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TARAXACUM OFFICINALE CONTAMINATION OF HEAVY METALS (IRON, COPPER)

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Abstract

Given the importance *Taraxacum officinale* medically, its roots as a drug used in the treatment of the liver, and the leaves are used in diuresis and it is considered an antibiotic and anti-rheumatic. Safety must have this grass identification through the plant content of heavy elements of its high toxicity measure and its impact on the dangerous plant and thus accumulate in human organs and the occurrence of metabolic disorders, kidney and cancerous tumors.

This research study aims to measure the plant *Taraxacum officinale* content of iron and copper in different regions. Where the plant collection of contaminated and non-contaminated areas (2 km away from the contaminated area of industrial waste) in Baghdad, Diyala was estimated elemental iron and copper in the roots, leaves and flowers of the plant by Flame atomic absorption.The results showed that the concentration of iron in plant contaminated areas(Baghdad) was in flower 73.1 mg / kg, leaves 30.9 mg / kg and roots 19.0 mg / kg ,while the iron concentration in the plant uncontaminated areas in the flowers of 25.8 mg / kg, floral 21.9 mg / kg, and roots 10.0 mg / kg. As for copper, although it an important enzyme for normal growth of the plant component, but it is toxic by increasing the concentration of 20 mg / kg. Where record copper concentration in the flowers that were collected from areas contaminated by 2.4 mg / kg, the leaves 1.6 mg / kg and roots of 1.4 mg / kg, while in non-contaminated areas was copper concentration in the flower 1.3 mg / kg, and in the, leaves 1.0 mg / kg and roots of 0.7 mg / kg and despite high copper concentration in contaminated areas for uncontaminated, but it was less than the critical limit of toxicity. Compared with copper content of the plant cultivated in areas contaminated Diyala, where the rate was the lowest rate.

Key words : *Taraxacum officinale,* copper,iron .

الخلاصة: نظرا لأهمية الطرخشقون طبيا واستخدام جذوره كعقار في علاج الكبد , و اوراقه في إدرار البول . كما أنه يعتبر مضاد حيوي ومضاد للروماتيزم . فقد وجب تحديد أمان هذا العشب من خلال قياس محتوى النبات من العناصر الثقيلة لسميتها العالية وتأثيرها الخطير على النبات وبالتالي كلوية وأورام سرطانية. لهذا تهدف الدراسة تراكمها في أعضاء الإنسان وحدوث اضطرابات أيضية من الحديد والنحاس في مناطق مختلفة . *Taraxacum officinale* البحثية قياس محتوى نبات كم من المنطقة الملوثة بالمخلفات 2حيث تم جمع النبات من مناطق ملوثه وغير ملوثه (على بعد الصناعية) في بغداد وديالى وتم تقدير عنصري الحديد والنحاس في الجذور والأوراق وأزهار النبات . وقد بينت النتائج ان تركيز الحديد في نبات المناطق Flame atomic absorption عن طريق ملغم 19.0ملغم /كغم والجذور 30.9 ملغم /كغم , الأوراق 73.1الملوثة من بغداد كان في الأزهار ملغم /كغم , الأزهار 25.8/كغم بينما كان تركيز الحديد في نبات المناطق الغير ملوثه في الأوراق ملغم /كغم . اما عن عنصر النحاس بالرغم من أنه عنصر أنزيمي هام 10.0 ملغم /كغم ثم الجذور 21.9 ملغم/ كغم .حيث سجل تركيز النحاس 20للنمو الطبيعي للنبات الا أنه يكون سام عند زيادة تركيزه عن 1.4 ملغم /كغم والجذور 1.6ملغم /كغم , الأوراق 2.4في الأزهار التي جمعت من المناطق الملوثة ملغم /كغم , وفى الأوراق 1.3ملغم /كغم , بينما في المناطق الغير ملوثه كان تركيز النحاس في الأزهار

ملغم /كغم . وعلى الرغم من ارتفاع تركيز النحاس في المناطق الملوثة 0.7ملغم /كغم والجذور 1.0 مقارنة بنسبة عنصر النحاس من محتوى النبات عن الغير ملوثه الا أنه كان أقل من الحد الحرج للسمية المزروعة في مناطق ديالى الملوثة حيث سجلت النسبة اقل .

الكلمات المفتاحية : نبات *Taraxacum officinale* النحاس, الحديد ,

Introduction

Taraxacum officinale is a medicinal plant belonging to the family. It is used as a source of rubber and as an alternative to coffee. Its roots are used in the treatment of the liver and its leaves are boiled to stimulate urination. It is also a tonic, antimicrobial, anti-rheumatic and convulsive. Due to the importance of medicinal plants and their increasing tendency in all countries of the world to be used in alternative medicine such as extracts, clinical pharmacology or spices to add flavor to food, the safety of these herbs and their containment of heavy metals have to be determined by the recent contamination of industrial waste and war wastes.

Heavy metals are found in the soil at low levels but due to pollution from industrial, agricultural and other wastes, their level of toxicity has increased. It is better to measure the plant content of these toxic and hazardous elements (Pb, Cd, Cu, Zn) because their accumulation leads to serious effects not only on the plant but on human health, causing metabolic disorders and cancerous tumors (Abu-Darwish and Abu-Dieyeh, 2009; Nicholson *et al*., 2003). Of the natural growth of the plant and its development, but it is toxic in high concentrations and toxicity of the plant when the concentration of more than 20 milligram/kg (dry weight) and the critical concentration of copper in the plant is 20-100 milligrams / kilogram, which results in melting and grinding of dangerous fumes to health, leading to fever fumes fever, flu-like symptoms and changes in color of hair and skin (Diaconu *et al*., 2009). Research the natural content of plant elements (microgram / gram dry weight) is as follows: cadmium 0.5, copper 20, iron 50, manganese 200, zinc 100 (Haider *et al*., 2004; Kabata, 2004).

In the study of some minor elements in the Turkish herbs, which was used Rezum plant *Alpina officinarum*, turmeric, ginger, black pepper seeds, cloves and the experiment showed that the concentration of cadmium has differed in the level of herbs used in the study was the highest concentration in black pepper 206 microgram/ kg While the lowest concentration was 13 micrograms/ kg In clove samples. The concentration of copper was highest in black pepper, while iron had a concentration of 374 milligrams/kg in black pepper to 28. Thus, these elements are at safe limits and are lower than those in other parts of the world, even the high concentration of cadmium found in black pepper seeds (206 micrograms/ kg) lower than the recommended concentration (300 µg/ kg) for herbs and spices from the World Health Organization (Ozkutlu *et al*., 2006; WHO, 1999).

Materials and Methods

Taraxacum officinale was collected from various polluted and uncontaminated areas (2 km from the industrial waste area) in Baghdad and Diyala to measure the concentration of copper and iron to determine the toxicity of elements in plants. Iron and copper elements were estimated in plant parts, roots, leaves and plant flowers, by flame atomic absorption after washing, drying and processing the plant to estimate the elements in its plant parts. (3 g) of the dry weight of the plant parts and grinding with a special treadmill up to the size of (70 microns) of the ground part and the ratio of the elements above was calculated by the weight of the ground.

Statistical analysis

The experiment was designed according to the full randomized design of R.C.D with three replicates per treatment and compared to the averages using the least difference difference (L.S.D) Least significant difference at a probability level of 0.05. (SAS, 2012).

Results and Discussion

The results showed that the concentration of iron in polluted areas in Baghdad was 73.1 mg / kg, leaves 30.9 mg / kg and roots 19.0 mg / kg while the concentration of iron in the plant area was not polluted in leaves 25.8 mg / kg, flowers 21.9 mg / Kg then the roots 10.0 mg / kg. The copper component, although an important enzymatic component of normal plant growth, is toxic at a concentration of more than 20 mg / kg. Concentration of copper in flowers collected from contaminated areas was 2.4 mg / kg, leaves 1.6 mg / kg and roots 1.4 mg Kg / kg. In the non-polluted areas, the concentration of copper in flowers was 1.3 mg / kg, 1.0 mg / kg and 0.7 mg / kg. Although the concentration of copper in polluted areas was higher than that of non-contaminated, it was less

than the critical limit of toxicity. Compared to the percentage of the copper component of the cultivated plant content in the contaminated areas of Diyala, where the percentage is lower, as shown in tables 1 and 2. Increases or decreases in the major minor elements (Fe, Zn, Cu) have undesirable effects (Masud and Jaffar, 1997; Osu and Odoemelam, 2007).

Table 1 : Iron and copper content (mg/kg) of *Taraxacum officinale* plant in contaminated areas of Baghdad and Diyala.

Contaminated areas of Diyala		**Contaminated areas of Baghdad**		
Cu	**Fe**	**Cu**	**Fe**	**Plant part**
0.26 ±0.4	13.52 ±1.3	1.4 ±1.6	19.0 ±0.5	Root
0.28 ±0.5	14.62 ±1.0	1.6 ±1.2	30.9 ±0.7	Leaf
0.24 ±0.9	5.64 ±1.67	2.4 ±1.01	73.1 ±1.7	Flower

Table 2 : Iron and copper content (mg/kg) of *Taraxacum officinale* plant of not contaminated areas of Baghdad and Diyala.

Clean areas of Diyala		**Clean areas of Baghdad**		
Cu	**Fe**	**Cu**	**Fe**	**Plant part**
0.18 ±0.5	2.6 ±0.2	0.7 ±0.2	10.0 ±0.4	Root
0.2 ±0.4	1.9 ±0.2	1.0 ±0.3	25.8 ±0.3	Leaf
0.2 ±0.4	2.0 ±0.3	1.3 ±0.2	21.9 ±0.6	Flower

Therefore, the results of our research experience indicate the high percentage of heavy elements in plants in polluted areas compared to non-polluted areas. For copper, the toxicity of the plant when the concentration is greater than 20 mg/kg (dry weight) and iron concentration 50 (Hussain and Khan, 2010; Samsoe-Peterson *et al*., 2002; Al-Khashman, 2007). Tarkhoush plant within the natural limits, although the level of non-polluted areas. Therefore, the plants or their parts must be examined to determine whether they are safe or unsafe for human consumption. Plants should also be examined for their content of other heavy metals such as lead and zinc.

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