

## **MICROBIOLOGICAL ANALYSIS OF MANASBAL LAKE WITH REFERENCE TO FUNGAL COMMUNITY**

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### **ABSTRACT**

The present investigation on Manasbal lake was undertaken during May –December 2008 and deals with aquatic mycological study. The main objective of this study was to know the status of Manasbal lake regarding its pollution and relationship of aquatic fungi with that of organic loading of Lake. Various fungal colonies isolated and identified proved to be the indicator of pollution and these were found dominant at Qazibagh site revealing that this site is more polluted than central site.

**Keywords :** Manasbal lake, fungal flora and pollution.

### **INTRODUCTION**

The valley lakes, indispensable aquatic ecosystem are enveloped on all sides by Himalayan Mountains. They are irreplaceable natural water bodies aboding a rich and diverse gene pool. The presence of saprotrophic fungi in water bodies indicates the abundance of organic matter Khulbe and Durgapal, (1992); Harvey, (1952). Some saprotrophs are pathogenic causing diseases among humans. Cooke and Pipes, (1970); Nardndra Babu and Manoharacharya (1992 ) while most of them are harmless and cause mineralisation of dead organic matter and release the nutrients for reuse in the material cycle of the system Cooke

and Kenneth (1997); Pandey (1996) Physico-chemical factors of ecosystem play an important role in the growth, multiplication, distribution and seasonal periodicity of water Cooke (1960); Park (1972). The studies conducted on Kashmir lakes mostly pertain to Physico-Chemical and biological parameters, but at the same time little attention has been paid to study fungal flora of various lakes including Manasbal lake. The present study on aquatic flora of Manasbal lake is an attempt in this direction.

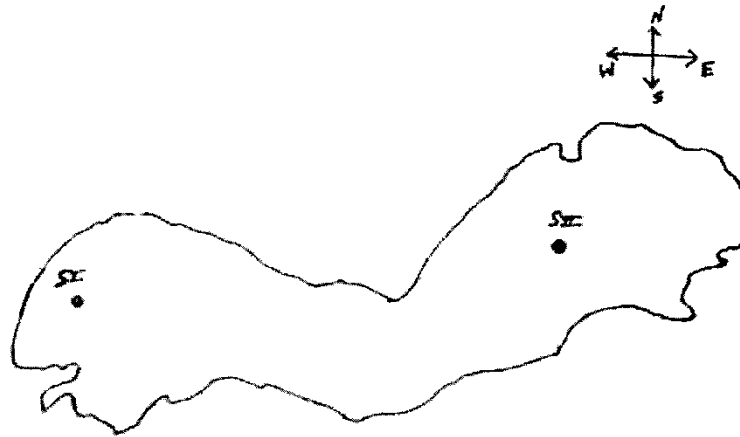
### **STUDY AREA**

The present work deals with fungal community of Manasbal lake. It is situated 30 kms from Srinagar city at an altitude of 1,583m a.b.s.l. surrounded by three villages, Kondabal, Jarokbal and Gratbal overlooking the lake.

Manasbal is considered as the supreme gem of all lakes and water supply is maintained through spring. In the present study two sites are taken:-

1. Qazibagh: It has high tourism impact and the average depth is 3.6mt. Water is comparatively clear but there is an abundance growth of macrophytic vegetation.

2. Central Site: It has maximum depth of 12.5mt. Water is clear with almost no suspended solids.



Site I Qazibagh site

Site II Centre site

Fig 1: Map of Manasbal lake showing study sites

#### MATERIAL AND METHODS

Samples of water from sites under consideration were collected in suitable plastic bottles, which were previously carefully cleaned. During collection of samples extreme care was exercised to avoid contamination of the parts of bottle. The collected samples were immediately processed for fungal analysis. All the glassware used in cultivation of microorganisms were properly washed and sterilised in hot air oven at a temperature of 80°C for 3-4 hours. Nutrient medium selected for culturing the fungi present in the water

samples was Rose-Bengal Agar medium (Singh *et al.*, 1999). The medium was dispensed into flasks (250 ml) which were tightly plugged with non-absorbent cotton. These medium laden flasks were subjected to sterilization by autoclaving at 15 lb pressure and at a temperature of 121°C for 15-30 minutes. Before performing the inoculation, the UV lamp of inoculation chamber was kept on for half an hour which was followed by putting the motor of flow on to remove all the ozone generated by UV radiations. The floor of laminar flow was properly cleaned with 95% ethyl alcohol before

dispensing the medium in petriplates and performing inoculations. The most frequent method for measurement of microbial populations is the Plate count method which measures the number of viable cells. Pour plate technique Koch (1912) using serial dilution was followed for counting the number of colonies per ml of water sample.

The inoculated petriplates were incubated at a temperature of  $25 \pm 3^\circ\text{C}$  in an incubator, in an inverted position. After seven days colony count and its morphology was studied with unaided eye as per the key given by Johnson and Case (1995). Pure cultures were obtained by platinum loop through streaking technique APHA (1998) under laminar flow. Identification of colonies was made under the microscope on the basis of conidiophores, sporangiophores, mycelia, pigmentation, spore structure etc using lactophenol and cotton blue stains.

#### RESULTS AND DISCUSSION

The data was recorded from each site on monthly basis from May-Dec 2008 (Fig1). Colonies were counted and their morphology was studied on the basis of key given by Johnson and Case (1995). The number of colonies per ml of inoculum was calculated by dilution technique. The present investigation reveals that water in Manasbal lake is polluted. Large number of Fungi suggest excessive organic load, while a highly diversified

mycobiota indicates populations adjusted to the organics Awasthi and Khare (1990)s; Cooke (1960); Khulbe and Durgapal (1992).

The occurrence of fungi was maximum in the month of July and minimum in December. (Fig 1). This may possibly be due to more feasible temperature and increase in organic matter as Khulbe and Durgapal (1992) has reported in Nainital lake. It appeared from the observation of colony morphology, that most of colonies were circular, entire and convex in appearance, margin and elevation respectively, however, few colonies appeared as irregular, filamentous and raised.

After identification (Fig-2) various isolated species like *Aspergillus* spp, *Penicillium* spp, *Rhizopus* spp, *Fusarium* spp, *Cladosporium* spp and *Verticillium* spp were found and number of these species varied with season. *Rhizopus* spp was found low in number in autumn and summer and totally absent in winter. *Penicillium* spp was found maximum in summer and autumn at Qazibagh site. The species of genus *Penicillium* and *Aspergillus* isolated are usually found in polluted lake waters and act as cellulose decomposers Kellerman and Mc Beth (1912). The frequent isolation of *Penicillium*, *Cladosporium*, *Fusarium* and many other fungi are because of their constant activity and their adaptability to their semi aquatic habitats. Further these genera

also have been reported frequently from drain waters with maximum density during higher pollution Khulbe and Durgapal (1994). The fungal population show variations with various chemical parameters such as density of fungi increases with increase in conductivity, dissolved oxygen in higher concentration decreased the fungal population and vice versa and higher concentration of sulphates and nitrates shows low fungal populations and vice versa (Baradshaw *et al.*, 1973; Khulbe and Durgapal, 1981; Misra 1983).

The species of genus *Rhizopus* were usually found in very small numbers especially in summer and autumn, thus giving an indication of exhibiting narrow ecological amplitude and don't tolerate the conditions of pollutions as also opined by Khulbe and Durgapal (1992). Our observation for *Aspergillus* group were as shown by Khulbe and Durgapal (1992) that some species of *Aspergillus* thrive well with in temperature range of 15-23°C.

The observations reflect that the site near Qazibagh harbours the species of fungi which are typically found in polluted lake and drain waters. The water resources of Kashmir both lentic as well lotic have been facing tremendous threat from various types of pollutions. The maximum species found at study sites are not found in pure water. The need of hour is thus to

make the water resources pollution free through strict administration, law, proper scientific methods, regular public awareness, monitoring and coordination among government and NGO's.

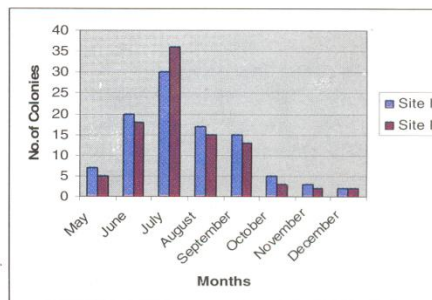


Fig 1: Assessment in Density of Fungal Populations in different months (2008).

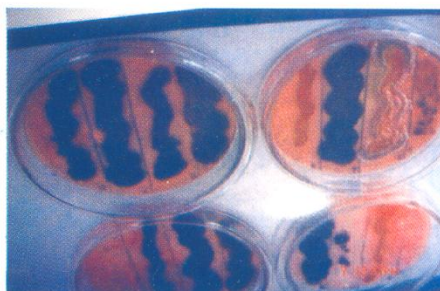


Fig2: Isolated Colonies of Fungal Strains from Manasbal lake

#### ACKNOWLEDGEMENT

The authors are highly thankful to the Head, Department of Environmental science S. P College, Srinagar for providing the necessary laboratory facilities to carry out this study.

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