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Ecological Study of Fungi Isolated from the Surface Water of Dudhawa Dam Dhamtari, Chhattisgarh, India

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Article Info	Summary
Article History <i>Received</i> : 11-03-2011 <i>Revised</i> : 27-03-2011 <i>Accepted</i> : 04-04-2011	Dudhawa Dam is located in Dhamtari district of Chhattisgarh in India. It is built across Mahanadi river in Dudhawa villag. The quantitative and qualitative fungal composition of dam water was surveyed monthly for a year i.e. March 2010 to February 2011. A variety of fungal strains was isolated and identified from the water of Dam. Out of a total 193 fungal colonies, 35 fungal species belongs to 16 fungal genera were isolated. <i>Aspergillus niger</i> was most frequent species with 91.67%, <i>Neoarachnotheca keratinophila</i> (75%) followed by <i>A. flavus</i> and <i>A. fumigatus</i> with 66.67% frequency. It was also found that maximum percentage contribution was observed for <i>Aspergillus fumigatus</i> (19.68%), which was followed by <i>Aspergillus niger</i> with (18.65%) contribution.
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©ScholarJournals, SSR	Key Words: Ecological study, Percentage frequency, Pond

Introduction

Environment, which is actually a complex of several inter-related factors and is much dynamic (i.e. varying with time and space), works as a sieve selecting organisms for growth from so many forms, as its one or the other factor becomes critical at critical stages of the life cycle of the species. Water fungi play a crucial role in the freshwater ecosystem in nutrient cycling by breaking down leaves and woody substrates¹ and also as symbionts. Ecology deals with the various principles which govern relationships between organisms and their environment. All the fungal species present in an area constitute the fungal community of that area. For the study of fungal community present in dam water, we have collected fungi from water, to understand the overall diversity among different taxonomic groups of fungi present, as well as their occurrence, frequency and contribution of the fungal species in water.

Materials and Methods

Dudhawa Dam is located in Dhamtari district of Chhattisgarh in India. The construction of the dam began in 1953-54 and commissioned in 1963-64. It is built across Mahanadi river in Dudhawa village, 21 km from Sihawa and 29 km Kanker. The height of the dam is 24.53 m and the length 2,906.43 m. The reservoir has a catchment area of 625.27 km². A surface water sample was aseptically collected from one to two meters away from the bank, in pre sterilized bottle from different parts of dam; 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 water fungi for one year March 2010 to February 2011. At the end of the incubation period the percentage frequency and percentage contribution of the fungal flora was calculated³.

Results and Discussion

During the present study total 193 fungal colonies of 35 different species belonging to 16 fungal genera were isolated from pond water samples.

Percentage frequency of fungi

During ecological study it was observed that *Aspergillus niger* was most frequent throughout year with 91.67%, *Neoarachnotheca keratinophila* with 75%, *Aspergillus flavus* and *A. fumigates* with 66.67% frequency. Where as *A. versicolor* and *Cladosporium sphaerospermum* were moderately frequent species with 41.67% frequency (Table-1). Some fungi such as *Acremonium implicatum*, *Aspergillus oryzae*, *A. phoenicis*, *A. ustus*, *Aureobasidium pullulans*, *Drechslera hawaiiensis*, *Tritirachium oryzae* etc were less frequent species throughout year (8.33%). Season wise observation showed that *Aspergillus niger* was most (100%) frequent species in rainy and winter season and in summer also with 75% frequency. While, only in rainy seasons, two another species *Neoarachnotheca keratinophila* and *Aspergillus versicolor* were also found to be most frequent species with 100% frequency.

Table 1: Showing number of fungal colonies of water mycoflora of Dudhawa dam water

No	NAME OF FUNGI	SUMMER					RAINY					WINTER					G. Tot.	% frequency	% contribution
		Mar	April	May	June	Tot.	July	Aug	Sep	Oct.	Tot.	Nov	Dec	Jan	Feb	Tot.			
A	Zygomycotina																		
	<i>Mucor racemosus</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	8.33	0.518	
	<i>Rhizopus nigricans</i>	0	0	0	0	0	0	0	2	2	0	2	0	1	3	5	25	2.59	
	<i>R. oryzae</i>	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	8.33	0.518	
B	Ascomycotina																		
	<i>Chaetomium globosum</i>	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	8.33	0.518	
	<i>Emericella nidulans</i>	0	1	2	2	5	0	0	0	0	0	0	0	0	0	5	25	2.59	
	<i>Thielavia appendiculata</i>	0	0	0	0	0	0	1	0	1	1	0	0	0	1	2	16.67	1.03	
C	Anamorphic																		
	<i>Acremonium implicatum</i>	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	8.33	0.518	
	<i>Aspergillus awamori</i>	0	0	1	1	2	0	0	0	0	0	0	0	0	0	2	16.67	1.03	
	<i>A. flavus</i>	0	0	2	1	3	3	1	1	0	5	2	0	2	5	17	66.67	8.80	
	<i>A. fumigatus</i>	18	8	4	3	33	1	1	1	0	3	0	0	2	2	38	66.67	19.68	
	<i>A. Japonicus</i>	0	0	0	1	1	0	0	0	0	0	1	0	0	1	2	16.67	1.03	
	<i>A. luchuensis</i>	0	0	1	1	2	0	0	0	0	0	2	0	0	2	4	25	2.07	
	<i>A. niger</i>	1	0	3	3	7	2	2	4	1	9	6	7	2	5	20	91.67	18.65	
	<i>A. niveus</i>	0	0	0	0	0	0	1	0	1	2	0	0	0	0	2	16.67	1.03	
	<i>A. ochraceus</i>	0	0	0	0	0	0	1	0	0	1	0	1	0	1	2	16.67	1.03	
	<i>A. oryzae</i>	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	8.33	0.518	
	<i>A. parasiticus</i>	1	0	0	0	1	0	0	0	2	2	0	0	1	0	4	25	2.07	
	<i>A. terreus</i>	0	0	0	1	1	0	1	0	0	1	0	0	0	0	2	16.67	1.03	
	<i>A. versicolor</i>	0	0	1	0	1	1	7	3	3	14	0	0	0	0	15	41.67	7.77	
	<i>Aspergillus sp. I</i>	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	8.33	0.518	
	<i>Cladosporium cladosporoides</i>	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	8.33	0.518	
	<i>C. sphaerospermum</i>	0	0	0	0	0	2	0	1	0	3	1	14	2	0	17	20	41.67	10.36
	<i>Drechslera hawaiiensis</i>	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	8.33	0.518	
	<i>Fusarium moniliforme</i>	0	0	0	0	0	0	2	0	0	2	0	0	0	0	2	8.33	1.03	
	<i>F. oxysporum</i>	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	8.33	0.518	
	<i>F. solani</i>	0	0	0	0	0	1	0	0	0	1	0	0	1	1	2	25	1.55	
	<i>Penicillium griseofulvum</i>	0	0	0	1	1	0	0	0	1	1	0	0	0	0	2	16.67	1.03	
	<i>P. notatum</i>	0	0	0	1	1	0	0	0	0	0	1	0	1	0	2	25	1.55	
	<i>P. rugulosum</i>	0	0	0	1	1	0	0	0	0	0	1	0	0	1	2	16.67	1.03	
	<i>Phoma. tropica</i>	0	0	0	0	0	2	0	0	0	2	0	0	0	0	2	8.33	1.03	
	<i>Trichoderma viride</i>	0	0	1	0	1	1	1	0	0	2	0	3	1	0	4	7	41.67	3.62
	<i>Trichoderma sp.</i>	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	8.33	0.518	
	<i>Trichothecium roseum</i>	1	1	0	0	2	0	0	0	0	0	0	0	0	0	2	16.67	1.03	
D	Mycellia sterile																		

1	Mycellia striala (white) - 1 (steri)	0	0	0	0	0	2	0	0	0	2	0	0	0	0	2	8.33	1.03	
2	Mycellia striala(ash)	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	2	16.67	1.03

During study it was found that, the biggest toll group Anamorphic fungi, as a whole, dominated the entire water mycoflora and present throughout year. Out of 35 fungal species which is isolated during study, the broadest spectrum of species is shown by *Aspergillus* (20 species). *Aspergillus niger*, *A. fumigatus*, *A. flavus*, *A. versicolor*, and *Cladosporium sphaerospermum*, are commonest species, show maximum percentage frequency and contribution. *Aspergillus* is one of the more commonly isolated genera in water^{4,5,8}. Laila A. Nasser also found that the genera *Aspergillus* (9 species out of 45 species, 166 colonies out of 400 fungal total counts) and *Penicillium* (7 species, 68 colonies) had the greatest diversity of the isolated species as well as the highest fungal total count⁶. As we know fungi are among the most diverse groups of living organisms on earth, though inadequately studied worldwide^{7, 9, 10, and 11}. It is well known fact that due to annihilation of our natural areas is leading to an ever-increasing decline in biodiversity worldwide¹².

References

- [1] Bärlocher F. and Kendrick B., Role of aquatic hyphomycetes in the trophic structure of streams, In: Wicklow DT, Carroll GC, eds. The fungal community: its organization and role in the ecosystem, New York: Marcel Dekker. Pp. 743-760, (1981)
- [2] Sharma P.D., Ecology and environment, Rastogi publications, Meerut, 7th edition, (2004).
- [3] Hogg B. and Hudson H.J., Microfungi of the leaves of *Fagus sylvatica* The microfungal succession, *Transactions of the British Mycological Society*, 49: 185-192, (1966)
- [4] Giorgio Brandi, Maurizio Sisti, Andrea Papparini, Gianluca Gianfranceschi, Giuditta F. Schiavano, Mauro De Santi, Daniele Santoni, Valter Magini, Vincenzo Romano-Spica, Swimming pools and fungi: An environmental epidemiology survey in Italian indoor swimming facilities, *International Journal of Environmental Health Research*, Vol-17, Issue-3, June 2007, pages 197 -206, (2007)
- [5] Arvanitidou M., S. Spaia, A. Velegraki, M. Pezarloglou, D. Kanetidis, P. Pangidis, N. Askepidis, C. Katsinas, G. Vayonas, and V. Katsouyannopoulos, High level of recovery of fungi from water and dialysate in haemodialysis units, *Journal of Hospital Infection*, 45:225-230, (2000)
- [6] Laila A. Nasser., Occurrence of Terrestrial Fungi in Accumulated Rainfall Water in Saudi Arabia, J. King Saud Univ., *The Journal of Agricultural Science* (1), Vol. 18, pp. 63-72, Riyadh, (2005)
- [7] Ruby Grover, Sharma K.P., Kumar P. and Kumar S., Response of fungal community in the unpolluted and polluted (textile and distillery wastes) habitats, *Journal of Environmental Science and Engineering*, 49(2): 93-8 (2007)
- [8] Kwon Jin-Hyeuk and Chang-Seuk Park, Sooty Mold of Persimmon (*Diospyros kaki*) Caused by *Cladosporium cladosporioides*, *Journal of Plant Pathology*, 19(5): 266-268, (2003)
- [9] Deryck Damian Pattron, *Aspergillus*, Health Implication & Recommendations for Public Health Food Safety, *Internet Journal of Food Safety*, Vol.8, 2006, p. 19-23, (2006)
- [10] Yun C. Chang, Huei-Fung Tsai, Marvin Karos, K.J. Kwon-Chung, THTA, a thermo-tolerance gene of *Aspergillus fumigatus*, *Fungal Genetics and Biology*, 41 (2004), 888-896, (2004)
- [11] Britt A. Bunyard, A Survey of Fungal Diversity in Northeast Ohio, *The Ohio Journal of Science*, 103 (2):29-32, (2003)
- [12] Kishbaugh M.A. and Yocam D.H., The impact of habitat fragmentation on arthropod biodiversity, *The American Biol. Teacher*, 62:414-20, (2000)