

Impact of Human Activities on Microbiological Attributes of River Yamuna at Mathura

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Abstract - The study was made to observe microbial status of Yamuna river water at Mathura. Three sites were chosen for the sampling. Samples were taken in the first week of the month of May 2017 from the selected sites. The microorganisms studied were different species of fungi, total coliform, actinomycetes, cyanobacteria etc. These organisms were found to be above the permissible limit as suggested by WHO and ISI. Thus the water status of the river Yamuna was found to be grossly polluted and unfit for human and other animals consumption without prior treatment.

Keywords – Microbiological, sampling, treatment, species.

I. INTRODUCTION

Water is the most vital resource for all kinds of life on this planet as also been adversely affected both qualitatively and quantitatively by all kinds of human activities. The Yamuna, the western most river of the Ganges-system originates from the Yamnotri glacier. Due to the indiscriminate disposal of industrial and domestic wastes in the holy river, a large number of aquatic species, specially fishes, microflora and fauna have become extinct.

Being the birth place of Lord Krishna, Mathura is visited by millions of pilgrims every year from the every corner of the world. They used to perform bathing, washing and other religious activities on the bank of river Yamuna. They directly or indirectly disposed the wastes in the river Yamuna.

At present Yamuna river received large amount of garbage, sewage, domestic wastes, industrial and agricultural effluent containing substances varying in characteristics from simple nutrients to highly toxic substances.

II. MATERIAL AND METHODS

About 15 km stretch of river Yamuna from site-I to site-III. Water samples were collected from selected three sites viz., upstream site-I (entry point of Masani Nala, that receiving untreated urban sewage and industrial effluents), mid stream site-II (Vishram Ghat, the main religious spot) and downstream site-III (entry point of refinery drain) and transferred to laboratory for the microbial analysis. For the study of microbes spread plate technique and dilution plate technique were used as recommended by P.K. Goel.

III. RESULT AND DISCUSSION

To quantify population of different kinds of micro organisms included in the present study viz. fungi, bacteria,

actinomycetes, cyanobacteria and total coliform, the isolation were made applying standard methods.

An inventory of fungal species spectrum was prepared from the water samples collected from the different chosen sites of Yamuna river. Different sites exhibited fluctuation in fungal members in the sampling month (first week of May 2017), the maximum numbers of fungal species (17) were isolated from site-I, 10 species isolated from site-II and 5 species isolated from site-III. The common fungal species such as *Aspergillus glaucus*, *A. flavus*, *A. nidulans*, *A. niger*, *Phoma capitulum*, *Mycotypha sp.*, *Absidia litchtheimia*, *Cunninghamella echinulata* etc. has been reported from the water samples taken from different sites.

Increasing numbers of fungi usually indicate increasing organic loading in water. Similar finding have also been reported by Meyers *et al.* (1970), Abubacker *at al.*(1992), Tan and Lim (1984), Harvey (1952), Shrivastava *at al.* (1986).

The absence and presence of some microbial groups in Yamuna river water gives an information about pollutional status. The maximum number of bacterial cells (15000/100 ml.) were found in site-I and the minimum numbers of bacterial cells (13500/100 ml.) were found at site-II. The microbial examination is of much value in determining the causes of objectionable taste and odour in water (Ampofo, 1997).

The actinomycetes have been recognized as the cause of disruption in waste water treatment. It ranging between 4500/100ml to 5400/100 ml maximum number of actinomycetes found at site-III and minimum 4500/100 ml at site-I. The data of present investigation are more or less in accordance to those of Williams *et al.* (1984).

The total coliforms in Yamuna river water gives an important information about the pollutional status of the

river. It ranging between 254000/100ml to 157500/100ml. The coliform group of bacteria in river water is treated as indicative of excretal pollution *Dukta (1979)*.

Cyanobacteria are the microorganisms formerly called blue-green algae. In the present study values of cyanobacterial density was highest 52300/100 ml. at site-III and lowest 30200/100 ml. at site-II.

Table: *Microbiological characteristics of Yamuna river water.*

Microbial Parameters	Site-I	Site-II	Site-III
1. Fungi : - *(Importance Value Index)	---	---	---
(i) <i>Abscidia litchtheimi</i>	---	9.50	---
(ii) <i>A. flavus</i>	14.20	---	---
(iii) <i>A. fumigates</i>	12.40	27.20	14.60
(iv) <i>A. gloucus</i>	14.40	---	---
(v) <i>A. nidulans</i>	9.50	8.40	---
(vi) <i>A. niger</i>	27.00	14.40	65.00
(vii) <i>A. sulphurius</i>	---	13.40	---
(viii) <i>Chaetomium sp.</i>	7.50	16.30	---
(ix) <i>Cunninghamella echinulata</i>	18.40	---	---
(x) <i>Curvularia lunata</i>	12.60	---	---
(xi) <i>Fusarium solani</i>	8.50	---	---
(xii) <i>Mucor racimosus</i>	7.20	13.30	18.20
(xiii) <i>Mycotypha sp.</i>	14.00	16.70	10.50
(xiv) <i>Penicillium oxalicum</i>	7.80	7.90	---
(xv) <i>Penecillium sp.</i>	13.60	---	---
(xvi) <i>Phoma capitulum</i>	8.40	---	8.50
(xvii) <i>Rhizopus nigricans</i>	8.0	---	---
(xviii) <i>Trichoderma viride</i>	29.00	26.30	---
(xix) Unidentified sp.	15.60	---	---
2. Bacterial sp. (cells/100ml)	15000	13500	14000
3. Actinomycetes (cells/100ml)	4500	4650	5400
4. Cyanobacteria (cells/100ml)	41000	30200	52300
5. Total coliform (cells/100ml)	254000	225000	157500

*Importance value Index (IVI) indicates quantitative value of fungi in one ml of sample.

IV. CONCLUSION

Above study clearly indicates that the water of River Yamuna is grossly polluted. Micro- organisms present in the water, gives the water unpalatable taste and odour. Lable of pollution in Yamuna at Mathura is dangerous to animals and plants. Use of this polluted water may cause many dangerous disease in humans and cattle. To protect human beings and other organisms, it is urgent to find out the solution of Yamuna water pollution.

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