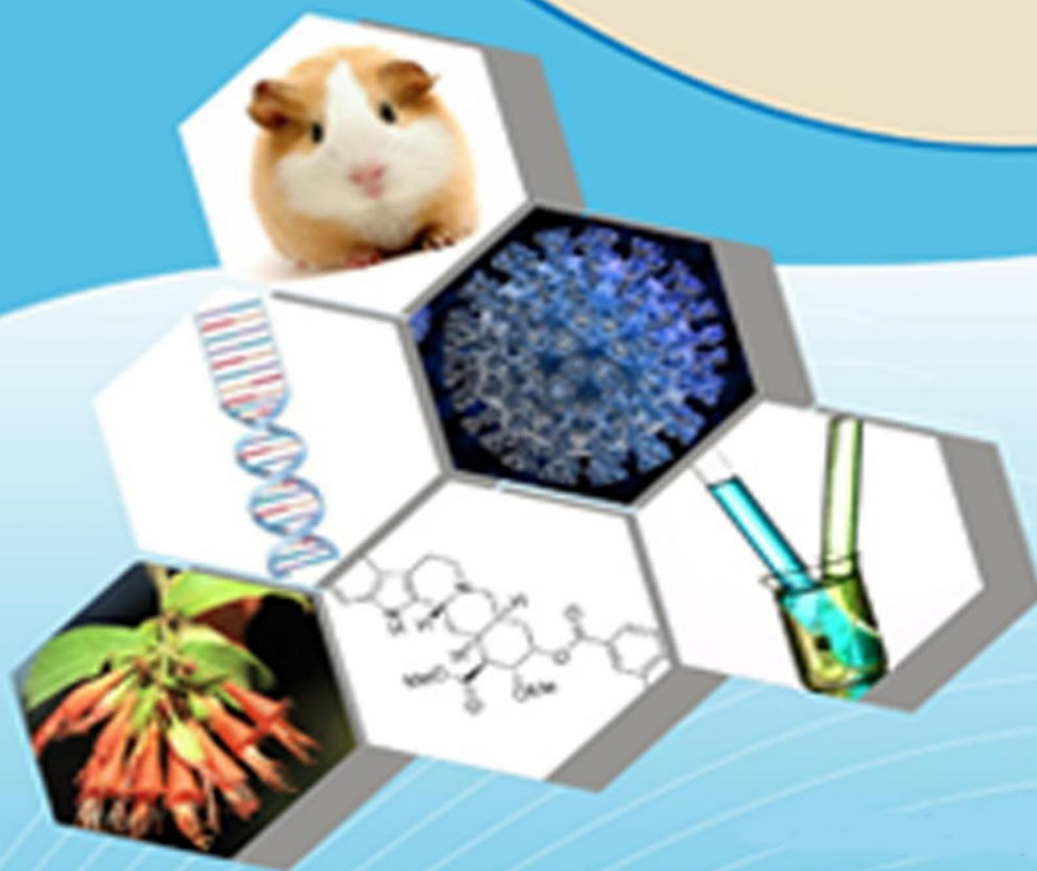




ISSN : 2347-2251
**Indo-American Journal of
Pharma and Bio Sciences**



www.iajpb.com

iajpb.editor@gmail.com
editor@iajpb.com



Research on the flora and fauna of the riverine drinking water

V. Rakshitha¹, A. Meghana²

1 Department of Botany and Research Centre, Scott Christian College (Autonomous), Nagercoil-629 003, Tamilnadu, India.

2 Department of Biomedical Engineering, Noorul Islam Centre for higher Education, Kumaracoil, India

Received on: 21 Oct 2024 Revised on: 20 Nov 2024 Accepted Date: 25 Dec 2024

Published on: 18 Feb 2025

ABSTRACT

In order to evaluate the water quality, the current research looked at the effects on the variety of aquatic fungus. In September 2012, the water quality of the Tamiraparani River was tested at the Kuzhithurai research stations for the variety of aquatic fungi. The research included the isolation and identification of twelve different species of aquatic fungi, including those of the genera *Aspergillus*, *Fusarium*, and *Penicillium*. *Sporothrix* sp. and *Phialophora* sp. had the lowest proportion of fungal species found, while *Aspergillus* sp. had the most. The current study found that there is a discrepancy in the distribution and occurrence rates of aquatic fungus in the Tamiraparani River.

Fungi, water for human consumption, *Aspergillus* species,



INTRODUCTION

Fungi are a diverse category of eukaryotic creatures that may take many forms in nature, including filamentous and multicellular molds and unicellular yeast. Of the over 70,000 fungal species found within these groupings, only under 5% are known to cause human illness; however, they account for over 90% of all fungal infections. Fungal infections may manifest in a variety of ways, including toxin generation, host invasion, and allergic reactions to fungal antigens (McGinnis, 1996). For a long time, epidemiologists and engineers have studied secondary pollution in water distribution systems. The taste and smell of the water are negatively impacted as a result of the proliferation of bacteria, actinomycetes, cyanobacteria, fungus, and protozoa in the distribution system (Grabińska et al., 2007). Soil fungal ecology has grown in prominence, but aquatic fungal ecology has lagged behind. In recent years, researchers have made significant strides in understanding the qualitative makeup of water-borne fungus populations. The physicochemical characteristics of an aquatic environment determine the abundance of heterotrophic organisms in its natural water. According to Prasad Dei et al. (2009), freshwater has a diverse array of aquatic fungus, including chytridiomycetes, Saprolegniales, and Peronosporales. Servais et al. (1992) found that bacteria, fungus, and yeast, which are saprophytic heterotrophic microorganisms, colonize systems that provide fresh water by feeding on biodegradable organic waste. A wide variety of trash, including many organic substances, ends up in bodies of fresh water. River water contains naturally occurring microorganisms, such as bacteria and fungus, which readily break down these organic pollutants. According to Chauvet and Dobson (1999), aquatic fungi are crucial to the breakdown of aquatic leaf litter. Hunter (1975) investigated the water molds in the River Great Use and its tributaries to determine their function in waste degradation. Aside from being a major source of pollution, the accumulation of different types of trash in water bodies also kills aquatic fungus, which play an important role in

biodegradation.

methodology (Prasad Dei et al., 2009). Fungi may infect healthy hosts and cause a variety of illnesses, from mucosal infections to potentially fatal disseminated infections (van Burik and Magee, 2001). A number of investigations have found penicillium species in water samples. Mycotoxins may be produced by many species of *Aspergillus* and *Penicillium* on several different substrates, including food and drink (Moreau 1979; Pitt & Hocking, 1999). Water polluted with microbes such *Aspergillus fumigatus*, *Mucor*, *Absidia*, *Candida*, coliform bacteria, and others was found to be the source of the outbreak, according to the following research. There has been a lot of research on the relationship between indoor fungal species including *Aspergillus*, *Penicillium*, and *Cladosporium* and respiratory issues like asthma and allergies (Denning et al., 2006; Straus 2004). Because the agents cause fungal infections are eukaryotic, like human cells, they are notoriously difficult to cure. Their relevance and prevalence in aquatic habitats have received little research despite their prevalence (Souza et al., 2003). Coker (1923), Dick (1990), Johnson (1956), Scott (1961), Middleton (1943), Seymour (1970), and Robertson (1980) are only a few of the researchers from throughout the globe who have studied aquatic fungus. Referenced by Prasad Dei et al., (2009), the following researchers from India have studied aquatic fungi: Bhargava (1946), Dayal (1968), Khulbe (1977), Mer et al. (1980), Mishra and Dwivedi (1987), Manoharachary (1991), Sati (1997), and Paliwal and Sati (2009). Species diversity and the number of heterotrophic fungal populations in fresh water systems were the foci of this investigation.

MATERIALS AND METHODS

Water samples

The water samples were collected in Tamiraparani River in Kanyakumari District, Tamil Nadu. A riverside water samples were



collected for this study. It was collected in the month of September, 2012. All the samples free from soil/plant debris were collected in sterile containers and transferred immediately into laboratories for further analysis.

Enumeration of total fungal count

A volume of 100 ml of the each sample was passed through a sterile 0.45-micrometer filters using a filtration apparatus under a laminar airflow chamber. Using sterile forceps, the filters were placed directly on malt extract agar (containing 4 mg gentamycin and 10 mg chloramphenicol in 100 ml of medium) and incubated at 25-28°C for 3 to 7 days. After 7 days of growth, the numbers of the colony-forming units (CFU) per 100 ml of samples were assessed (Hedayati *et al.*, 2011).

Identification of fungal colonies

The fungi occurred in water samples were identified by standard mycological techniques based upon gross cultural (macroscopic) and microscopic characteristics (Hedayati *et al.*, 2011). Fungi that could not be identified by this manner were subcultured on potato dextrose

agar, water agar and slide cultures for further identification study.

RESULTS AND DISCUSSION

Enumeration of total fungal count

In this study 10 samples in each four seasons for two years was analysed. Entire samples were preliminarily tested for their total heterotrophic fungal colonies. The total number fungal count per sample was mentioned Table 1. The objective of this study was to determine the frequency and densities of filamentous fungi in water. The prevalence of fungi was investigated in parallel with the standard indicator microorganisms in drinking water samples from riverwater used for drinking purpose in residences and workplaces.

Identification of fungal colonies

Based on the standard mycological techniques such as cultural, morphology and staining techniques the fungal colonies were identified.

Table 1
Showing list of identified fungus

SL. No.	Fungal Name	No. of colonies
1	<i>Aspergillus sp.</i> ,	14
2	<i>Trichoderma viride</i>	3
3	<i>Cladosporium sp.</i> ,	2
4	<i>Fusarium sp.</i> ,	14
5	<i>Geotrichum sp.</i>	4
6	<i>Mucor sp.</i>	9
7	<i>Rhizopus sp.</i> ,	7
8	<i>Penicillium sp.</i> ,	12
9	<i>Alternaria sp.</i>	4
10	<i>Beauveria sp.</i>	2
11	<i>Sporothrix sp.</i> ,	1
12	<i>Phialophora sp.</i> ,	1

Studies on the mycoflora of water distribution systems have focused on the determination of the density and the type of microscopic fungi in the water phase and biofilm in water distribution systems, while their occurrence in other possible habitats of these organisms, i.e. the biomass "suspended" in the water phase and sediments

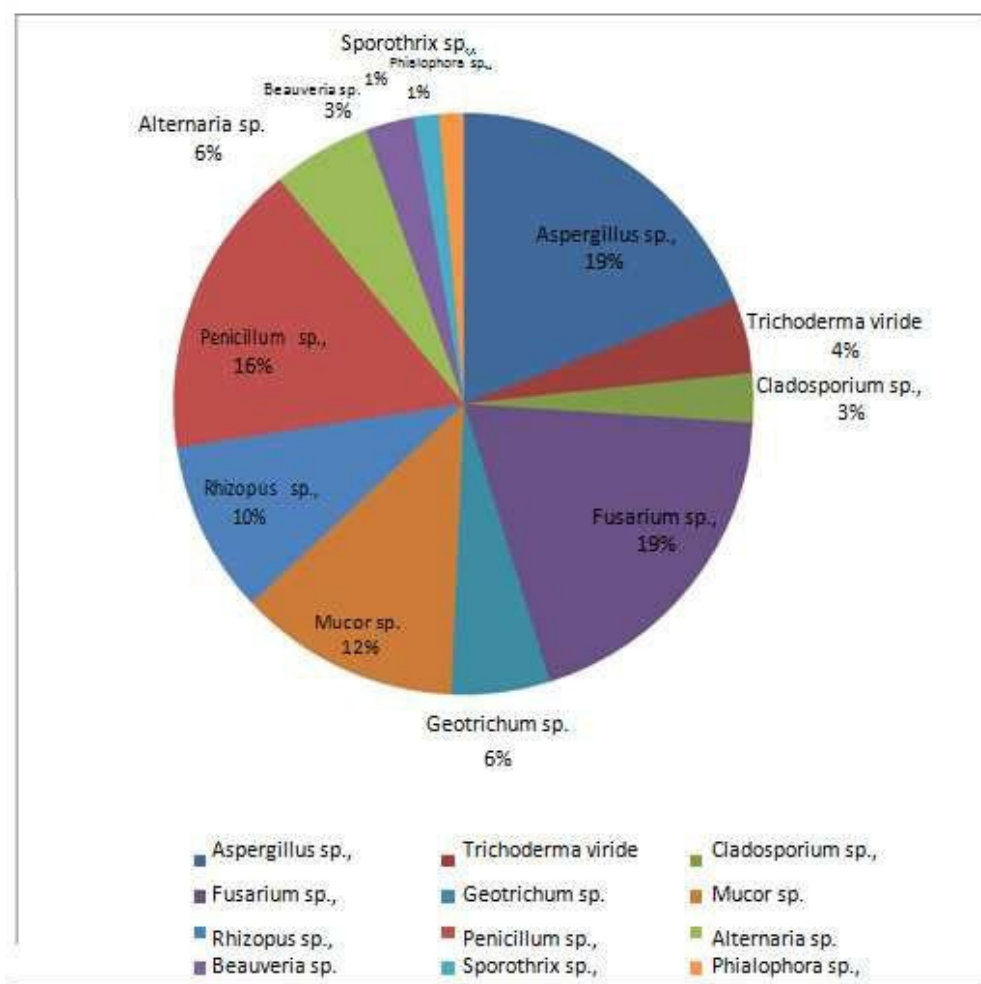
on the inner surface of water distribution pipes, has not been examined. *Aspergillus sps.* *penicillium sps.*, *Fusarium sp*, were dominant mould species in this basin; *Cladosporium sps.*, and *Geotrichum candidum* are species pathogenic or opportunistic pathogenic to humans in this group the significance of fungi in



drinking water has scarcely been evaluated. Two contradicting aspects are of importance when

considering fungal water studies with respect to the community.

Chart . 1
Percentage chart on Fungi diversity



Beauveria sp. Only a few number of species, including *Phialophora* and *Beauveria*, are found in river water. People have a right to know what's in the water they drink every day, and we must disclose critical scientific findings. It is prudent to take precautions for people at high risk, considering what is known from research on fungus water and the lack of epidemiological data about health effects. There needs to be further research on other potential health effects on the general public. Fungi may be notoriously difficult to identify to the species level, and sometimes it takes

a

multi-stage strategy that incorporates morphology, molecular biology, and metabolite analysis. Fungi in water studies may benefit from emerging molecular and spectral techniques in the future. While there is currently conflicting evidence on the potential health effects of water-borne fungus, the removal of these organisms is now part of the preventive advice and procedures taken with high-risk patients. Fungus testing of water systems, particularly those serving healthcare facilities, may become standard practice in the near future. More research is needed to determine the impacts of water treatment on fungus in water and to develop precise methodology, however adequate water treatment might be a solution.



In addition, the water suppliers need to be informed about the different aspects of fungi in water. Epidemiological studies should also be conducted to determine the health significance of fungal-contaminated drinking water. Until knowledge about the significance of

fungi in water is obtained, controversy will most certainly remain. In the meantime, we should be concerned about fungi in drinking water for the same reasons as for air-borne fungi, because increased levels may reduce the quality of drinking water, and constitute a potential health risk.

REFERENCES

1. Bhargava K S. Physiological studies on some membrane of the family Saprolegniaceae. V. Growth Substances Lioydia.; 9: 13-23(1946).
2. Gessner M.O., Chauvet E. & Dobson M. A perspective on leaf litter breakdown in streams. Oikos.; 85, 377-384 (1999).
3. Coker W C. The Saprolegniaceae with notes on other water molds. Univ. of North Carolina, Carolina press Chapel Hill, North Carolina, USA; 201 (1923).
4. Dayal R, Tandon R N. Ecological studies of some aquatic Phycomycetes. Hydrobiologia; 20: 121-127 (1962).
5. Denning DW, O'Driscoll BR, Hogaboam CM, Bowyer P, Niven RM. The link between fungi and severe asthma: a summary of the evidence. European Respiratory Journal . 27: 615-626 (2006).
6. Dick M W. Key to *Pythium*. Dept. of Botany, Univ. of Reading, U.K. :64 (1990).
7. Grabinska-Loniewska, A., Konillowicz-Kowalska, T., Wardzynska, G. and Boryn, K. Occurrence of fungi in water distribution system. Polish Journal of Environmental Studies, 16 (4): 539-547(2007).
8. Hunter, R.E. Water molds of the great river Ouse and its tributaries. Trans. British Journal of Mycological Society.; 65: 101-108 (1975).
9. Johnson, T W. The genus *Achlya*; morphology and taxonomy. Univ. of Michigan Press, Ann. Arbor.: 180 (1956).
10. Khulbe R D. Taxonomic and Ecological studies of water molds in Nainital and its suburbs. Ph.D.Thesis, Agra Univ., Agra.: 113 (1977).
11. McGinnis, M. R. Micology. In: Baron, S. (Ed.). *Medical Microbiology*. 4th ed. Texas: Galveston(1996).
12. Mer G S, Sati S C, Khulbe R D. Occurrence, distribution and seasonal periodicity of some aquatic fungi of Sat Tal (Naini Tal), India. Hydrobiol.; 76: 200-205 (1980).
13. Middleton J T. The taxonomy, host range and geographical distribution of the genus *Pythium*. Mem. Torrey Bot. Club. Mem.; 20: 1-171(1943).
14. Mishra R C, Dwivedi R S. Aquatic molds from Gujar lake, Jaunpur- II. J. Ind. Bot. (1979).
15. Pitt JI, Hocking AD,. Fungi and Food Spoilage, 2nd edn. Aspen Publishers, Gaithersburg, MD (1999).
16. Prasad Devi, Rajanaika, Joy Hoskeri and Venkatarangaiah Krishna., Diversity of Aquatic Fungi in Relation to Environmental Conditions in Tunga River (South India). Researcher. Vol.1(6); 54-62 (2009).
17. Robertson GI. The genus *Pythium* in New Zealand. New Zealand J. of Botany.; 18: 73-102 (1980).
18. Scott W W. A monograph of the genus *Aphanomyces*. Vir. Agr. Exp. Sta. Tech. Bull.; 115: 95 (1961).
19. Servais, P.; Billen, G.; Laurent, P.; Lévi, Y. and Randon, G. (), Studies of BDOC and bacterial dynamics in the drinking water distribution systems of the Northern Parisian suburbs. *Revue des Sciences de l'Eau*. 5, 69-89 (1992).
20. Seymour R L. The genus *Saprolegnia*. Nova Hedwigia. Z. Kryptogamemkd; 19: 1-



- 124 (1970).
21. Souza, A. D. G. and Tundisi, J. G. Water quality in watershed of Jaboatão River (Pernambuco, Brazil): a case study. *Brazilian Archives of Biology and Technology*, 46, 711-721 (2003).
 22. Straus DC. Sick building syndrome. *Advances in Applied Microbiology* 55: 3–473 (2004).
 23. Van Burik, J. A. and Magee, P. T. Aspects of fungal pathogenesis en humans. *Ann. Rev. Microbiol.*, 55, 743-772 (2001).