

A Case Study

APPLICATION OF *LEMNA* AND *PISTIA* FOR REMOVAL OF POLLUTANT FROM SEWAGE WATER OF BALRAMPUR, INDIA

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Asian Journal of Environmental Science, Vol. 3 No. 1 : 72-74 (June, 2008)

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Accepted : March, 2008
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SUMMARY

Present paper deals with the ecofriendly low priced ecobiotechnological method for the removal of pollutant releasing from the sewage water of Balrampur city. In this regard to free floating aquatic plant usually reported in fresh wetland are some times lead the problem of eutrophication. Application of *Lemna* and *Pistia* was found suitable for the pollutant free water. The increase in biomass of *Lemna* and *Pistia* and finding the physico-chemical analysis has proved that both plants are suitable as aquatic plants for phytoremediation of sewage water by absorbing inorganic and organic pollutants.

Key words : pH, Net primary productivity, COD, Dissolve oxygen.

Sewage water treatment has become a major challenge for Balrampur city of Uttar Pradesh. This is a growing city hardly has any treatment facility, simply diverting untreated sewage water in to aquatic bodies like rivers, ponds where it causes eutrophication. This practice is making water unhygienic for use. For this reason, *Lemna* and *Pistia* are utilized for eliminating pollutants. These plants have great potential in treating sewage water and to prevent an early eutrophication of water bodies. Many effort have been made earlier to utilize aquatic plants to remove trace metals from waste water, such as Rai *et al.* (1995) and Brix and Schierup (1989).

Although *Pistia* species is the main aquatic plant for removing the pollutant but the rate of pollutant removal enhances after addition of *Lemna* species which acts as auto catalyst for this phenomenon.

MATERIALS AND METHODS

Phytoremediation of sewage water of Balrampur city was done by using *Lemna* and *Pistia*. A fresh weight of 100 g of *Lemna* and *Pistia* were grown in cemented pots of 60cm dia. and 20 cm depth containing sewage water for a period of 10 days. The treatment potential of the plant and elimination of pollutant from sewage water were assessed on monthly basis by estimating quality of sewage water before and after the treatment. The quality was determined by analyzing physico-chemical standard (APHA, AWWA, WPCF, 1998. and the Standard Methods for the examination of water and wastewater).

RESULTS AND DISCUSSION

The result of physico-chemical analysis of sewage water of Balrampur city before and after 10 days of culture of *Lemna* and *Pistia* are presented in Table 1. Temperature being an essential physical factor, playing an important role in change of many chemical parameters in culture was given the due consideration. Reduction in temperature was observed after 10 days of culture and pH value around 7.0 before culture but increased after culture. Turbidity before culture was higher during summer month in May and June. Electrical conductivity was above 900 μ mhos during the summer months from April to June.

Total alkalinity was recorded above 300mg/L as CaCO_3 during March to May and September to November. Free CO_2 value was below 105mg/L except in the month of February and March with minimum value observed 59.02 in month of August. Free CO_2 value was low in culture.

Very small change was reported in chloride content due to non-utilization by the plants. Dissolved oxygen value were increased in small quantity in sewage water after culture as *Lemna* and *Pistia* helped in oxygen transfer in water system by their roots. Chemical oxygen demand was recorded higher above 240mg/L during April to June and lower value of 98.9mg/L in August. The reduction in COD after culture was due to move availability of oxygen in water for oxidation of organic matter. The peak value of total hardness 421.0mg/L was observed in month of March. Calcium value was always above 90mg/L throughout the year. Ca being a useful nutrient absorbed by plant *Lemna* and *Pistia* for their growth and development which accounted from 90 to