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RESEARCH ARTICLE

DISTRIBUTION AND ABUNDANCE OF COPPER, ZINC, CADMIUM, CHROMIUM AND LEAD CONTENT IN *LAGENANDRA OVATE* (L.)THWAITES

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ABSTRACT

Trace metals such as copper, zinc, cadmium, chromium and lead content in *Lagenandra ovata* were studied and the data were subjected to monthwise, seasonwise and annual average analysis. The study revealed that *L. ovata* is an efficient metal accumulator especially for zinc. Because of the higher metal accumulation efficiency it can be used as a bioindicator for metals.

INTRODUCTION

Metals are important components of the environment that become either beneficial or toxic depending upon their concentration. They are soluble in water and may be readily absorbed by plant or animal tissue. They reach the environment through various sources like solids, liquids etc, but finally get deposited at the surface of the water or land. Heavy metals are essential elements for life in normal concentrations, but are toxic when present in higher concentrations in any component of environment such as microorganisms, plants and animals. Industrial effluents agricultural activities, waste products, mining and mineral leaching are the important sources of trace metal contamination. Trace metals such as boron, molybdenum, zinc, chromium and copper are required by living organisms in very small amounts. The amount of trace elements in plants depends on many factor, especially their concentrations and availability in the medium, climatic conditions and the extend of accumulation by different species [1,2]. Trace metal concentration in plants have been studied extensively [3,10]. The present study is an attempt to delineate the temporal aspects of the accumulation of trace metals viz., copper, zinc, cadmium, chromium and lead in *Lagenandra ovate* (L.) Thwaites associated with Neyyer taking into consideration of its prominent role in plant metabolism as well as involvement in the environment resulting in the manifestation of different aspects of pollution.

MATERIALS AND METHODS

Lagenandra ovata associated with the Neyyar were collected once a month for a period of one year. Thoroughly washed plants were dried in shade at room temperature for 5 days and oven dried at 50^0C for 48 hours. The dried and powdered samples were used for elemental analyses following standard procedure[11]. The estimation of trace elements was done by digesting a known quantity of the sample in a mixture of nitric acid and perchloric acid (4:1 v/v) and aspirating the digested sample into Atomic Absorption Spectrophotometer (AAS) Perkin Elmer Model 2380 and the values were expressed in $\mu g\ g^{-1}$. Results were subjected to month wise, season wise and annual average basis. Annual and seasonal concentration factors of trace metals were also computed against sedimentary metal content to assess the metal accumulation efficiency of the plant.

RESULTS AND DISCUSSION

Elemental accumulations in different aquatic / riparian vegetation were studied by various workers[11-16] and reported more or less similar results of the present study. Monthwise, season wise and annual average data on the distribution of different trace metals are shown in Table 1 and figure 1. Among the five different trace metals analyzed cadmium, chromium and lead showed a general tendency of postmonsoon < premonsoon < monsoon trend. In the case of copper it was in the order of monsoon > postmonsoon > premonsoon trend while zinc showed a premonsoon < monsoon < postmonsoon pattern. All the five metals showed monsoon / postmonsoon high values which may be attributed to the heavy rain fall coupled with land run off / terrigenous run off carrying all kinds of waste materials as well as effluent discharge entering through the flood water. Difference in elemental accumulation observed may arise from numerous sources such as environmental variation, biological and environmental changes as well as environment – organism

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interactions. The order of accumulation of heavy metals in *L. ovata* on an annual basis were Zn > Cd > Pb > Cr > Cu. The reported values of trace metal content in *L. ovata* remained higher when compared to the accepted standard values[17].

Table 1. Monthwise data of trace metals in *Lagenandra ovata* (µg g^{-1})

Metal / Month	Copper	Zinc	Cadmium	Chromium	Lead
January	30.00	1006.50	38.50	36.00	22.50
February	27.00	1224.00	48.00	32.00	26.00
March	25.00	645.50	49.50	35.00	31.00
April	23.00	67.00	51.00	38.00	36.00
May	24.00	467.50	64.50	48.50	64.50
June	24.00	868.00	78.00	59.00	93.00
July	55.00	912.00	87.00	57.50	107.50
August	87.00	956.00	96.00	56.00	122.00
September	58.00	1068.50	73.50	36.50	62.50
October	28.00	1181.00	51.00	17.00	3.00
November	31.00	985.00	40.00	28.50	11.00
December	33.00	789.00	29.00	40.00	19.00

Table 2. Concentration factor for trace metals in *Lagenandra ovata*

Season / Metal	Premonsoon	Monsoon	Postmonsoon	Annual average
Copper	1.85	3.56	2.83	2.87
Zinc	14.23	13.60	18.46	16.43
Cadmium	1.36	2.56	1.92	1.98
Chromium	1.11	1.05	1.28	1.17
Lead	1.31	3.12	0.94	2.00

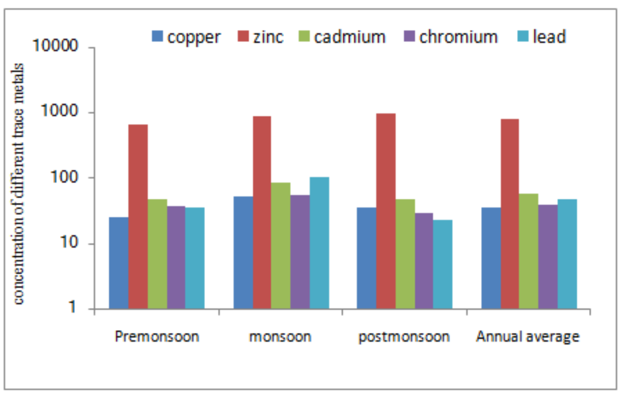

Fig. 1. Distribution of different trace metals in *Lagenandra ovate* (µg g^{-1})

Concentration factor (Table 2) recorded remained higher than unity irrespective of metals indicating that *L. ovata* is an efficient metal accumulator especially for zinc. Because of the higher metal accumulation efficiency, *L.ovata* could be exploited for various purposes including identification of metal indicators / pollution indicators. As *L. ovata* is an efficient accumulator of trace metals the nature of accumulation, flux and dynamics of each metal warrants further detailed investigation.

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