

**ANALYSIS OF PHYSICO- CHEMICAL FACTOR AND FUNGAL POPULATION IN MAHAMAHAM TANK AT KUMBAKONAM**

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**ABSTRACT**

Water quality of aquatic ecosystem has been deteriorated due to industrial and domestic wastes. The aquatic ecosystem as a greater part of the natural environment is also faced with the threat of a shrinking genetic base and biodiversity due to discharge of effluents from industries. The persistence of toxic chemicals in aquatic environment becomes dangerous for the survival of fish and their food organisms. The quality of any water body is governed by its physico chemical factors. The monitoring of physico chemical characteristics of a water body is vital for both long and short evaluation of its quality. Microbiological analysis for fungi in water samples collected from fish ponds in Kumbakonam was carried out. The fungal genera isolated from the ponds were *Aspergillus nigar*, *Aspergillus flavus*, *Aspergillus*

*fumigata*, *Tinea urguium*, *Fusarium*, *Rhizopus* species. The study revealed that the ponds were grossly contaminated with fungal organisms which poses a risk to human health thus of significant public health concern.

**KEYWORDS:** Fish ponds, fungal isolates, Physico-chemical Properties.

**I. INTRODUCTION**

Human civilization originating and revolving around rivers, ponds, lakes, wells and water bodies. Indeed human, animal and plant life is dependent on aquatic system for various purposes. Life in water is influenced either directly or indirectly or both by physical, chemical and biological factors. Freshwater habitats are one of the more common and stable habitats of the biosphere. They have their own physical and chemical characteristics and host

a large community which has adapted to this dynamic environment, involving close interaction between organisms and the physical and chemical conditions prevailing within the system. It has a well defined food chain and food web through which energy is channeled, and the community develops through discrete succession stages.

## **MICROBIOLOGY**

Microorganisms are relevant to all of us in a multitude of ways. Sometimes the influence of microorganisms in human life is beneficial where as at other times it is harmful. Fungi and bacteria plays an important role in the recycling of organic and inorganic material through their role in the maintenance of the stability of the biosphere. Microorganism get into natural water from air, soil, sewage, organic wastes, dead plants and animals. Almost all type of microorganisms found in water. Natural water contain sufficient nutrient which support growth of various microorganisms. Many other organisms are present in water in substantial numbers and play an important roles in pond water.

### **Fungi**

Fungi are filamentous, non-photosynthetic, eukaryotic microorganisms that have a heterotropic nutrition. The basic cellular unit is described as a hypha. The gross appearance of many multicellular fungi is familiar to each and every one of us. The hypha wall consist of microfiboil composed of hemicelluloses or chitin; true cellulose occurs only in the walls of lower fungi, fungi lack chlorophyll and like animals are unable to manufacture their own food with the help of carbon dioxide and water. Saprophytes depends on deep organic matter whereas parasites live on or in the living bodies of other organisms.

In the present study the water quality parameters of Mahamaham tank of kumbakonam town, Tamil Nadu, India has been carried out. The study also deals with the pathogenic fungal analysis of the same pond during Mahamaham festival.

## **II. MATERIALS AND METHODS**

### **Study Area**

The present study was carried out in the Mahamaham tank of kumbakonam in Thanjavur district. The study area is 1km distance easily approachable from kumbakonam Bus stand. The sample was collected on 6<sup>th</sup> March 2004 at the time of Mahamaham festival. The present work was aimed to analyse water quality parameters by<sup>[1]</sup> and isolate and identify the fungal population in Mahamaham tank water.

### Sample Collection for Microbiological Study

Water sample was collected in plastic canes from the Mahamaham tank in kumbakonam at Thanjavur district. The microbes (fungi) were isolated and identified from Mahamaham tank water, for that the water sample was immediately brought to the laboratory. The PDA medium was used for the culture of fungi.

### Serial dilution of the sample

One ml of the original sample mixed with a known volume of sterile water which contains a microbial mixture and 9 ml of sterile water is added to it, it will give 1:10 or  $10^{-1}$  dilution of the original sample. The original sample has been diluted to 1/10-1. Similarly prepare 1:100 ( $10^{-2}$ ), 1:1000 ( $10^{-3}$ ), 1:10000 ( $10^{-4}$ ) and 80 on diluted the original sample.

### Isolation and Identification of Fungi

Serially diluted water samples were collected in sterilized closed container. 1 ml of the diluted water sample was spread over the petriplate containing PDA medium add with streptomycin antibiotic. Fungi grow comparatively slow rates, requiring several days to week. Fungi produce spores on brightly coloured aerial hyphae. Most fungi grow best at room temperature i.e.,  $25^{\circ}\text{C}$  rather than  $35^{\circ}\text{C}$ . The colonies growing on the plates were isolated and maintained as pure cultures. The fungal species were identified by referring standard manuals.

### Maintenance of Fungal Colonies

The fungal colonies repeatedly sub cultured to ensure visibility and maintained in PDA medium by periodical sub culturing.

### Staining of Fungi

Fungi were stained with lactophenol cotton blue stain.

## III. RESULTS AND DISCUSSION

### *Aspergillus niger*

Colonies on Czapek's agar rapidly growing with abundant submerged mycelium, in some strains with more or less yellow colour in the hyphae, aerial hyphae usually scanty produced. Reverse usually without colour, conidiophres mostly arise directly from the substratum, smooth, septate or nonseptate, varying greatly in length and diameter. Conidial heads fuscous, blackish brown, purple brown, in every shade to carbonous black, varying from

small, almost columnar mass of a few conidial chains to the more common globose or reddish heads. Phialides typically in two series, thickly covering the vesicle, primary varying greatly in length.

*Aspergillus niger* is producing in fungal infection. Particularly high concentration of spores in dust from granaries, barns and silos. Inhaled spores germinate to produce superficial. It is known as otomycois.

### *Aspergillus flavus*

Colonies are formed on potato dextrose agar spreading with floccosity limited to scanty growth of a few aerial hyphae in older areas. Conidial areas having the colour from sea-foam yellow through chartreuse yellow, citron green or lime-green to mignonette-green. Conidiophores arise separately from the substratum. Heads in every colony vary from small with a few chains of conidia to large columnar masses or both mixed in the same area; small heads with small dome like vesicles. Conidia pyriform to almost globose and colourless to yellow green.

One of the most potent of these toxins is aflatoxin, a product of *Aspergillus flavus*. Although the mold itself is relatively innocuous, the toxins are carcinogenic and hepatotoxic. In human, it appears to be a cofactor in liver cancer, toxic fungi are growing source of environmental acquired illness associated with contaminated buildings. Starchy botrys spores and toxin inhaled from air are known cause of serious neurologic disease.

Aflatoxin-Acronym for *Aspergillus flavus* toxin.

### *Aspergillus fumigatus*

Colonies are formed on potato dextrose agar, some strains are strictly velvety with varying amounts to tufted aerial mycelium. Reverse and substratum, colourless to yellow. Conidiophores short, usually densely crowded. Branches are formed from aerial hyphae, with apical flask shaped vesicles upto 20-30  $\mu$  in diameter.

*Aspergillus fumigatus* is a fungal infection caused by the spores of *Aspergillus* species. It is widespread in dust, air and water. Inhaled spores germinate in the lung to form localized "fungus balls" susceptible hosts can develop systemic infections that have average poor prognosis. It is affected in the lower RT, lungs from human body.

*Fusarium* species of a common soil inhabitant and plant pathogen, occasionally infect eyes, toe nails and burned skin. Mechanical introduction of the fungus into the eye (for example, by contaminated contact lenses) can induce a severe mycotic ulcer. It can be also cause a patchy infection of the nail bed somewhat like *Tinea urguium*. *Fusarium* colonization of patients with widespread burns has occasionally led to mortalities.

#### ***Rhizopus* sp.**

Mycelium of two kinds, one submerged in the substratum and the other aerial, constituting the arching filaments or stolens. The sporangia, white at first, become bluish-black at maturity. Columnar broadly subjacent, hemispherical, forming after dehiscence, by collapse, an organ of the shape of the pileus of a mushroom. Spores round or oval, angular, colourless, or coloured bluish or brown, with a cuticularised wall, smooth or striate, rarely spinulose zygotes naked, formed in the substratum and on the stolens. Suspensors straight, very large and swollen, without appendages.

*Rhizopus* produce the infection known as mucormycosis. It is caused by saprobic fungi that colonize debilitated hosts with acidosis, mucormycosis invades through several port of entry and progress rapidly to a systemic infection not treated early.

In the present study air temperature was recorded as 32<sup>0</sup>C and the water temperature was recorded as 28<sup>0</sup>C. The present studies agree with the previous work by.<sup>[2]</sup> Hydrogen ion concentration or pH is another important hydrobiological factor which influences the growth and metabolism of aquatic organism. pH 8.0 was observed in the present study. It is agree with the previous work done by.<sup>[3]</sup> In the present work dissolved oxygen was recorded as 4.4913 ml/l. It is slightly deviating from the previous work done by.<sup>[4]</sup>

Large amount of carbon-di-oxide is present in the form of bicarbonates and carbonates. These sources of carbon-di-oxide are called as combined, fixed or bound carbon-dioxide. In the present study CO<sub>2</sub> was observed as 0.0008 ppm. The present study agree with the work done by.<sup>[5]</sup> In the present study salinity was recorded as 0.4907 ppt. The present study agree with the previous work done by.<sup>[6]</sup>

The presence of calcium in the system reflected the alkali strategy of the ecosystem. In the present study, it has been observed as 30 mg/l. The present studies agree with the work done by.<sup>[7]</sup> In aquatic system phosphorous enters into a complex cycle involving physic-chemical

and biological processes. In the present study phosphate was recorded as 0.064mg/l, the present study agrees with the work done by.<sup>[8]</sup> In the present study total suspended solid and total dissolved solid was recorded as 0.0051 mg/l and 0.066 mg/l. The present studies agree with the previous work done by.<sup>[9]</sup>

### Microbiological Study

Microorganisms are living all things. It is mostly living place of the water system. In the present work was isolate and identify the fungal population in Mahamaham tank water. The identified species of fungi are *Rhizopus* sp., *Aspergillus niger*, *Aspergillus flavus*, *Aspergillus fumigatus* and *Fusarium* sp. The dominant species of the water sample was *Aspergillus* sp. In the present study was microbial population and agree with the previous studies by many workers.<sup>[10][11][12]</sup>

The sources rarely contain pathogen capable of producing human diseases when swallowed with water, waste containing human excreta, however is the most dangerous material the pollutes water. People with communicable diseases of many kinds eliminate the causative organisms in their excreta. The most important common microbial diseases transmitted through water are typhoid fever, paratyphoid fever, amoebic dysentery, bacillary dysentery, cholera, tularemia poliomyelitis and infectious hepatitis.

### IV: Tables

**Table 1: The list of physico-chemical parameter in Mahamaham tank water (Kumbakonam).**

S.No	Parameters	Value
1.	Air temperature	32
2.	Water temperature	28
3.	pH	8.0
4.	Dissolved oxygen(ml/l)	4.4913
5.	Dissolved carbon-di-oxide(ppm)	0.0008
6.	Salinity (ppt)	0.4907
7.	Carbonate(g/l)	0.12
8.	Bicarbonate (g/l)	0.3965
9.	Calcium (mg/l)	30
10.	Phosphate(mg/l)	0.064
11.	Total suspended solid (mg/l)	0.0051
12.	Total dissolved solid(mg/l)	0.066

**Table 2: The list of fungal flora in Mahamaham tank water (Kumbakonam).**

S.NO	Name of the fungal species
1.	<i>Aspergillus species</i>
2.	<i>Aspergillus flavus</i>
3.	<i>Aspergillus fumigates</i>
4.	<i>Fusarium</i> sp.
5.	<i>Rhizopus</i> sp.

## V. CONCLUSION

The isolation and identification of the fungal flora as *Aspergillus niger*, *Aspergillus flavus*, *Aspergillus fumigatus*, *Fusarium* sp., *Rhizopus* sp. Were recorded. The presence of *Aspergillus niger* and *Aspergillus fumigatus* indicates the medium was contaminated due to mass bathing of public people consume it as holy water should be avoided to prevent the disease infection from the pathogenic fungus.

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