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A Preliminary Study of Fungal Flora of River Jhelum, Kashmir

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ABSTRACT

The present study on River Jhelum was undertaken during 2002-03 on seasonal basis. Two sites chosen were Batwara and Qamarwari from where water samples were drawn. Dilution plating technique was followed using Rose Bengal Agar medium. Fungal colonies isolated and identified proved to be the indicator of pollution and these were found dominant at Qamarwari site revealing that this site is more polluted than Batwara site due to the population pressure of Srinagar city.

Keywords : Fungal flora, river Jhelum, pollution.

INTRODUCTION

The Jammu & Kashmir State has been a tourist paradise from times immemorial because of its salubrious climate, typical flora and fauna and the beauty of its natural landscape which must be preserved at all costs against the onslaught of growing urbanization and development. River Jhelum, which flows through the heart of Srinagar City, is extremely important for the people of J&K as it is used for navigation, irrigation and for industrial purposes. Furthermore, its water is used for drinking purposes by house boat dwellers and by people living in villages situated on the banks of the rivers. Nowadays the river is being increasingly used for dumping of the wastes and discharge of raw household sewage. In short, we can say that the river has become a 'waste paper basket' for municipal garbage and domestic sewage (Raina, 1985). Till date, no study on fungal flora of this water body has been carried out. Keeping in view the importance and usefulness of River Jhelum, it was thought necessary to conduct preliminary studies on the aquatic fungal flora of the river in order to assess the pollution levels of its flowing water. The study is first of its kind in the valley.

AREA OF STUDY

Two sites of River Jhelum were chosen i.e. Batwara and Qamarwari.(Fig. 1)

Batwara:- This is at the initial point of River Jhelum in the city. So, the water

here is expected to be less polluted. This is lying on the southward of Srinagar city and is about 5 Kms from the centre of Lal Chowk. There is little inhabitation around the site. The water flow is comparatively smooth. The sampling site is situated about ½ km upstream from the Batwara bus stand.

Qamarwari:- It is the exit point of River Jhelum in the city. It is about 8 Kms away from the centre of Lal Chowk. This is lying on the north side of the Srinagar City. There exists a highly populated human inhabitation around the site. Houseboats are also located there. The water flow is comparatively faster than at site I. This site is located near the Qamarwari bridge.

Fig 1 : Map showing two sampling sites of River Jhelum.

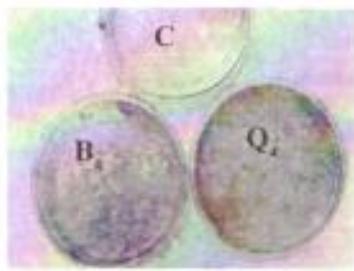
MATERIAL AND METHODS

Samples of water from Batwara and Qamarwari sites were collected in suitable bottles that were previously cleaned and dried. Samples were immediately used for culturing. All the glassware needed for the work was thoroughly cleaned by the use of lab detergent under running tap water and were later on sterilized by hot air oven at a temperature of 160°C for a period of 4–6 hours. Inoculating needles, scissors, forceps, scalpels etc were sterilized by flame sterilization method. The culture medium selected was Rose-bengal agar which is supposed to be antibacterial in action. The prepared medium was dispensed into flasks (1 litre capacity). The flasks containing medium were tightly plugged with non absorbent cotton and sterilized by autoclaving at 15 lb pressure for 25–30 minutes at a temperature of 121°C. Laminar air flow cabinet was washed with alcohol and sterilized by UV rays and its motor was allowed to run for about half an hour before use. Small aliquotes (10ml) of hot medium (40°C) was dispensed into previously sterilized petriplates under laminar flow and then 1ml of sample was mixed with the medium by the proper swirling motions of petriplates i.e. pour plate technique (Mc New, 1938). According to Van Soestbergen and Lee (1969) pour plate method is more precise than the spread plate method. At the same time serial dilutions were

made from the original samples and in each dilution pour plate technique of culturing was followed. The petriplates with solidified medium were incubated at a temperature of (25°C±3°C) in an incubator in an inverted position. After 7 days colony counting was made as per the key given by Johnson and Case, 1995. For pure cultures the fungal colonies were isolated from pertriplates by means of platinum loop and inoculated on to the medium by streaking technique. For identification of pure cultures the fungal mycelium and spores were observed under microscope after staining these with Lactophenol and Cotton blue stains on a slide.

RESULTS

The data was scored on the seasonal basis i.e. Summer, Autumn and Winter. Maximum number of fungal colonies were recorded from both the sites in the months of summer. Fig. 2 depicts fungal colonies during summer at two sites in dilution IV. Number of fungal colonies varied in different seasons at different sites and is depicted in Fig. 3. Fungal colonies started appearing after 48 hours, but the data was scored after 7 days of incubation period. The colonies were counted and recorded according to the key given by Johonson and Case,1995 which is a recent and widely accepted key for counting the parameters like shape, size, appearance, margin and elevation of colonies. The colonies identified from pure cultures recovered from two sites were *Penicillium* spp belonging to class Ascomycetes, *Brevilignia* spp. and *Saprolegnia* spp. belonging to class Oomycetes. *Brevilignia* spp. were found at Batwara site whereas *Saprolegnia* spp was found at Qamarwari. *Penicillium* spp were present at the both sites, but was in greater abundance at Qamarwari than Batwara.



Appearance of fungal colonies from dilution IV. B_4, Q_4 and C denotes Batwara, Qamarwari sites and Control respectively.

Fig. 2 : Appearance and growth of fungal colonies during summer seasob from two sites.

DISCUSSION

On the basis of identification of pure fungal colonies recovered after pour plate culturing technique it seems that the water flowing in River Jehlum is presently polluted. The data

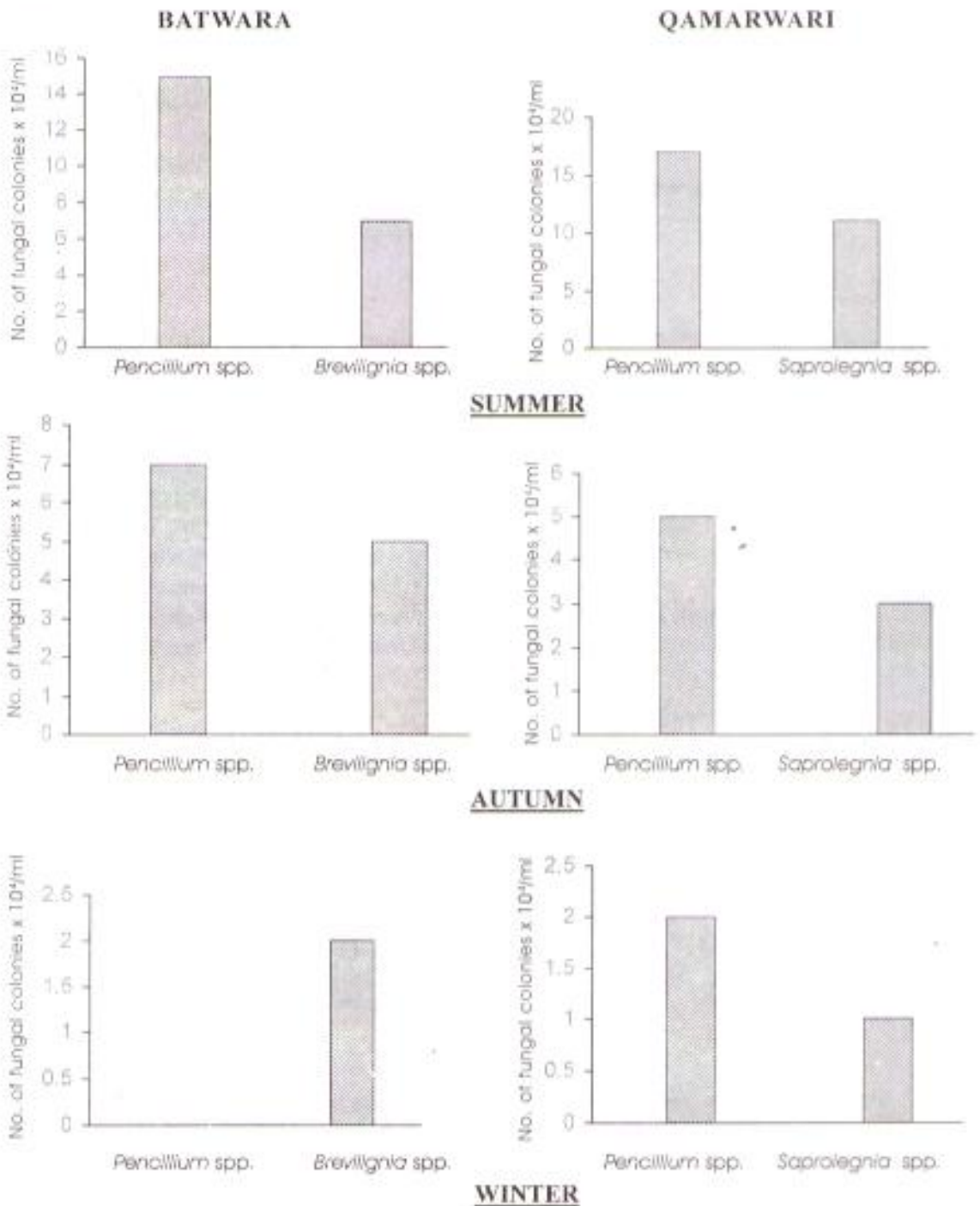


Fig. 3 : Comparative assessment of fungal colonies x 10^4 per ml in water sample from two different sites

indicates that Qamarwari site showed more pollution than Batwara due to greater abundance of *Penicillium* spp. Presence of *Saprolegnia* spp., which is indicator of highly polluted waters (Khulbe, 1980) at Qamarwari site clearly shows that water is highly polluted there. Khulbe (1980), reported that occurrence of water molds (*Saprolegnia* spp) was directly correlated with dissolved organic matter. This means that organic matter at the site of Qamarwari might have been high. On the other hand at Batwara site pollution has been found due to presence of *Penicillium* spp. and *Brevilignia* spp. According to APHA(1998), Oomycetes and Ascomyctes are indicators of polluted waters. The present findings also reveal that genera which were present at both the sites, belong to the same two classes, hence indicate pollution in this river. The Chytridiomycetes and Hypochtridiomycetes which are true aquatic fungi and indicators of pure water, were both absent in River Jhelum at considered sites. Their absence from the sites indicate that water quality of River Jehlum is not suitable for their growth and development. Further, water samples from the considered sites showed that the number of fungal colonies was highest during high temperature (summer) and was minimum during low temperature (winter). Khulbe and Durgapal (1992), in his studies on Nainatal lake reported that fungal population was maximum in August during high temperature while it was lowest in the month of January when temperature was minimum. These results confirm the present study. Our studies reveal that the water quality of river has undergone deterioration. Qamarwari site has shown indication of more pollution than Batwara site especially during summer and winter season. It is due to dumping of more domestic sewage and other wastes generated from the city, in the river. Batwara site gives less signs of pollution, compared to Qamarwari because of less human settlements in that area. The condition of River Jhelum is deteriorating day by day mainly due to the human pressure. If, this situation is not controlled, the day will not be far off when River Jhelum, our traditional heritage, will be totally extincted.

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