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### Biodiversity of fungi from soil and water samples from Waldhuni River

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#### KEYWORDS

Waldhuni  
River,  
PDA,  
Fungi

#### A B S T R A C T

Waldhuni is a small river originating at Kakole Lake near Ambarnath and unites with Ulhas River near Kalyan with its total length of 31.8 Km. The river is so much polluted that it is now referred to as Waldhuni Nallah. The soil and water samples (surface and deep water) were collected frequently from four locations of the river. The soil samples were dried and used for culturing. The water samples were used immediately for culturing. The medium used for culturing all the samples was Potato dextrose Agar. A number of fungi were isolated such as *Trichoderma*, *Aspergillus*, *Penicillium*, *Auriobasidium*, etc.

#### Introduction

River Waldhuni is a left bank tributary of Ulhas River. The Waldhuni River flows through Ambarnath, Ulhasnagar and Kalyan and its entire stretch is 31.8 Km. The river bank has maximum encroachment from Ulhasnagar on the east and Ashoknagar and Shivajinagar in Kalyan on the west of its bank.). It flows through thickly populated area, which was severely polluted due to domestic and industrial sewage. Fungi are non-green, heterotrophic organisms that are important in industrial processes and in many medicines (Saler *et al.*, 2007). Even when the river is so polluted, there are many fungi growing in soil as well as water of this river. Such fungi that have ability to tolerate the pollutants may have some special capacities. To understand this, present project was taken up as initial study.

Freshwater fungi are a diverse and heterogeneous group, comprising many species from different orders in which Ascomycetes and Hyphomycetes are dominant orders.

Fresh water Hyphomycetes were practically untouched by the pioneering work of who recognized them, as 'Aquatic Hyphomycetes'. Later these fungi have also been described as "Freshwater Hyphomycetes" and "water borne Hyphomycetes". The main role of the freshwater Ascomycetes, Basidiomycetes and Mitosporic fungi in fresh water ecosystems are in the degradation of dead organic material (Nizamdeen *et al.*, 2014).

## **Materials and Methods**

Sample collection was done from June 2010-Apr. 2012 in different seasons in sterile bottles from four locations viz. Kakole lake (origin of the river), AMP gate, Ambernath, In front of Smt. C. H. M. College, Ulhasnagar and Petrol Pump area, Viththalvadi. The areas were selected on the basis of Levels and types of pollution. At the point of origin, people use water for house hold purposes and is almost free of pollution. At the second location, there is maximum domestic pollution. At the third location, there are many dye industries, the sewage from the industries from Ambernath containing inorganic wastes, those from dye industries containing dyes, acids, bases etc. are mixed with the water that already contains domestic sewage. The last location is the site just before the meeting point of Waldhuni and Ulhas Rivers. At this point, water contains all sorts of pollutants and is the site of extreme pollution.

The water samples were collected from the surface, at the depth of two feet from the surface and the soil was collected from the base of the river.

All the samples were plated on Potato Dextrose Medium (Difco manual, 1969) after isolating by dilution technique (Prämer and Schmidt, 1966).

The fungi were isolated on the slants of PDA and the pure cultures were maintained in fridge.

To identify the fungal specimen, the slides were prepared by staining in cotton blue in lacto phenol.

The slides were photographed by Olympus Magnus Camera No.70.0491 to maintain the record.

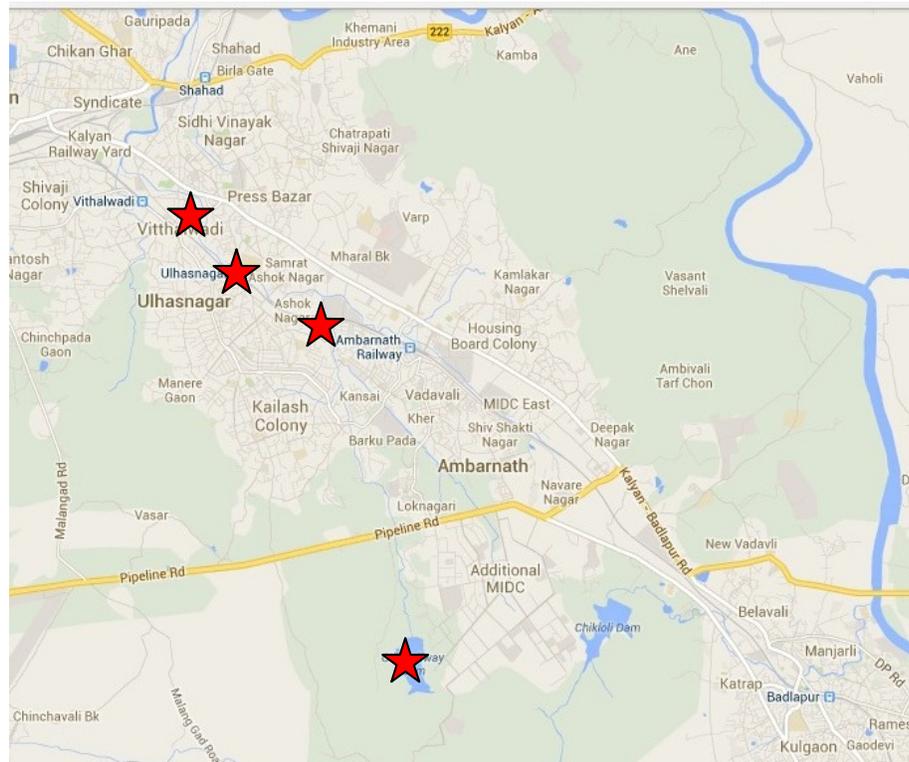
The identification of fungi was done at Agharkar Research Institute and by using manual of soil fungi (Nagmani *et al.*, 2006).

## **Result and Discussion**

Most of the fungi isolated from water as well soil belonged to the groups-Phycomycetes and Ascomycetes. Total 22 fungal species were isolated from both the surfaces. As compared to water samples, soil samples contained more genera of fungi. The deep water samples contained less fungal genera as compared to the surface water samples. The level of pollution of water increased from the place of origin till the last spot of collection i.e. petrol pump region. The number and species variation of fungi increased with the increasing levels of pollution.

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. Heterotrophic organisms are usually present in natural water in direct proportion to the physicochemical nature of the aquatic environment. Fungi play an important role in biological processes in an aquatic ecosystem. Aquatic fungi contribute significantly in aquatic ecosystem as decomposers of animal and plant remains. Aquatic fungi contribute to the energy flow and productivity of ecosystem by their active role in the utilization and biodeterioration of organic materials. These fungi also possess the ability to parasitize aquatic plants and animals including fishes under certain condition.

**Figure.1** Locations of sample collection



**Table 1** The fungi isolated from the water samples

Location→	Kakole lake		AMP Gate		CHM College		Petrol Pump Area		%	%
	DW	SW	DW	SW	DW	SW	DW	SW		
Name of the fungus↓	DW	SW	DW	SW	DW	SW	DW	SW	D.W	S.W
<i>Aspergillus niger</i>	+	+	+	+	+	+	+	+	100	100
<i>Aspergillus flavus</i>	-	+	-	+	+	+	+	+	50	100
<i>Aspergillus fumigatus</i>	-	-	-	+	-	+	-	+	0	75
<i>Aspergillus nidulans</i>	-	-	-	+	-	+	+	+	25	75
<i>Aspergillus repens</i>	-	-	-	-	-	-	-	+	0	25
<i>Aureobasidium pullulans</i>	-	-	-	-	-	-	+	+	25	25
<i>Chaetomium indicum</i>	-	-	-	+	+	+	+	+	50	75
<i>Cladosporium cladosporioides</i>	-	+	-	+	-	+	+	+	25	100
<i>Cocliobolus australiensis</i>	-	-	-	+	-	+	+	+	25	75
<i>Curvularia brachyspora</i>	-	+	-	+	+	+	+	+	50	100
<i>Fusarium moniliforme</i>	-	-	-	-	-	+	+	+	25	50
<i>Rhizopus orizae</i>	-	-	-	+	-	+	-	+	0	75
<i>Trichoderma asperellum</i>	-	-	-	-	-	-	-	+	0	25
<i>Trichoderma pseudokoningii</i>	-	-	-	-	-	-	-	+	0	25
<i>Trichoderma reesei</i>	-	-	-	-	-	-	-	+	0	25
<i>Trichoderma koningii</i>	-	-	-	+	+	+	+	+	50	75

**Table.2** The fungi isolated from the soil samples

Location→	Kakole lake	AMP Gate	CHM College	Petrol Pump Area	
Name of the fungus↓					%
<i>Aspergillus niger</i>	+	+	+	+	100
<i>Aspergillus flavus</i>	+	+	+	+	100
<i>Aspergillus fumigatus</i>	+	+	+	+	100
<i>Aspergillus ustus</i>	-	-	-	+	25
<i>Aspergillus unguis</i>	-	-	-	+	25
<i>Aspergillus nidulans</i>	+	-	+	+	75
<i>Aspergillus ochraceus</i>	-	+	+	+	75
<i>Aspergillus terreus</i>	-	+	+	+	75
<i>Aspergillus repens</i>	+	+	+	+	100
<i>Acrophialophora fusispora</i>	-	-	-	+	25
<i>Aureobasidium pullulans</i>	-	-	+	+	50
<i>Chaetomium indicum</i>	-	-	-	+	25
<i>Chaetomium globosum</i>	-	-	-	+	25
<i>Chaetomium funicola</i>	+	+	+	+	100
<i>Cladosporium cladosporioides</i>	+	+	+	+	100
<i>Cladosporium variabile</i>	-	-	-	+	25
<i>Cocliobolus australiensis</i>	-	-	-	+	25
<i>Colletotrichum dematium</i>	+	+	+	+	100
<i>Curvularia brachyspora</i>	+	+	+	+	100
<i>Cylindrocladium parvum</i>	+	+	+	+	100
<i>Fusarium moniliforme</i>	-	-	-	+	25
<i>Penicillium griseofulvum</i>	+	+	+	+	100
<i>Pseudocochliobolus pallescens</i>	-	-	-	+	25
<i>Rhizopus orizae</i>	+	-	+	+	75
<i>Scolecobasidium humicola</i>	-	-	-	+	25
<i>Trichoderma asperellum</i>	-	+	+	+	75
<i>Trichoderma harzianum</i>	-	+	+	+	75
<i>Trichoderma pseudokoningii</i>	-	+	+	+	75
<i>Trichoderma reesei</i>	-	+	+	+	75
<i>Trichoderma koningii</i>	-	+	+	+	75



*Aspergillus niger*



*Aspergillus flavous*



*Aspergillus terreus*



*Penicillium griseofulvum*



*Trichoderma koningii*

### **Conclusion**

As more number of fungal specimens is found in the most polluted water, these fungi are tolerant to such conditions. These fungi can be studied further for their mycoremediation capacity.

### **Acknowledgement**

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