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CONCENTRATION OF TRACE METALS IN AQUATIC PLANTS OF THE AL-HAMMER MARSH, IRAQ

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ABSTRACT

The distribution of Trace metals have been determined in aquatic aquatic plant species and sediments of Hor Al-Hammar marsh. It was found that the nature of the region is unpollutad with the trace, the variation in metal concentration in plants were attributed to the ability these plants to accumulate and eliminate trace metals in relation to their ambient concentrations.

INTRODUCTION

There are always traces of trace metals in plants from fresh water environment, plant which live in polluted waters may accumulate toxic trace metals via their environment levels (Abaychi and Al-Obaidy),1987;and Welsh & Denny, 1980), thus possibly endangering human health.

The background or baseline levels of trace metal are poorly documented in the aquatic plants, no detailed has been undertaken to assess the concentration of trace matals in plants from the Al-Hammer marsh (study area).

Despite the fact that plant are considered an essential partof the food web in the region (Abaychi and Al-Obaidy,1987; and Al-Mousawi, 1988), little is known on the plant ecology of the marshes in Iraq (Al-Hilli 1977), and only slightly more on the Limnological (Al-Saadi *etal*. 1981; Al-Mousawi and Whitton,1983; Antoine,1984;Al-Saadi and Al-Mousawi,1984).

The Al-Hammar marsh, is situated in the Southern basin of the Euphrates river at the South of Iraq,with Maximum length of about 210 km and width of 170 km, and total area of about 35000 km2 is coverd by water at the peak flood time and dry period is from June to October.

The marsh water is Oligohaline with a salinity rang from 1.5-2.8‰, with minimum temperature is 12.4°C in Junuary and maxmum 33.9°C in August, and the annual discharge of march is 14.3 km (Al-Saadi and concentration of Cd,Cr,Fe,Mn,Ni,Pb,V and Zn in the following plants species from the Al-Hammar marsh i. Baccpa monnieru, Ceratophylum demrsum, Najus marinum, Nymphoids indica, Polygonum spp., Salvinia natans and Vallisneria spiralis.

Trace metals levels in sediment samples from the area were also determined, since sediments can accumulate different metals and may reflect yhe extent of pollution by these metals (Thomas,1972).

MATERIALS AND METHODS

Plants were collected frome Al-Hammar marsh during 1988-1989 (Fig.1), the samples were freeze dried and ground with agate morter, (1 g dry wt) were digested according to the procedure described by Goldberg etal.(1983). sediment were obtained by means of a Van Veen grab sampler from representative sites,the surface sediment about 5 cm upper layer was used for the present study. Trace metals analysis were perfomed on the < 63 um fraction of the sediment which had been separated by sieving after freeze-drying and grinding and determind by following a procedure described by Sturgeon etal. (1982).

The trace metals were extracted in duplicate frome plant and sediment Cd,Cr,Fe,Mn,Ni,Pb,V and Zn were determined on a Pye-Unicam flameless AAS model SP9 Equipped with graphite furnace, video furnace programmer and data graphics system. Blank values were negligible for all metals studied. To check the possible loss trace metals during sample processing, quality control samples containing known a mounts of trac metals in biota and sediments ,supplied by U.S.Environment Protection Agency (U.S.EPA) were processed and analyzed. The results of triplicate analyses agreed with the given values to within 5%.

RESULTS AND DISCUSSION

The mean concentration of trace metals in aquatic plant species plant species studied are presented in the Table (1). Unfortunately,there are no data available on the concentration of trace metals in aquatic plants from other areas of the Al-

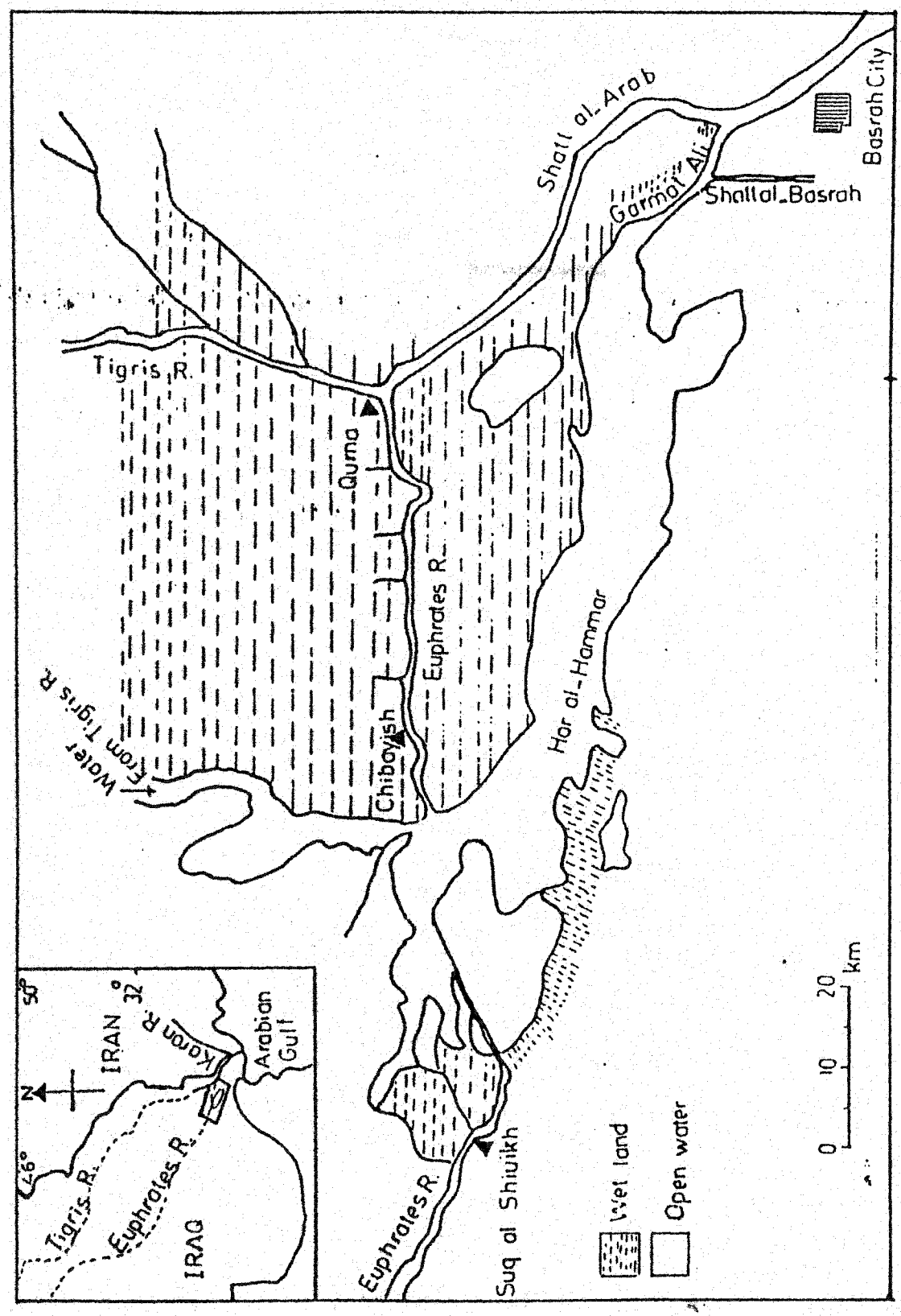

Fig. 1: Map of Hor al-Hammar

Table (1) Concentrations of trace metals in Aquatic plants (µg/g dw) of Al-Hammar marsh , Iraq .

Plants	Cd	Cr	Fe	Mn	Ni	Pb	V	Zn
Bacopa monniera	nd	2.65	0.70	1.90	5.11	0.26	2.92	0.11
Ceratophyllum demersum	nd	2.52	15.00	3.10	1.36	0.33	0.98	0.10
Nymphoids indica	nd	2.07	5.40	3.00	0.86	0.44	0.91	0.12
Najus marinum	nd	0.91	11.80	1.30	3.14	0.79	1.28	0.10
Polygonum spp.	5.23	2.11	3.70	3.00	10.53	0.09	2.58	0.11
Potamogeton crispus	1.05	1.38	3.60	2.40	4.25	0.34	2.43	0.08
Potamogeton lucens	1.92	3.84	4.30	2.50	2.61	0.80	1.91	0.11
Potamogeton perfoliatus	nd	2.79	13.10	3.00	6.72	0.13	2.47	0.11
Ranunculus spp.	nd	1.18	0.90	1.20	2.08	0.26	1.71	0.11
Salvinia natans	1.42	3.17	2.49	1.80	7.39	0.28	4.19	0.11
Vallisneria spiralis	1.19	3.09	1.50	2.60	2.02	0.29	1.24	0.12

nd = none detected

Hammar marsh for comparative porposes. In general the concentrations of Fe,Mn,Pb,Ni and Zn in plants studied were lower than the baseline concentrations,while those for Cd,Cr and V were relatively higher,however, ther are noticealbe variations in the concentrations of some trace metals in the plants studied. These include highest concentrations of Cd in Polygonum spp., Fe in Ceratophyllum detersum, Najus marinum and Potamogeton perfoliatus, Ni in Bacopa monniera, Polygonum ssp., Potamogeton crispus, P. perfoliatus and salvinia natans and V in Salvinia natans. These variations illustrates the ability of these specied to accumulate certain trace metals (Abaychi and Al-Obaidy, 1987). The concentrations obtained are in agreement with those reported in differenees biota from southern of Iraq sites (Abaychi and Mustafa, 1988; Abaychi and Al-Saad, 1988; and abaychi and Al-Obaidy,1987.

In sediment samples, total concentrations of Cr,Fe, Mn,Ni,V and Zn were 194, 44992, 743, 184, 69 and 147 ug/g, respectively, these concentrations are, in most cases, relatively lower than those reported by abaychi and Douabul (1985) in the Shatt Al-Arab Estuary sediment, with the exception of Fe an Zn, which exhibit higher conentrations in the present wrok.

CONCLUSIONS

The unpolluted nature of the Al-Hammar marsh was concluded from the low trace metal concentrations encountered in the aquatic plants and surficial sediment. Varied concentrations of trace metals in aquatic plants studied have been attributed to the ability of plants to accumulate and eliminate certain metals, and the high concentrations of both Fe and Zn in the sediment have been correlated to the increasing in human activities of the region. Hence, trace metals contents in the Al-Hammar marsh seems to be controlled by the abudance of metals in the metals in the soil of the marsh's catchment area and by their geochemical mobility.

REFERENCE

Abaychi, J. k. and Al-obaidy, S. Z. 1987, Concentrations of trace elements in aqutic vascular plants from Shatt Al-Arab river, Iraq. J. Biol. Sci. Res., 18(2), 123-129.

Abaychi, J. and Al-Saad, H. T. 1988, Trace elements in fish from the Arabian Gulf and the Shatt Al-Arab river, Iraq. Bull. Environ.Contam. Toxical., 40, 226-232.

Abaychi, J. K. and Douabul, A. A. Z. 1985, Trace metals in Shatt Al-Arab river, Iraq. Water Res., 19(4), 457-462.

Abaychi, J. K. and Mustafa, Y. Z. 1988, The asiatic clam, Corbicula fluminea: An indicator of trace metal pollution in the Shatt Al-Arab river, Iraq. Environ.Pollu., 45, 109-122.

Al-Hilli, M. R. 1977, Studies on the plant ecology of the Ahwar region in Southern Iraq. Ph.D.Thesis, Cairo University, Egypt.

Al-Aaadi, H. A. and Al-Mousawi, A. H. A. 1984, On the chemical composition of aquatic plants in Shatt Al-Arab near Basrah, Iraq., Bang. J. Bot., 13, 137-146.

Al-Saadi, H. A. and Al-Mousawi, A. H. A. 1988. Some notes on the ecology of aquatic plant in Al-Hammer marsh, Iraq. Vegetatio, 75, 131-133.

Al-Saadi, H. A.; Antoine, S. E. and Nurul Islam, A. K. M 1981, Limnological investigation in Al-Hammar marsh area in Southern Iraq. Nova Hedwigia, 34, 157-166.

Antoine, S. E. 1984, Studies on the bottom sediments of Al-Hammar marsh area in Southern Iraq. Limnoloica (Berlin), 16,52-82.

Al-Mosuwi, A. H. A. and Whitton, B. A. 1983, Influence of environmental factors on algae in rice-field soil from the marshes. Arab Gulf J. Sci. Res., 1, 234-235.

Goldberg, E. D., Koide, M. and Hodg, V. 1983 US Mussel Watch: 1977-1978 results on trace metals and radionuclides. Estuar. Coast. Mar. Sci., 16, 69-93.

Sturgen, R. E., Desaulniers, J. A. H; Berman, S. S. and Russell, D. S. 1982, Determination of trace metals in estuarine sediments by graphite furnace atomic absorption spectrometry. Analytica Chim. Acta, 134, 283-291.

Thomas, R. L. 1972, The distribution of mercury in the sediment of lake Ontario. Can. J. Earth Sci., 9, 636-651.

Welsh, R. P. H. and Denny, P,. 1980, The uptake of lead and copper by aquatic macrophytes in two Enghlish lakes. J.Ecol., 68, 443-455.

تراكيز المعادن النزرة في النباتات المائية لهور الحمار ، العراق

المستخلص

لقد تم تحديد توزيع المعادن النزرة في انواع النباتات المائية والرواسب لهور الحمار . وقد وجد ان المنطقة غير ملوثة بالمعادن النزرة ، وان التغيرات في تراكيز المعادن في النباتات تعزى الى قابلية هذه النباتات لتركيز المعادن النزرة مقارنة بتراكيزها الاولية ثم التخلص منها .