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MORPHOLOGICAL STUDY OF LEAD WITH FEW AQUATIC PLANTS

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ABSTRACT

Presence of toxic heavy metals in organisms can cause many diseases even if present in very low concentrations. Heavy metals in the atmosphere come from various sources like fertilizers, pesticides, dumping of mining waste and industrial wastes etc. Others various source of atmospheric pollution due to toxic heavy metals are transport industries, power generation and fossil fuel burning. These toxic heavy metals enter into our body through the water we drink., air we breathe and the food we eat. In this paper, the toxicity effect of metal lead has been observed morphologically on some water plants.

Key words : Lead, Toxicity, Aquatic plants.

INTRODUCTION

Heavy metals like lead, cadmium, copper, mercury, nickel etc., are the main threats to human health[1]. The positive or negative effects of these metals for human health have been studied and reviewed by a number of researchers[2-4]. The cycle of trace metal ions from environment to human is also an important part of environmental studies[5,6].

EXPERIMENTAL

Aquatic plants used were obtained from botanical gardens, Agra. *Marsilea minuta,* which is an aquatic or sub aquatic herb was used. It belongs to pteridophyta division of cryptogams sub kingdom. It has widely spreading rather slender creeping or floating rhizomes. Leaves are cercinate, single or in tufts from the nodes with floating or emergent blades. *Hydrlla verticillata* is an aquatic annual submerged herb was used. Plants in family Hudrocharetaceae contain leaves radical, fascilled, and alternate opposite with lamina undivided. *Nymphaea stellata* was used, which is a perennial water plant rooted on mud. It

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belongs to the division angiosperm of sub kingdom phanerogam. Leaves are radical with the lamina floating on the surface of water.

All the above threee aquatic plants were grown in the green house of the botanical garden in the natural environment. Buckets with the capacity of ten to fifteen litres were used. Soil from the botanical garden was used to cover up to one fifth of the bottom space in the bucket. Aquatic plants were transplanted from botanical garden into the buckets containing one fifth of the soil and nearly ten litres of water and kept in the green house. They were allowed to grow for about a week so that they get acclimatized with the growing conditions.

Solutions of lead nitrate obtained from B. D. H. India was prepared in water for different concentrations in parts per million. Precaution was taken to prevent precipitation and appearance of turbidity. These different concentrations were given to the aquatic plants growing in the buckets at normal conditions. Temperature of the green house was regularly monitored and noted. All the experiments were performed in the temperature range 20-30ºC. Observations were done at regular time intervals. Fresh water was regularly provided for each experiment.

RESULTS AND DISCUSSION

It was observed that lead nitrate when added to the buckets in which the aquatic plants were growing, leading to different final concentrations; distinct effects on the plant growth were observed. Number of days of exposure also has noticeable effects as listed in Table 1. Lower concentrations were tolerated by all the three plants, as the growth was not affected. It was observed that for lower concentrations, growth remained unaffected for more than 15 days. For higher concentrations, growth was affected adversely.

It is clear from Table 1 that lead nitrate concentration of 200 μg/mL has no effect on plants up to sixth day of giving dose. After sixth day at this concentrations, plants started to show loss of chlorophyll, appearance of spots and weakening effect on plants. Concentration of 200 μg/mL was, therefore, selected for all the exposures.

Table 1 : Morphological changes observed in plants after sixth day of supplying different concentrations of Pb^{2+} ions in the form of lead nitrate solution.

Concentration of the metal given (μg/mL)	*Marsilea minuta*	*Hydrilla verticillata*	*Nymphaea stellata*
5	Growing normal	Growing normal	Growing normal
10	Growing normal	Growing normal	Growing normal
50	Growing normal	Growing normal	Growing normal
100	Slight white deposition on petals	Growing normal	Growing normal
500	White deposits intensifies	Leaves slightly yellow	Growing normal
1000	White deposits intensifies	Leaves started loosing chlorophyll	Leaves started tilting
1500	Petals completely white and dry	Leaves became transparent	Growth retarded

Chlorosis and weakening of the plant shoot were the common morphological symptoms observed when higher concentrations were given. Treatment with lower concentrations for longer period also exhibited growth inhibitory effects. Plants died after twenty days. When lower concentrations were given *M. minuta* leaves developed brownish veins and margins became dry. *H. verticillata* showed yellow coloured leaves and in *N. stellata* brownish spots and veins develop in leaves. Plants showed inhibited growth after fifteen days.

Further study on bioaccumulation of lead by aquatic plants is in progess.

REFERENCES

1. S. N. Luoma, Total Environ., **28**, 1 (1983).
2. U. Forstner and G. T. W. Willian, Spring Verlag, Berlin (1983).
3. L. Jarup, Br. Med. Bull., **68**, 167 (2003).
4. K. A. Momani, Instrum. Sci. Technol., **34**, 587 (2006).
5. K. Syamasundar, M. A. Chari and D. Shobha, Indian J. Anal. Chem., **2**, 134 (2006).
6. P. Chiranjeevi, D. Rekha, K. Suvardhan, K. S. Kumar and B. Jayaraj, Indian J. Anal. Chem., **2**, 92 (2006).

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