

ABSTRACT

The contamination of our fresh water streams by the harmful heavy metals through the disposal of effluents from the industries is one of the focal environmental issues. This has resulted in an increase in metals concentrations, more than the required threshold, leading to metal toxicity for aquatic life. Metal resistant ciliates remove metal ions from contaminated water, mainly by the process of bioaccumulation. This bioaccumulation is due to low molecular weight, metal ions chelating proteins known as metallothioneins.

Nine water samples were collected from five different localities of Lahore. These samples were inoculated in wheat grain media and kept at $27\pm 2^{\circ}\text{C}$ for 72 hours. Growth was observed after two days of inoculation. All of the samples had some algal and fungal growth. Five samples contained required ciliates. Within ciliates, *Paramecium* were observed in three samples of River Ravi (R1V1, R1V2, R2V1) and in one sample of Jallo lake (JL), *Tetrahymena* were found were found in one sample of Canal water (CW).

Pure cultures of ciliates were obtained by drop method. Five pure cultures of ciliates were cultured in wheat grain medium, bold-basal salt medium, and Neff's medium to determine their growth pattern. Cells were counted for 15 days. The organisms showed maximum growth in Neff's medium compared to the bold-basal salt and wheat grain medium.

The effect of metal ions of Pb, Cu, and Zn were studied on the growth of ciliates. There was around two fold increase in the number of cells per ml in the presence of Pb, Cu, and Zn at $2\ \mu\text{g/ml}$, $4\ \mu\text{g/ml}$, and $6\ \mu\text{g/ml}$ respectively. . However, under metal stress there was no growth seen in culture R1V1 and J.L after 9th day as compared to ordinary 15 days, while in culture R1V2 , R2V1 and CW there was no growth seen after 11th day . This demonstrates that the critical concentration of metal ions needed for inhibition of growth may have been obtained. The order of toxicity of these metals is that $\text{Pb} > \text{Cu} > \text{Zn}$, because the growth of organisms is effected even at lower concentration of Pb ions as compared to Cu and Zn metal ions.

Metal uptake by three strains of ciliates was determined in Wheat grain medium. Four sets of triplets were prepared for each metal and culture. The comparison was done among two different concentrations 156 μ M (10 μ g/ml) and 312 μ M (20 μ g/ml) of copper, 153.8 μ M (10 μ g/ml) and 307 μ M (20 μ g/ml) of Zinc and 48.3 μ M (10 μ g/ml) and 96.6 μ M (20 μ g/ml) of Pb at Day 5 when the concentration was at its peak in order to determine the metal absorbance by each strain.