Plant Pathology Journal

ISSN 1812-5387

science alert

ANSInet
an open access publisher
http://ansinet.com

Plant Pathology Journal 13 (3): 200-202, 2014
ISSN 1812-5387 / DOI: 10.3923/ppj.2014.200.202

Diversity of Aquatic Fungi in Three Bank of Ganga River in Varanasi District of Uttar Pradesh

[1]Bhupendra Kumar Singh, [2]Saurabh Singh, [1]Vandana Srivastava and [1]D.N. Shukla
[1]Department of Botany, University of Allahabad, Uttar Pradesh, India
[2]Banaras Hindu University, Varansi, Uttar Pradesh, India

Abstract: Water fungi and fungus-like organisms as a biological factor of ecological water systems have significant influence on the environment and its modification. Fresh water samples were collected from region of Ganga River in Varanasi district, Uttar Pradesh, India. Three sampling sites which are known as ghats (stairways to the bank) Assi ghat, Rajendra ghat, Harishchandra ghat) were selected for sample collection. The water samples were examined for fungi by plating method culturing Potato dextrose agar medium. The isolated fungal strains were identified by lactophenol cotton blue staining. Results were found that a total of 23 micoflora were found to be dominant at three place of Ganga River in Varanasi District. In all three places maximum number of fungi was recorded in Assi ghat followed by Harishchandra ghat then Rajendra ghat. *Aspergillus flavus* and *Aspergillus niger* showed highest 36.75 and 29.50% frequency at Harishchandra ghat and Rajendra ghat. White sterile mycelium and *Trichothecium roseum* showed lowest 0.23 and 0.45% frequency in Assi ghat.

Key words: Ganga river, Varanasi, aquatic fungi, fungus like organism, ghat

INTRODUCTION

The city of Varanasi is located in the middle Ganga valley of North India in the Eastern part of the state of Uttar Pradesh along the left crescent-shaped bank of the Ganga River. A total of 83 ghats (stairways to the bank) are situated. The Varanasi city is the district headquarters of the Varanasi district and the major part of the urban area delimited by the census as 'Varanasi Urban Agglomeration'"The Ganga river and the Riverfront and Old City Heritage Zone of Varanasi" being proposed for nomination to the World heritage list of UNESCO fall mainly into the second category of cultural properties i.e., "groups of buildings, groups of separate or connected buildings which because of their architecture, their homogeneity or their place in the landscape are of outstanding universal value from the point of view of history and art or science. Places of historical, religious and touristic importance around the globe are often prone to large amount of solid waste leftovers by the pilgrims which not only sparks several environmental issues pollution but also serves as source of inoculums for many diseases or some other health hazards/social problems (Blackman, 1995). The Ganga river water pollution was reported from previous studies in 2014. A number of investigations have been carried out on the physiochemical and biological characters of the Ganga. Lakshminarayana (1965) published a series of papers reporting the results of studies carried out at Varanasi during the period between March 1957-1958. It was observed by him that the values of the most of the parameters decreased during rainy season while no marked variation was observed during winters and summers. A year later Ajmal and Din (1988) made a systematic survey of the chemical quantity of Ganga at Kanpur. According to the study, the Biological Oxygen Demand (BOD) varied from 5.3 ppm (minimum) in winter to 16.0 ppm (maximum) in summer. In the one month long festivities organized on the banks of river Ganga during the auspicious occasion of Ardh Kumbh Mela of 2004 at Allahabad, the solid waste leftovers comprised of 62.20% biodegradable, 17.14% non-biodegradable and 13.61% miscellaneous components (Gangwar and Joshi, 2008).

MATERIALS AND METHODS

Three sampling stations (Assi ghat, Rajendra ghat, Harishchandra ghat) were selected for sample collection and sample were kept in presterilized bottle from different parts of river in this manner that the collected water represents the entire water body. The water samples are collected twice a month at fortnightly intervals for the isolations of fungi. During present study Potato Dextrose Agar (PDA) media has been adopted for isolation of pond

Corresponding Author: Bhupendra Kumar Singh, Department of Botany, University of Allahabad, Uttar Pradesh, India

water fungi for three mounth at three region of Ganga river. Fungal flora was calculated (Hogg and Hudson, 1966). Samples will be collected at locations where the river entered Varanasi and sampling sites will be carefully chosen on the basis of their significance in pollution input and capacity of river for assimilation and self purification. The samples will be kept in laboratory at room temperature for isolation of sediment fungi.

RESULT AND DISCUSSION

A total of 23 micoflora were found to be dominant at three place of Ganga River in Varanasi District. Different species of fungi belonging to various genera were isolated at four month. Total number of fungi were recorded in different ghat of Ganga river are listed in (Table 1).

Assi ghat: A total of 13 fungal spp. *Aspergillus flavus*, *Aspergillus terrus*, *Aspergillus niger*, *Aspergillus fumigatus*, *Aspergillus terreus*, *Alternaria alternata*, *Chaetomium globosum*, *Cladosporium* spp., *Drechslera* spp., *Fusarium roseum*, *Fusarium moniliforme*, *Fusarium oxysporum* and *Trichthecium roseum* were isolated at Assi ghat.

Rajendra ghat: A total of 10 fungal spp. fungi *Aspergillus flavus*, *Aspergillus terrus*, *Aspergillus niger*, *Aspergillus fumigatus*, *Aspergillus terreus*, *Alternaria alternata*, *Cladosporium* spp., *Drechslera* spp. and *Fusarium roseum* were isolated in Rajendra ghat.

Table 1: Percentage frequency of fungal flora from three region of Varanasi District in Uttar Pradesh

Mycoflora	Assi ghat	Rajendra ghat	Harishchandra ghat
Aspergillus flavus	5.50	13.75	36.75
Aspergillus terrus	6.70	2.057	0.00
Aspergillus niger	8.50	29.50	28.55
Aspergillus ochraceus	0.00	0.00	3.46
Aspergillus fumigatus	2.55	9.75	7.45
Aspergillus terreus	1.90	5.43	1.09
Alternaria alternata	11.50	4.35	6.00
Curvularia lunata	0.00	0.00	1.02
Chaetomium globosum	4.50	0.00	19.05
Cladosporium spp.	13.35	2.98	0.00
Drechslera spp.	10.00	0.50	14.00
Fusarium roseum	3.12	1.21	9.09
Fusarium moniliforme	2.55	0.75	3.45
Fusarium oxysporum	6.45	0.00	11.25
Fusarium subglutinans	0.00	0.50	0.55
Penicillium rubrum	4.75	5.50	1.50
Penicillium citrinum	6.65	2.25	0.50
Rhizopus nigricans	12.00	0.00	1.50
Macrophomina phaseolina	0.23	2.25	2.75
Trichoderma Koningii	0.00	5.00	5.65
White sterile mycelium	0.00	0.00	0.23
Dark sterile mycelium	0.00	0.50	0.00
Ttrichthecium roseum	0.45	0.00	0.00

Harishchandra ghat: A total of 11 fungal spp., *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus fumigatus*, *Aspergillus terreus*, *Alternaria alternata*, *Chaetomium globosum*, *Drechslera* spp., *Fusarium roseum*, *Fusarium moniliforme*, *Cladosporium* spp. and *Fusarium oxysporum* were isolated in Harishchandra ghat.

Aspergillus flavus and *Aspergillus niger* showed highest 36.75 and 29.50% frequency at Harishchand ghat and Rajendra ghat. White sterile mycelium and *Trichothecium roseum* showed lowest 0.23 and 0.45% frequency in Assi ghat.

For the study of qualitative nature of fungi associated with sand sediment of Ganga River were classified into three different groups on the basis of their appearance in different time of intervals.

Dominant group: The frequency of this fungi appeared more than 70% incidence and more in number. These are; *Aspergillus flavus*, *Aspergillus terrus*, *Aspergillus niger*, *Aspergillus fumigatus* and *Aspergillus terreus*.

Common group: This group of fungi appeared less than 70% and more than 50%. These are; *Aspergillus fumigatus Aspergillus terreus*, *Alternaria alternata*, *Chaetomium globosum*, *Cladosporium* spp. and *Drechslera* spp.

Rare group: This group of fungi which appeared once or twice during isolation *Cladosporium* spp., *Fusarium roseum*, *Fusarium moniliforme* and *Fusarium oxysporum*.

Excessive levels of nutrients and other chemicals lead to changes in aquatic life (Wesbster and Descals, 1979). Heterotrophic organisms are usually present in natural water in direct proportion to the physicochemical nature of the aquatic environment (Goh *et al*., 2003). Aquatic fungi contribute to the energy flow and productivity of ecosystem by their active role in the utilization and bio deterioration of organic materials (Khulbe, 2001). These fungi also process the ability to paradise aquatic plants and animals including fishes under certain condition (Cooke, 1977). Fungi of Ganga waters in self purification and public health hazards and posses capability of reducing BOD as well as phosphate and ammonia-N (Jaiswal and Tewari, 2012).

CONCLUSION

All three places of Ganga River in Varanasi of Uttar Pradesh all fungal spp., were found to be dominant. Maximum frequency of fungi was recorded in Assi ghat followed by Harishchandra ghat then Rajendra ghat. *Aspergillus flavus* and *Aspergillus niger* showed highest

frequency at Harishchandra Ghat and Rajendra ghat while White sterile mycelium and *Trichothecium roseum* showed lowest frequency in Assi ghat.

ACKNOWLEDGEMENT

Authors are grateful to thanks Department of Botany, University of Allahabad my senior and junior who helped me a lot. Main contribution was goes to my junior Saurabh Singh who is doing Ph.D from Banaras Hindu University Varanasi. All laboratory practice was done in mycology and plant pathology lab.

REFERENCES

Ajmal, M. and R. Din, 1988. Studies on the Pollution of Hindon river and Kali Nadi (India) Ecology and Pollution of Indian Rivers. Ashish Publishing House, New Delhi, India.

Blackman, Jr., C.W., 1995. Basic Hazardous Waste Management. 3rd Edn., CRC Press, New York, USA., ISBN-13: 9781566701686, Pages: 416.

Cooke, W.B., 1977. Fungi in streams, lakes, adjacent soil and sewage treatment systems in the Flathead River basin, Montana. Northwest Sci., 51: 172-182.

Gangwar, K.K. and B.D. Joshi, 2008. A preliminary study on solid waste generation at Har Ki Pauri, Haridwar, around the Ardh-Kumbh period of sacred bathing in the river Ganga in 2004. Environmentalist, 28: 297-300.

Goh, T.K., K.M. Clement and C.K.M. Tsui, 2003. Key to Common Dematiaceous Hyphomycetes from Freshwater. In: Freshwater Mycology, Tsui, C.K.M. and K.D. Hyde (Eds.). Fungal Diversity Press, Hong Kong, USA., ISBN-13: 9789628676538, pp: 325-343.

Hogg, B. and H.J. Hudson, 1966. Micro-fungi on leaves of *Fagus sylvatica*: I. The micro-fungal succession. Trans. Br. Mycol. Soc., 49: 185-192.

Jaiswal, H. and H. Tewari, 2012. Bottom sediments mycoflora of ganga river at Kanpur (U.P.). Indian J. Fundam. Applied Life Sci., 2: 260-265.

Khulbe, R.D., 2001. A Manual of Aquatic Fungi (Chytridiomycetes and Oomycetes). 1st Edn., Daya Publishing House, Delhi, India, ISBN: 81-7035-222-3, Pages: 255.

Lakshminarayana, J.S.S., 1965. Studies of the phytoplankton of the river Ganges, Varanasi, India, Part-I, physico chemical characteristics of River Ganga. Hydrobiologia, 25: 119-175.

Wesbster, J. and E. Descals, 1979. The Telomorphs of Waterborne Hyphomycetes from Freshwater, In: The Whole Fungus, Kendrick, B. (Ed.). National Museums of Canada and Kananaskis Foundation, Ottawa, Canada, ISBN-13: 9780660001463, pp: 419-451.