for it as well as other water birds. Present investigation is therefore an attempt to assess some phytoplankton families and monthlies variations in their density.

STUDY AREA

The Alwara lake is located in Kaushambi district of Uttar Pradesh. The lake is 75 km far from Allahabad, 25 km from Manjhanpur (headquarter of district Kaushambi) and 290 km from Lucknow by road. Its nearest railway station is Bharwari at a distance of 35 km and nearest airport Bamrauli (Allahabad) is at a distance of 70 km. It is situated between the latitude 25°24′05.84″S – 25°25′10.63″N and longitude 81°11′39.49″E-81°12′57.95″W with altitude MSL – 81.08 meter.

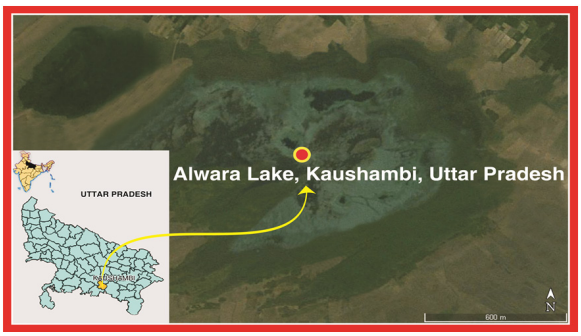


Fig. 1. Alwara lake in Kaushambi district (U.P.)

Fig. 2. A view of Alwara lake

Material and methods

Water samples were collected weekly *i.e.* four times in a month from selected areas in all the 12 months over the year 2014.The collection time was late morning. The lake water was collected in a flask and brought to laboratory for further examination. Physico-chemical analysis was carried out in accordance with Standard Methods for Examination of Water and Waste Water described by American Public Health Association (APHA, 1998). The samples for dissolved oxygen and Biological Oxygen Demand used to fix at the collection sites. The temperature was measured with the Glass - mercury centigrade thermometer at the collection site. Transparency was measured with the Secchi disc at the site. The other parameters were analyzed in the laboratory.

The assessment of phytoplankton population was done by preparing 10 ml concentration in 4% formalin after filtering 100 liter of sample water through number 20 bolting net. Microscopic counting was done by Sedgwick Rafter Cell slide by using of binocular stage microscope. The phytoplankton population was calculated as unitsL^{-1} with the help of following formula :

Total plankton count per liter = A * (1/L) * (n/v) where,

A = number of organisms per drop L = volume of original sample (l) n = total volume of concentrated sample (ml) v = volume of one drop (ml)

Identification of phytoplankton was done according to Desikachary (1959), Ramnathan (1964), Sarode and Kamat (1984). Four groups of phytoplanktons studied are: Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglinophyceae.

Table . Monthlies variation (Mean±SE) of phytoplanktons (unitsL^{-1}) of Alwara Lake during 2014.

Month	Phytoplanktons (unitsL^{-1})				
	Bacillariophyceae	Chlorophyceae	Cyanophyceae	Euglinophyceae	Total(Mean±SE)
Jan	548.5±14.29	695.0±07.46	230.0±17.62	39.2±2.68	1512.7 (378.2±149.0)
Feb	438.6±16.71	554.0±07.46	225.6±17.65	42.5±2.49	1260.7 (315.2±113.5)
Mar	421.3±20.04	532.0±24.69	195.0±10.34	48.2±3.29	1196.5 (299.1±109.1)
Apr	392.5±23.31	514.0±23.22	180.2±15.37	28.0±2.59	1114.7 (278.7±108.3)
May	316.5±16.25	205.5±27.17	129.0±12.35	18.5±1.70	0669.5 (167.4±062.8)
Jun	307.2±08.05	195.8±20.17	110.6±19.19	15.4±1.87	0629.0 (157.3±062.1)
Jul	128.6±15.86	158.0±09.41	125.0±16.67	18.6±2.29	0430.2 (107.6±030.6)
Aug	135.0±10.26	105.0±18.97	102.8±09.80	12.6±1.94	0418.9 (088.9±026.5)
Sep	198.5±07.23	180.0±21.22	139.4±18.71	29.1±2.44	0483.5 (136.8±038.0)
Oct	318.4±11.60	250.0±16.91	182.6±08.14	32.5±3.06	0783.5 (195.9±061.1)
Nov	290.8±18.48	459.0±16.91	200.0±13.13	38.7±3.67	0988.5 (247.2±087.8)
Dec	405.4±17.85	548.0±23.26	222.0±12.50	36.7±2.50	1212.1 (303.1±111.1)
Average	325.1±36.46	366.4±58.32	170.1±13.48	30.0±3.35	0891.7 ±106.96
%	**36.46**	**41.09**	**19.09**	**03.36**	**100.00**

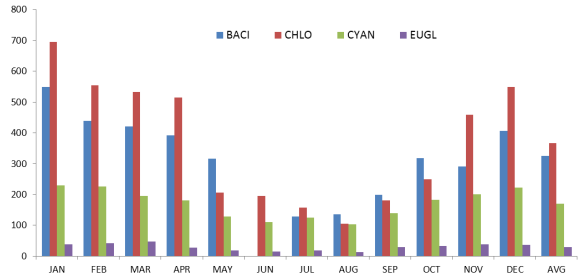
RESULT AND DISCUSSION

Total four groups of phytoplanktons are worked out from all the sampling sites with their similar distribution (Table). The overall population density of phytoplankton, 1512.7 (378.2±149.0) - 0418.9 (088.9±026.5) was observed during the study period. The maximum density (unitsL^{-1}) was recorded in winter season (Jan., Feb., Nov. and Dec.) as: 1243.5±107.6 (1512.7-988.5); moderate in summer season (Mar. – Jun.) as: 902.4±147.4 (1196.5-629.0) and minimum in rainy season (Jul. – Oct.) as: 529.0±86.0 (783.5-418.9). The density of Chlorophyceae 366.4±58.32 (105.0-695.0) dominated over Bacillariophyceae 325.1±36.46 (128.6-548.5) followed by Cyanophyceae 170.1±13.48 (102.8-230.0) and Euglinophyceae 30.0±3.35 (12.6-48.2) and given in Table.

The table represented explains that Chlorophyceae was the dominant in density among all the observed phytoplankton. The dominancy of Chlorophyceae in the similar physiographic region has also been reported by various workers (Khan and Siddiqui, 1976, Lakshminarayana 1965, Nayak 1993, Kumar and Watal 2006, Hossain *et al*., 2013).

Kumar and Watal (2006) reported higher turnover of lake energy in the month of January- June (mid winter- summer) and less in July to September (rainy) for both phytoplankton and aquatic plants. In our present study, almost similar result is also obtained. The findings of Chaudhary and Pillai (2009), Ghosh *et al*., (2012), Narasimha and Benarjee (2013) told maximum phytoplankton abundance and density in summer season.

The phytoplanktons density depends more to physical factors than chemical factors of water which influence its seasonality and distribution pattern in the water body in this physiographical environment. That is why certain phytoplanktons and their density are regulated by seasonal fluctuations of water temperature and apparently disappear in severe condition due to the fact that certain species either become too scarce or occur as spore, resting eggs etc which are not easily detectable (Munawar 1970, Majagi 2013).



Monthlies variation in phytoplankton (unitsL-1) of Alwara Lake during the year, 2014

CONCLUSION

In the present investigation, marked monthlies variations of planktons are reported. Sometimes it becomes more abundant and sometimes scare. Certain planktonic population apparently disappears at specified period and reappears during other months. Such temporary disappearances are due to the fact that species concerned either become scare or occur as spores or resting eggs etc. which are not easily detectable. Similar trend was reported by Imam and Khan (2014). The dominancy of Chlorophyceae members was evident. The reason behind this dominancy is that chlorophyceae members can adapt any type of water environment due to their photosynthetic pigments.

At the same time, authors also found marked variations in some vulnerable species such as sarus crane and some endangered species such as lotus. The lotus or Indian lotus or sacred lotus is not only a symbol of Indian cultural heritage, deeply associated with Hindu mythology, art and culture but also accorded the status of the National Flower of India. The plants of this species help to improve the economic condition of poor rural people and protect water sites as well. It is one of the most attractive aquatic plant species in India showing huge phenotypic diversity with a large number of variants. It is now a need to conserve the lotus and its sustainable use will make this marvellous and heavenly species alive.

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