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Research Article

TOXICITY EVALUATION OF LEAD IN AQUATIC MACROPHYTES

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ABSTRACT

The present study was focused on Lead (Pb) toxicity on macrophytes and biochemical parameters and profile of metal accumulation in aquatic macrophytes. The laboratory experiments were conducted for the assessment of Morphological Index Parameters (MIP), biochemical parameters and accumulation status of lead (Pb) in test plants at various concentrations, viz, 0.1, 0.5, 1.0, 1.5 and 2.0 ppm at regular interval for 12 days exposure duration. The test plants viz. *Salvinia* & *Spirodela* were used for toxicity evaluation and profile of metal accumulation (Lead-Pb) from synthetic medium. The test plants were cultured in a modified Hoagland solution supplemented with Pb(NO₃)₂. The test plants shows visible symptoms like withering of roots, chlorosis, necrosis etc. particularly at higher concentrations i.e 1.5 ppm and 2.0 ppm, lower leaves gets decayed. However, at lower concentration i.e 0.1 ppm shows normal growth. The estimation of total chlorophyll, protein and carbohydrate of test plants showed significant increased at lower concentration i.e 0.1 ppm and decreased with increase in exposure concentrations i.e 0.5 to 2.0 ppm. It reveals that the toxic effect was directly proportional to its concentrations and exposure duration. The accumulation status was maximum in following orders (*Salvinia* > *Spirodela*) at low and higher concentrations of lead at 4 & 12 days exposure duration. However, accumulation profile in the test plants was maximum at 4 days exposure irrespective of metal concentrations and gradually decreases at subsequent exposure concentrations and duration.

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INTRODUCTION

Heavy metal contamination in the water bodies is increasing at an alarming rate due to industrial and anthropogenic activities.

(1). Heavy metal pollution is a major environmental problem facing the modern world (1, 17). The danger of heavy metals is aggregated by their indefinite persistence in the environment because they cannot be destroyed biologically but are only transformed from oxidative state or organic complex to another. In addition, they are highly toxic for both aquatic flora and fauna (2). Heavy metals persisting in sediments may be slowly released into the water. Heavy metals viz, Zinc (Zn), Copper (Cu), Iron (Fe), Manganese (Mn)etc are represented as micronutrients (3) and are only toxic when taken in excess quantities, but nonessential ions like lead (Pb), Cadmium (Cd) and Nickel (Ni) inhibit various metabolic activities even in small quantities; (4, 5). The heavy metal lead (Pb) is selected as toxicant for the present study because it is used in several industries in India and are highly toxic to animals, humans and plants. Biological treatment of waste water through aquatic

microphytes and macrophytes has great potential for its purification, which were effectively accumulates heavy metals (6). Aquatic macrophytes accumulate considerable amount of toxic metals and make the environment free from the xenobiotics. Thus, they play a significant role in cleaning up of environment and make it free from toxic pollutants. The metal tolerance of plants may be attributed to different enzymes, stress proteins and phytochelatins (7). Accumulation of metal at higher concentration causes retardation of biochemical activities and also generation of -SH group containing enzymes (8).

In the present investigation *Salvinia* and *Spirodela* common aquatic floating macrophytes, are used to study the effect of different concentrations of lead on morphology, biochemical constituents and efficiency in the accumulation of lead from the experimental pond under laboratory conditions.

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