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Diversity of aquatic fungi in the coastal region of Cauvery river in Thanjavur district of Tamilnadu

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ABSTRACT

Fresh water samples were collected from coastal region of Cauvery river in Thanjavur district, Tamilnadu, India. Five sampling stations (Kallanai, Thirukkatupalli, Thiruvaiyar, Papanasam, Kumbakonam) were selected for sample collection. The water samples were examined for fungi by plating method culturing in Rose Bengal agar and Potato Dextrose agar medium.The isolated fungal strains were identified by Lactophenol Cotton Blue staining. A total number of 25 species of fungi belonging to 2 genera were recorded. Thus the water samples from Cauvery river of Tamil Nadu yield impressive diversity of fungi.

Keywords: Cauvery river, aquatic fungi, diversity.

INTRODUCTION

Seventy-one percent of our planet's surface consist of water, but only 0.6% are lentic andlotic freshwater habitats. Often taken for granted, freshwaters are immensely diverse habitats and host >10% of all animal and >35% of all vertebrate species worldwide.However, no other major components of global biodiversity are declining as fast and massively as freshwater species and ecosystems. Urbanisation, economic growth, and climate change have increased pressure on freshwater resources, whilst biodiversity has given way to the increasing demands of a growing human population. The adverse impacts on aquatic ecosystems include habitat fragmentation, eutrophication, habitat loss, and invasion of pathogenic as well as toxic species. Although there is increasing evidence that fresh water fungal diversity is high, the study of the biodiversity of freshwater fungi is still in its infancy. In light of the rapid decline in freshwater biodiversity, it is timely and necessary to increase our efforts to evaluate the diversity and potential ecological function of this fascinating and diverse group of freshwater organisms.

Aquatic fungi are usually microscopic organisms, which do not produce visible fruiting bodies but grow asexually (anamorphic fungi). Their occurrence in water is rather subtle and specialized methods are needed to examine their diversity, population structure and ecological function. Water associated fungi have been known historically as "phycomycetes", a functionally defined group consisting of "true fungi" (Eumycota) and "analogously evolved fungus-like organisms" belonging to Chromista (Oomycetes, Thraustochytridiomycetes). Other groups formerly placed in the fungal kingdom include slime moulds (Amobae), Ichthyosporae (Mesomycetozoea) and Actinomycetes (Bacteria), which are now recognised as distinct taxa. While the "true fungi" are a sister group to animals, Oomycetes are biochemically distinct from fungi while having similar morphology, size and habitat usage. Colloquially known as "water moulds", they comprise approx. 200 species inhabiting freshwater, mud and soil. Many of these are saprobes or parasites [1, 2]. Slime moulds [3] are also found in freshwater habitats. Although they

are relatively easy to isolate from plant detritus submerged in ponds and lakes, their ecology is little known and requires further investigation [4].

Some authors estimated that there are approximately 1.5 million fungal species on earth[5]. Of these, only around 3000 species are known to be associated with aquatic habitats and only 465 species occur in marine waters [6]. This small proportion of aquatic fungal taxa is surprising because the aquatic environment is a potentially good habitat for many species. Based on this notion we assume that the "real" number of aquatic fungi is much larger than 3000 and includes a large variety of hither to undescribed species with unknown ecological function.

MATERIALS AND METHODS

Study area

Five different stations from the cauvery river were selected for water sample collection for fungal diversity analysis from Tanjavur city viz., Station-1. Kallanai, Station-2. Trirukkatupalli, Station-3. Triruvaiyaru, Station-4. Papanasam, Station-5. Kumbakonam.

Collection and analysis of fungi

The water sample for fungal diversity analysis were collected in the river. The samples were collected from each collection site. Water samples for fungal diversity analysis were collected in sterile plastic bottles from five different locations from each site and brought to the laboratory.

Isolation of pure culture of fungi

Isolation of fungi was carried out by serial dilution method [7]. Cultures were maintained on potato Dextrose agar (PDA) and Rose Bengal agar medium.

Identification of fungal strains

The isolated fungal strains were identified by using Lacto phenol cotton blue stain and fungal slide culture technique. The standard plate count is a reliable method for enumerating fungi [7]. Identification of pure cultured fungi by direct mount from culture and its slide was done with the help of aquatic fungi manual [8-12].

RESULTS AND DISCUSSION

In the study, totally 25 species of fungi were isolated by dilution plating technique (Table-1). Out of 25 species recorded, the maximum number of organisms recorded belonged to Deuteromycetes followed by zygomycetes. The fungi that were more frequently isolated for these studies were *Rhizopus nigricans, Aspergillus terreus, Aspergillus niger, Penicillium sp., Fusarium sp., Alternaria, Gliocladiopsis, Cladosporium*respectively. Besides these, 4 unidentified fungal forms were isolated and recorded.

Fungi are ubiquitous achlorophyllous and heterotrophic organisms, which are directly influenced by environmental factors. They are cosmopolitan in occurrence and are found in rivers, oceans and occur commonly on decomposing organic matter. Excessive levels of nutrients and other chemicals lead to changes in aquatic life [13]. Heterotrophic organisms are usually present in natural water in direct proportion to the physicochemical nature of the aquatic environment [14]. Fungi play an important biological process in an aquatic ecosystem. Aquatic fungi contribute significantly in aquatic ecosystem as decomposers of animal and plant remains [15,16]. Aquatic fungi contribute to the energy flow and productivity of ecosystem by their active role in the utilization and biodeterioration of organic materials[17]. These fungi also process the ability to paradise aquatic plants and animals including fishes under certain condition [8].

Freshwater fungi are a diverse and heterogeneous group, comprising many species from different orders. In which Ascomycetes and Hyphomycetes are dominant orders. Freshwater hyphomycetes were practically untouched by the pioneering work of [18],who recognized them, as 'Aquatic Hyphomycetes'. Later these fungi have also been described as ''Freshwater Hyphomycetes'' [19]and ''water borne Hyphomycetes''[20]. Hyphomycetes is one of the main order, which comprise 4 biological groups; viz., Ingoldian, aeroaquatic, terrestrial aquatic hyphomycetes and submerged aquatic hyphomycetes[21]. The members of Chytridiomycetes and Oomycetes are mostly aquatic and commonly known as water molds [22]. The main role of the freshwater Ascomycetes, Basidiomycetes and Mitosporic fungi in fresh water ecosystems are in the degradation of dead organic material[23].

Table 1. Fungi isolated from five sampling stations

S. No	Species	No. of Colonies				
		S_1	S_2	S_3	S_4	S_5
	Deuteromycetes					
1	*Alternaria alternata*	+	-	-	-	+
2	*Aspergillus awamori*	-	-	+	+	-
3	*A.clavatus*	+	+	+	-	-
4	*A.flavus*	+	+	+	-	-
5	*A.fumigatus*	+	+	+	+	+
6	*A.humicola*	+	+	+	+	+
7	*A.luchuensis*	+	+	+	+	+
8	*A.nidulans*	+	+	+	+	+
9	*A.niger*	+	+	+	+	+
10	*A.sulphureus*	-	+	+	+	+
11	*A.variecolor*	+	+	-	-	+
12	*A.versicolor*	+	-	-	-	-
13	*A.wentii*	+	-	-	+	-
14	*Cladosporium sp.*	-	+	+	+	+
15	*Fusarium oxysporum*	--	+	-	+	+
16	*Gliocladiopsis sp.*	+	-	-	+	+
17	*Penicillium funiculosum*	+	+	-	+	-
18	*Penicillium sp.*	+	+	+	+	+
	Zygomycetes					
19	*Rhizopus nigricans*	+	+	+	+	+
20	*Black sterile mycelium*	+	-	-	-	-
21	*White sterile mycelium*	-	-	+	+	+
22	*Unidentified fungi*	-	+	-	-	-
23	*Unidentified fungi*	-	+	-	-	-
24	*Unidentified fungi*	-	+	-	-	+
25	*Unidentified fungi*	+	-	+	+	+

(+) = Present; (-)=Absent; s_1= Kallanai; s_2= Thirukkatupalli; s_3= Thiruvaiyar; S_4= Papanasam; s_5= Kumbakonam

CONCLUSION

A total of 25 fungal species were isolated and identified from Cauvery river at Thanjavur district of Tamilnadu. The study of biodiversity on the edge elucidates the relationships between organism and environment, and unravels the mechanisms of adaptation to extreme environment condition. Hence the above global and indian scenario on rivers provides unities for mycologists to explore fungal diversity and exploit their ecological, medicinal and industrial potential.

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REFERENCES

[1] B.Czeczuga, M. Kozlowska.**2012**, *Limnologica***,** 32(2), 180-193.
[2] J.Nechwatal, A.Wielgloss and Mendgen, Kurt.**2005**,*MycologicalResearch*, 109(12),1337-1346.
[3] S.M. Adl, A.G. Simpson.**2005**,*The journal of eukaryotic microbiology*, 52(5),399-451.
[4] L.A. Lindley, S.L. Stephenson. **2007**,*Mycologia*, 99(4), 504-509.
[5] K. Hyde, B. Bussaban. **2007**, *Biodiversity and Conservation*, 16(1), 7-35.
[6] C. Shearer, E. Descals, B. Kohlmeyer, J. Kohlmeyer, L. Marvanova, D.Padgett.**2007**, *Biodiversity conserve*, 16(1), 49-67.
[7] J.G. Cappuccion, N. Sherman.**2006**, In: Microbiology, A laboratory manual addision-WesleyLongaman, Inc. 125-179.
[8] R.D.Khuble. **2001**, A manual of aquatic fungi (*Chytridiomycetes* and *Oomycetes*) 255**.**
[9] F.K. Sparrow, **1960**. *Ann Arbor*, 11-87.
[10] H.L. Banett, B.B. Hunter. **1972**, Illustrated Genera of Imperfect fungi, 1-300.
[11] M.S. Fuller, A. Jaworski. **1987**, *J.zoosporic.Fungi in teaching and research*,310.
[12] M.W. Dick.**1990**. Key to *pythium.*

[13] D. Dudgeom, A. Arthington, M. Gessner, Z. Kawabata, D. Knowler, C. Leveque, R. Naimen and C.Stullivan, **2006.***Biological Review*, 81 ; 163-182.
[14] D. Prasad, J.H. Rajanaika, and V. Krishna, **2009.***Researcher*, 1(6) : 54 – 62.
[15] T.W. Jonshonn, **1956.** *Ann.Arbor*, 180.
[16] F.K Sparrow, **1968.***Ecology of fresh water fungi Thefung*, 111: 41-93.
[17] R.D. Khuble, **1991.***Indian Tropical Ecology*, 32: 127 – 135.
[18] C.T. Ingolg, **1942.***Trans British Mycological Society*, 25 : 339 – 417.
[19] S. Nilsson, **1964.***Symb.Bot. Ups*, 18 : 1- 130.
[20] J. Wesbster, and E. Descals, **1979.** The telemorphs of waterborne hyphomycetes from fresh water, 2: 419-451.
[21] T.K. Goh, K.M. Clement, and C.K.M. Tsui, **2003.**Fresh water mycology, 325- 343.
[22] P.C. Paliwal, and S.C. Sati **2009**. *Nature and Science*, 7(3) : 70 -74.
[23] T.K. Goh, K. Hyde, **1996.***Industrial microbiology*,17: 325-343.