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Distribution of Trace Metals in Southern Iraqi Marsh Reed

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Abstract:

An Investigated study showed that the trace metals (Cu, Fe, Mn, Ni, Pb and Zn) contents of reed plant parts, Phragmites Sp., determined as a plant accumulator and plant monitor for the environmental pollution by trace metals because it is one of the most famous plants that growth so widely and wildly in the marsh wet lands in Basrah The sampling location was Assafia Wild Life Park station in Al-Huwizah Marshes during April 2009,The highest concentration was recorded for Fe in all the parts of the reed sample, in roots 1012 µg/gm, in rhizomes 105 µg/gm, in leaves 572 µg/gm, and in steams 396 µg/gm. The concentration of Cu in roots show the highest level than the other parts 20.95 µg/gm, in rhizomes 17.95 µg/gm, in reed leaves 11.95 µg/gm, and in steams 8.95 µg/gm. For Pb the concentration recorded was in roots 7.3 µg/gm, in rhizomes 3.65 µg/gm, in leaves 3.65 µg/gm, and the same concentration in steams 3.65 µg/gm. The concentration of Mn was in roots 85.35 µg/gm, in rhizomes 64 µg/gm, in leaves 46 µg/gm, in steams 17.05 µg/gm. The lowest concentration recorded by Zn, in roots 2.76 µg/gm, in rhizomes 2.25 µg/gm, in leaves 0.99 µg/gm, in steam the concentration was 2.19 µg/gm, only the concentration of Ni show ND in all the parts of the reed sample that studied.

The concentrations of trace metals decreased in the order of root > rhizome > leaf > stem, and the trace metals concentrations in the different parts of the reed decreased in order of Fe> Mn> Cu> Pb > Zn > Ni.

Key Words: Trace Metals, Reed, Marsh, Southern Iraq.

Introduction

Al-Huwaizah Marshes its classified as the Eastern Marshes, its situated East of Tigris (S.E. Amara) extending towards the Iraqi Iranian boarder, received input mainly from Tigris and partially from Karon inside Iran (Alwan,2006). And this Marshes are considered as the largest ecosystem in the Middle East and Western Eurasia (Maltby, 1944, UNEP, 2001, Nicholson and Clark, Hussain and Ali, 2006). The aquatic plants are the most important primary source of energy and therefore they are the basis of all life on land, they are sustain life by providing food (for human, birds, animals and fish) Oxygen shulter, nursery and spawining grounds and feeding areas for many fishes and invertebrates they are also contain chemical combinations and can be used as important bio indicators for environmental changes by pollutants (Rae and langram, 1999, UNEP, 2004).

Phragmites australis (common reed) is the most widespread plant in the marsh wet lands in the world with wide ecological amplitude. The reed plays a complex role from the point of view of water quality management because its ability to purify water by taking up dissolved pollutants (Wolverton, 1982). Distribution of trace metals that discharge into water columns of rivers from many sources, urban environments, agricultural areas and traffic emissions (Wang *et al,* 2004). They become more concentrated as animals feed on plants, when they reach high levels in the body, because of the bioaccumulation, trace metals can be immediately poisonous, and result long term health problems (Blaylock *et al,* 1997; Ebb and Kochian, 1997). Because metals do not degrade so the trace metals are of considerable environmental concern due to their toxicity and accumulative behavior (Quartacci *et al,* 2006). Trace metal pollution in water bodies (both surface water and groundwater) that result from industrialization and high anthropogenic emission of these pollutants into the water bodies is a serious environmental problem, threatening not only the aquatic ecosystems but also human health (Cheng *et al,* 2002). Human exposure to the toxic metals is a matter of health concern. Consumption of plants and fish is the most important pathways by which trace metals enter the food chain. As water plant acquires important nutrients from the water, they also can accumulate toxic metals (Cobb *et al,* 2000). The determination of trace elements is considered as a useful and important test in surveys of environmental pollution, because levels of some elements can be related to various pathological conditions in man. There are no toxic elements but only toxic concentrations, even essential trace elements can cause damage to health or even death at increased concentrations. The form in which an element is ingested also play a major role in its restorability or toxicity, therefore the results obtained diagnosis and treatment of particular diseases (Parasad and Oberleas, 1976; Kharasch, 1979).

The aim of the present work is determination of trace elements in different part of reed marsh wet land as a plant indicator for environment pollution by trace metals.

Materials and Methods:

The reed sample was bringing from Assafia Wild Life Park in Al-Huwaizah Marshes during April 2009 Fig.3. Show the station of sampling and prepared to be ready for atomic absorption analysis after drying and digestion treatment by concentrated HCl and HNO_3 following the procedure of (Sturgeon et al; 1982). Atomic absorption spectrophotometer model AA32ON, Angstrom Company, USA, used for determined most of the trace metals mention in this study, only Zn determined by using HANNA, HI 83200 multiparameter ion specific meter, Hungary because the hallow cathode lamp was not stabile for determination.

Result and Discussion:

Common reed is a widespread, dominant plant species in many aquatic ecosystems. Reed also plays an important role in the management of water plant sample was preliminarily dissected in roots, rhizomes, stems and leaves to recognize the different bioaccumulation capability. Table.1. show the concentration of trace metals Fe, Mn, Cu, Pb, Zn and Ni, in the various parts of reed root, rhizome, leaf and steam

The highest concentration was recorded for Fe in all the parts of the reed sample, in roots 1012 µg/gm, in rhizomes 105 µg/gm, in leaves 572 µg/gm, and in steams 396 µg/gm as showed in fig.1. The concentration of Cu in roots show the highest level than the other parts 20.95 µg/gm, in rhizomes 17.95 µg/gm, in reed leaves 11.95 µg/gm, and in steams 8.95 µg/gm. For Pb the concentration recorded was in roots 7.3 µg/gm, in rhizomes 3.65 µg/gm, in leaves 3.65 µg/gm, and the same concentration in steams3.65 3.65 µg/gm. The concentration of Mn was in roots 85.35 µg/gm, in rhizomes 64 µg/gm, in leaves 46 µg/gm, in steams 17.05 µg/gm. The lowest concentration recorded by Zn, in roots 2.76 µg/gm, in rhizomes 2.25 µg/gm, in leaves 0.99 µg/gm, in steam the concentration was 2.19 µg/gm, only the concentration of Ni show ND in all the parts of the reed sample that studied fig.2.

The concentrations of trace metals decreased in the order of root > rhizome >leaf> stem, and the trace metals concentrations in the different parts of the reed decreased in order of Fe> Mn> Cu> Pb > Zn > Ni.

This agree with the study of (Mahmood, 2008), as the study showed the high concentration of trace metals absorbed by the aquatic plants especially in the summer period and the decreased of metals were Fe>Mn>Zn>Ni>Pb>Cu.

Also agree with the study of (Zhang et al, 2009) that show the concentration of trace metals decreased in order root >leaf> steam, and also showed that

reeds in this wetland had different abilities to absorb different metal species in the following order: Hg>Zn>As> Cu >Cr, this result was consistent with the result from Gong's study in 2006 (Gong et al., 2006)

The present study results agree with the study of (Bonanno and Lo Giudice, 2009), that showed the metals accumulation in plant organs decreased in the order of root > rhizome ≥ leaf > stem different decreasing trends of metal concentration, the trend Mn > Zn > Pb > Cu was found in each plant organ. Results showed that belowground organs were the primary areas of metal accumulation. Trace metal concentrations in plant organs decreased in the order of root > rhizome _ leaf > stem. All four organs showed significant differences in concentration for Fe, Mn, Cu, Pb, Zn and Ni.

Rooted species can absorb metals through their roots and rhizomes as well as through their leaves because the latter provide an expanded area to trap

Particulate matter, sorb metal ions, and accumulates and sequesters pollutants. Factors affecting metal accumulation by aquatic plants can be biological (e.g., species, age, generation) and non-biological(e.g., temperature, season, salinity, pH, metal concentration)., metal accumulation is affected by metal concentrations in water and that was clear in an increase in the levels of trace metals in Shatt Al–Arab branches during Spring and Summer seasons that are affected by untreated sewage disposal (Al-Imarah et al ,2006),and also the higher values that recorded in the study of levels of trace metals in water from Southern part of Iraq due to waste discharges through Shatt Al–Arab branches and the waste discharge from Brick and vegetable oil production factories, some affected by agricultural lands and refinery waste thrown at Shatt Al-Arab (Al-Imarah et al,2000).

Table -1- Trace Metal Concentration in reed (Phragmites sp.) various parts µg/gm dry weight.

Reed sample parts	Cu	Fe	Mn	Ni	Pb	Zn
Root	20.95	1012	85.35	N.D.	7.3	2.76
Rhizome	17.95	105	64	N.D.	3.65	2.25
Leaf	11.95	572	46	N.D.	3.65	0.99
Steam	8.95	396	17.05	N.D.	3.65	2.19

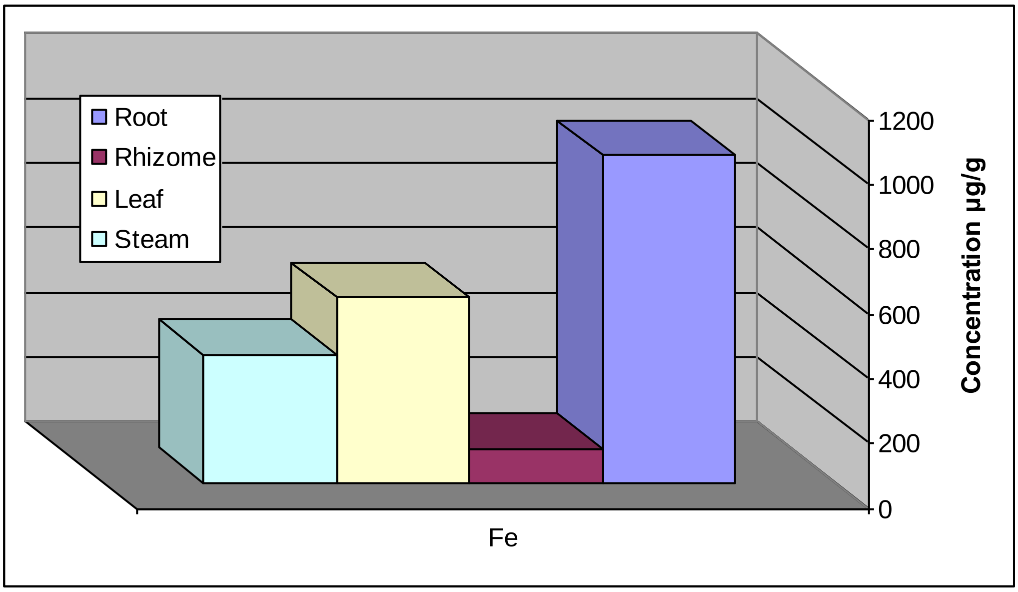

Fig.1. The highest concentration of Fe in reed organs

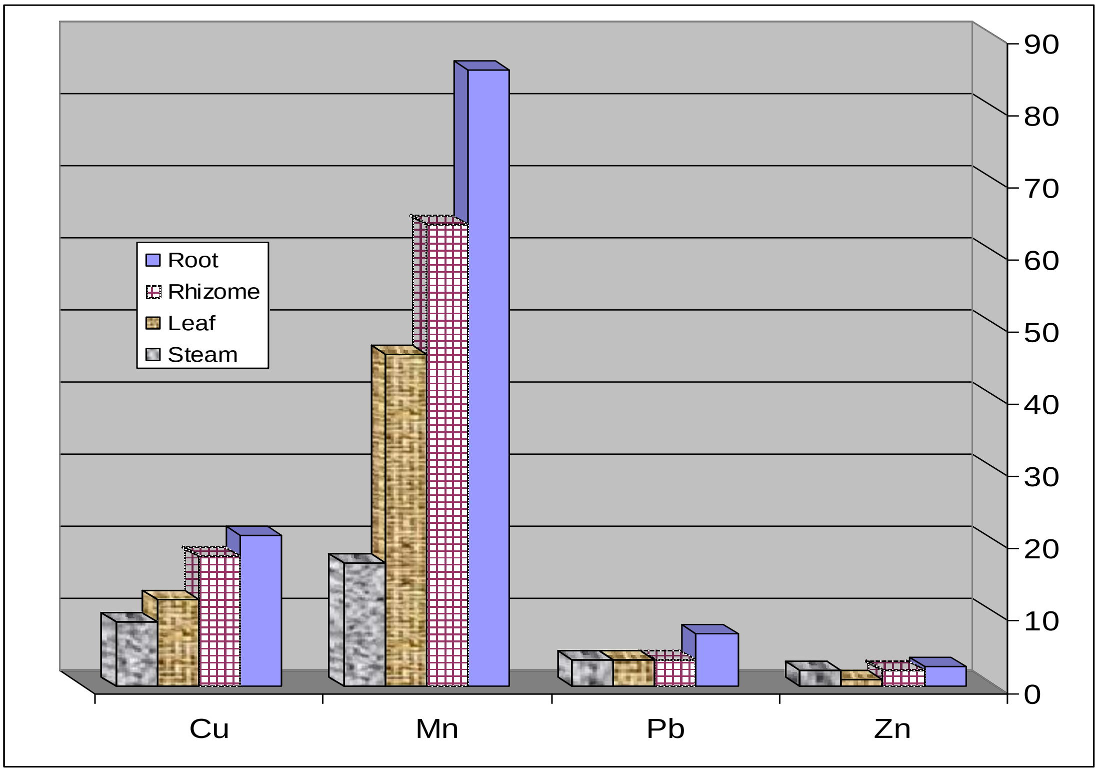

Fig.2.The concentration of trace metals in reed organs

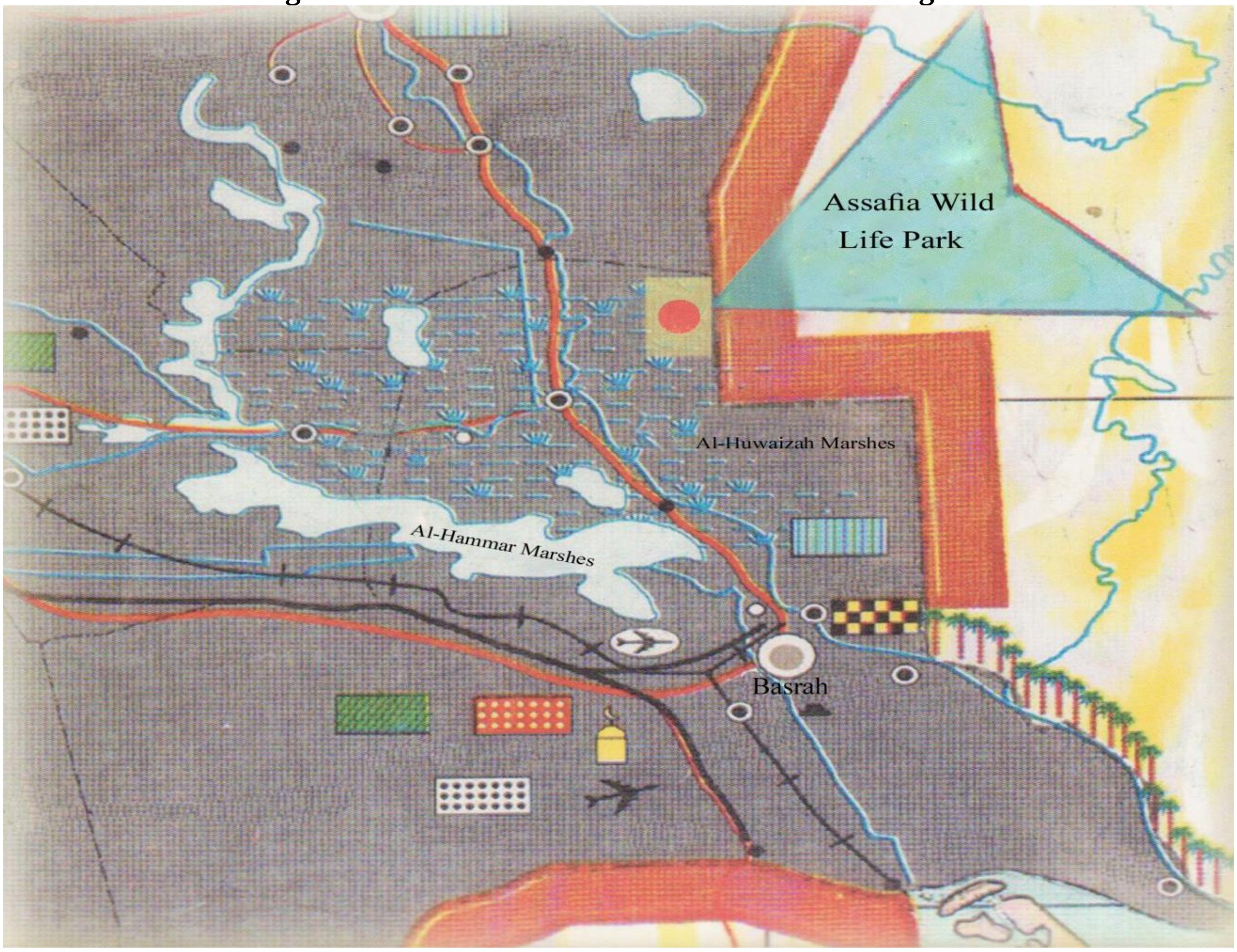

Fig.3. Map showing the location of sampling (Assafia Wild Life Park)

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انتشار العناصر النزرة في قصب اهوار جنوب العراق

سيتا ارام كيورك كرابيديان
مركز علوم البحار- جامعة البصرة

الخلاصة:

بينت الدراسة الحالية العناصر النزرة (النحاس والحديد والمنغنيز والنيكل والرصاص والخارصين) في اجزاء نبات القصب كدليل تراكمي ودليل نباتي لتلوث البيئة بالعناصر النزرة لانها تعتبر من اكثر النباتات شيوعا ونموا بشكل بري وواسع في اهوار البصرة. منطقة الدراسة كانت محمية الصافية في هور الحويزة خلال شهر نيسان 2009. اعلى تركيز تم تسجيله للحديد في كل اجزاء القصب حيث بلغت في الجذور 1012 ميكروغرام/غرام وفي الجذور الرايزومية 105ميكروغرام/ غرام وفي الاوراق 572 ميكروغرام/ غرام وفي الساق 396 مايكروغرام/غرام. تركيز النحاس في الجذور كان اعلى عن بقية اجزاء القصب 20,95 مايكروغرام/غرام في الجذور الرايزومية 17,95 مايكروغرام/غرام في الاوراق 11,95 وفي الساق 8,95 مايكروغرام/غرام تركيز الرصاص المسجل في الجذور 7,3 مايكروغرام/غرام في الجذور الرايزومية 3,65 مايكروغرام/غرام وكذلك في الاوراق والساق تركيز المنغنيز كانت في الجذور 85,35 مايكروغرام/غرام في الجذور الرايزومية 64 مايكروغرام/غرام وفي الاوراق 46 مايكروغرام/غرام في الساق 17,07مايكروغرام/غرام التركيز الاقل تم تسجيله من قبل الخارصين في الجذور 2,76 مايكروغرام/غرام في الجذور الرايزومية 2,25مايكروغرام/ غرام في الاوراق 0,99 مايكروغرام/غرام في الساق 2,19 مايكروغرام/غرام فقط النيكل لم يظهر تركيزا في كل اجزاء نبات القصب قيد الدراسة تراكيز العناصر النزرة نقصت حسب التالي الجذور< الجذور الرايزومية< الاوراق< والساق وتراكيز العناصر النزرة تناقصت في جميع اجزاء نبات القصب كما يلي الحديد< المنغيز< النحاس< الرصاص< الخارصين< والنيكل.

كلمات المفتاح: العناصر النزرة، القصب، الاهوار، جنوب العراق.