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Measurement of Concentration of Some Heavy Elements in Soil and Some Vegetable Areas of the Capital Baghdad

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ABSTRACT

In this research, we collected 10 samples, 2 soil and 8 vegetables cultivated in orchard area allowing district agricultural land in Al-Khatib at a few distances from Kadhimiya district, and adjacent to the area Al-Huria samples are congested after the chemical digestion of the seamount by using the atomic absorption technique, we found the following results: The highest value of Cadmium in A_5 sample was 0.0436 ppm and 0.026933 ppm, the highest value of Lead in the sample A_1 (soil of Kadhimiya) was 0.07345 ppm average and the highest value of Brass in A_2 was 1.1176 ppm and 0.1762 ppm. The highest value of Cadmium in B_4 (Rashad) was 0.0514 ppm and 0.04303 ppm, and the highest value of Lead in B_5 (Kirath) was 0.365 ppm and on average 0.2293 ppm, the value of Copper in B_4 (Rashad) was 1.1491 ppm and 0.20185 ppm in seriously. The limits are permitted within the WHO (World Health Organization), and therefore, there is no contamination of these items in these regions A and B (allows bastinade Kadhimiya, Khatib) respectively.

KEYWORDS: Pollution, lead, copper, cadmium, human health

الخلاصة

يتضمن البحث مقارنة تراكيز بعض العناصر الثقيلة (Pb, Cu, Cd) لكلا من التربة وبعض الخضروات الموسمية ومقارنتها مع الحد المسموح عالميا ضمن منظمة الصحة العالمية جمعت 10 عينات (2 تربة و8 عينات) من الخضروات المختلفة المزروعة في منطقتين الاولى منطقة بستان علاوي والمنطقة الثانية الاراضي الزراعية في الخطيب والتي تقع على مسافة قليلة عن منطقة الكاظمية ومجاورة لمنطقة الحرية المكتظة بالسكان وبعد اجراء تجربة الهضم الكيميائي ودخول العينات تقنية الامتصاص الذري وجدنا النتائج التالية. ان اعلى قيمة لكادميوم فيعينة A_5 (رشاد) بمقدار 0.0436 ppm وبمعدل 0.02693 ppm واعلى قيمة لرصاص في العينة (A_1) (تربة) وبمعدل 0.07345 ppm واعلى قيمة لنحاس في A_2 (معدنوس 1.1176 ppm (وبمعدل 0.1762 ppm كما مبين في الجدول 3 واعلى قيمة لكادميوم في B_4 (رشاد) وبمقدار 0.0514 ppm وبمعدل 0.04303 ppm واعلى قيمة لرصاص في B_5 (كراث) وبمقدار 0.365 ppmوبمعدل 0.1096 ppm اما النحاس فأعلى قيمة في B_4 (رشاد) ومقدارها 1.1491 ppm وبمعدل 0.20185 ppm وفي الخضروات المذكورة ضمن الحدود المسموح بها ضمن منظمة)WHOمنظمة الصحة العالمية) ولهذا فليس هنالك تلوث بهذه العناصرفيهاتان المنطقتان A)و (B بستان علاوي الكاظمية,الخطيبعلىالتوالي.

INTRODUCTION

The ecosystem consists of living and non-living components located within any area of Nature (we call it the environment) interacts with each other continuously within an integrated system of balance during which a set of relations and mutual interactions prevail between the components of the ecosystem and these mutual processes are subject to a system of extreme accuracy and balance, hence if the environment is today considered the stock of natural and human resources available somewhere at any time in order to meet the needs of man, Pollution of all kinds of material and non-material, food crisis, problems of population congestion and traffic problems are only images of human abuse, which reflect unintentional ignorance at times and excessive selfishness at other times, and by reference to the scientific definition of the phenomenon of pollution represents every quantitative and qualitative change of the components of the living and non-living environment, which makes ecosystems unable to absorb its effects without disrupting its balance.

RELATED WORK

Heavy elements are conceptual one of the main sources of pollution of the environment that clearly impact on system performance, past centuries have seen the increasing impact of human activities on content-heavy elements in soil and vegetation, which affected the dynamic balance dramatically and many geological heavy elements. The term (heavy elements) is called on elements that have atomic weights ranging from 63.546 to 200.590 and above, and have a relatively high density greater than 5 gm/cm^3 and some have even poisonous at low concentrations and a significant impact on human life cycles and chemical, including Lead, Cadmium, Iron, Copper, Manganese, Zinc, Mercury, and others. There are different methods to evaluate the impact of heavy elements in the environment, and the most effective method is to determine the concentrations of heavy elements in the soil, which is very important in monitoring environmental pollution. By being one fixed rate, have in the environment to increase these percentages and stay for long in the soil is severely on human health, due to their transition to the food chain, which are an indicator of environmental pollution [1]. There are heavy elements in the soil usually at low levels, but because of pollution from industry, agriculture and other waste, such as remnants of the cities, which is the best to measure the content of plants from these toxic and dangerous elements Pb, Cd, Cu, Zn, Hg as shown in Figures 1, 2, and 3, due to accumulation and toxicity, leading to serious impact, not only plant, but also on human health. This plant contains elements of its presence in soil, water, air, and some of these plants do not bear the high levels of these elements in the problem of heavy elements, which tend to accumulate in human organs over time, and the presence of these elements of metabolic disturbance and cause an increase or decrease trace elements Fe, Zn, Cu to undesirable effects mused, and while the toxic elements Cd, Pb, Ni, Cr [2]. Big problems with cadmium for Pyelonephritis, Oesteomolica and matched bullets are causing renal carcinomas and schumacher *et al*. 1991, and Iron, Copper and Zinc are less toxic than these two elements, but they become dangerous when increasing the allowable limits [3]. Many studies have shown that the metals Lead and Cadmium, Chromium, Nickel, Zinc, and Copper up to toxic concentrations in pollution-prone lands [4].

Figure 1. Cu [11].

Lead: a very harmful for humans and plants in lead mines and car exhaust sludge, [5,6] and compost and declaration concentration allowed in food is 1 mg/kg, and lead prolonged exposure to lead to increasing it in the body and many symptoms, such as serious anemia, paleness of skin, abdominal pain, nausea, vomiting and paralysis of the joints (Growth *et al.* 1990). Continuous exposure may lead to kidney damage, reduce fertility and increase the chance of pregnancy failures or defects.

Figure 2. Pb [11].

Cadmium: an SAM has no function in a plant, animal or human when its accumulation in college stays out, causing high blood pressure and kidney disease, and the difficulty to remove output Lead and Cadmium for direct damage neurons, because it prevents the formation of steel Colin and activates the enzyme choline esterase inhibitor) reduce the embarrassment of cadmium in the soil of 3-5 mg/kg this limit does not cause increased accumulation of toxic concentration of lead occurring cadmium 5-10 mg/kg to reduce production and lay the seriousness of this element in it (SAM) in low concentrations [7].

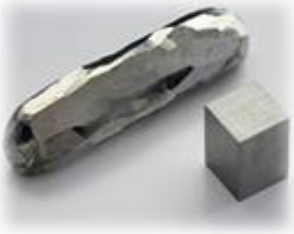

Figure 3. Cd [11].

Copper: although it is an important component of an enzyme to normal growth and development of leaf, it is SAM in high concentrations and plant toxicity occurs when increasing the concentration of 20 mg/kg (dry weight) and the critical concentration of copper in plants 20-100 mg/kg (Gupta 1975), and lead melting and grind or chop copper because of dust or fumes, lead exposure or inhalation of these fumes of seriousness on health, where copper metal fumes fever and influenza symptoms like hair and skin color changes [8, 9].

MATERIALS AND METHODS

Samples were collected from Al-Kadhimiya and Al-Khatib in growing seasonal vegetables, and experiment on soil and plant to take the heavy metal concentration of Cu, P b, Cd in soils and various kinds of vegetables as shown in Table 1 and Table 2, which there are several ways to analyze samples as in Figure 4, To calculate the concentrations of elements, such as the way of Jackson and how Lindsey [12] after completing the modeling process is fragmenting the samples and took approximately (1g) of each sample in such a way as to ensure the representation the sample well, then pass the sample with a series of stages in order to analyze them chemically and GIO create samples for final analysis using atomic absorption device as the final analyses laboratory consumer product marketing research at the University of Baghdad. In the following basic stages for treatment of samples and final analysis presented by the way of Jackson [9, 10]:

1- Make a palm (Sieving) form crushed through a sieve (2mm).
2- Very finely grind sample using an electric windmill
3- Put in the oven on (80C°) for an hour to dry for soil, either we have to plant sun just for drying samples.
4- Weight (1gm) of the dried sample and put on a little weight bag using a delicate balance.
5- Add the digestion sample (15ml) HCl acid with (5ml) of nitric acid and 3HNO center in baker with each.
6- Heat the sample using the heater placed on the temperature (35C °) to the wet part evaporates from the sample and stays just like clay, as in Figure 4.
7- The baker cooling to the temperature of the laboratory and add (15 ml) of HCL acid and (5ml) of nitric acid and placed on the heater, and raise the temperature (65C°) until it begins to boil as in Figure 5.
8- The baker cooling filtration filters paper (42) and put leaky vials volumetric capacity (100 ml).
9- Wash the dissolved sediment, and add distilled water scrubber to the leaky cauldron and complete volume is (50ml), and then sending for analysis by atomic absorption spectroscopy (Atomic Absorption) device.

Figure 4. Collected Samples from Al-Kadhimiya and Al-Khatib in growing seasonal vegetables.

Figure 5. The experiment in the Laboratory.

Table 1. Al-Kadhimiya (Soil & Plant name).

Soil & Plant name	symbol
Soil	A1
Muedinus (Metal)	A2
Rocca (jarjer)	A3
celery (Karfus)	A4
Rashad	A5

Table 2. Katib (Soil & plant name).

Soil & plant name	symbol
Soil	B1
Rocca (jarjer)	B2
Karfus (Celery)	B3
Rashed	B4
Kirath (LEEKS)	B5

RESULTS AND DISCUSSION

Table 3 shows the concentrations of heavy elements Cd, Cu, Pb in soil and different vegetables as shown in Tables 1 and 2 to both Al-Kadhimiya and Al-Khatib, and note that after conducting an experiment of chemical digestion and atomic absorption technique, a sample entry found results, as shown in Figures 6, 7, 8, 9, and 10. Next to the highest value of Cadmium in A5 (Rashad) sample was 0.0436 ppm and 0.026933333 ppm, and the highest value of lead in the sample A1 (soil) average was 0.07345 ppm, and the highest value of Cu in A2 (Muedinus) was 1.1176 ppm and 0.1762 ppm, and the highest value of Cadmium in B4 (Rashad) was 0.0514 ppm average and 0.04303333 ppm. The highest value of bullets in B5 (Karats) was 0.365 ppm and in average of 0.1096 ppm, and the highest value of copper in B4 was 1.1491 ppm and 0.20185 ppm. Table 4 notes that concentrations of these elements in the soil and vegetables [10] are listed in Tables 1 and 2 with in the allowable limits. The negative value of some concentrations means that the device does not sense this heavy component in the sample.

Table 3. The concentration of heavy metals in soil & different vegetables.

Sample	Conc. (Cd) ppm	Conc. (Pb) ppm	Conc. (Cu) ppm
A1	0.0263	0.4734	0.9065
A2	0.0228	BDL	1.1176
A3	0.0347	0.1751	0.162
A4	0.0317	0.0531	0.2083
A5	0.0436	0.0667	0.1583
Average	0.03182	0.15344	0.51054
Permissible limits in Soil. [3,4]	12 (ppm)	1-64 (ppm)	1-85 (ppm)
Permissible limits in plant [3,4].	3-5 (ppm)	1 (ppm)	20-100 (ppm)

Table 4. The concentration of heavy metals in soil & different vegetables.

Sample	Conc. (Cd) ppm	Conc. (Pb) ppm	Conc. (Cu) ppm
B1	0.0377	0.3107	0.612
B2	0.046	BDL	0.2565
B3	0.0454	0.365	0.2694
B4	0.0514	0.2158	1.1491
B5	0.0502	0.365	0.1472
Average	0.04614	0.22938	0.48684
Permissible limits in soil [3,4].	12 (ppm)	1-64 (ppm)	1-85 (ppm)
Permissible limits in plant [3,4].	3-5 (ppm)	1 (ppm)	20-100 (ppm)

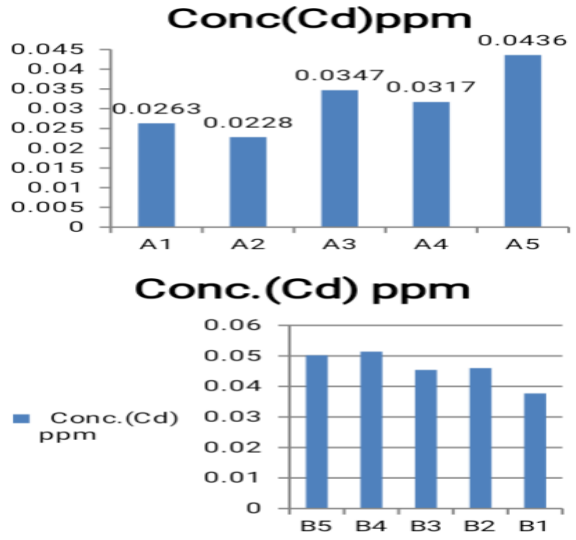

Figure 6. Concentration of Cd.

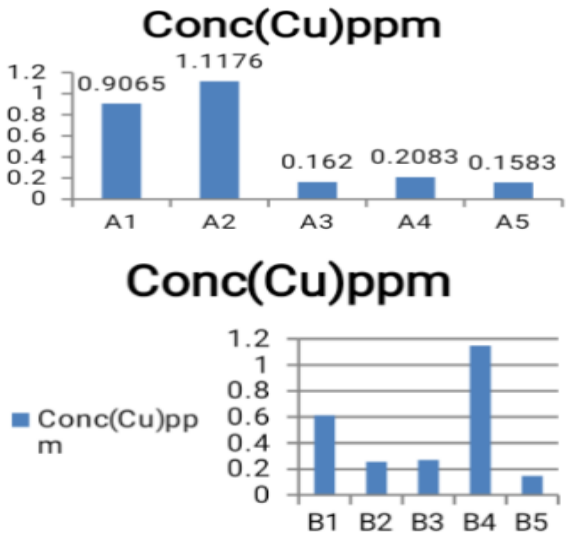

Figure 7. Concentration of Cu.

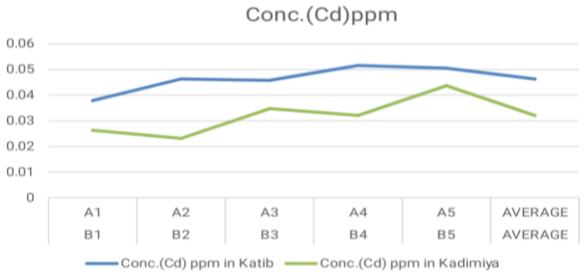

Figure 8. Concentration of (Cd).

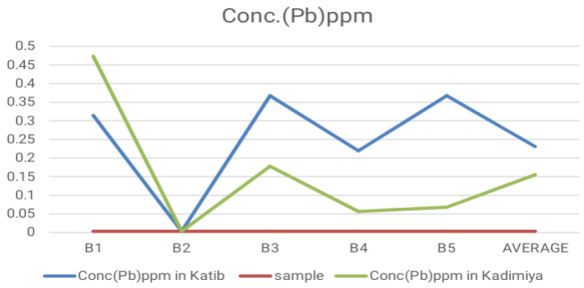

Figure 9. Concentration of (Pb).

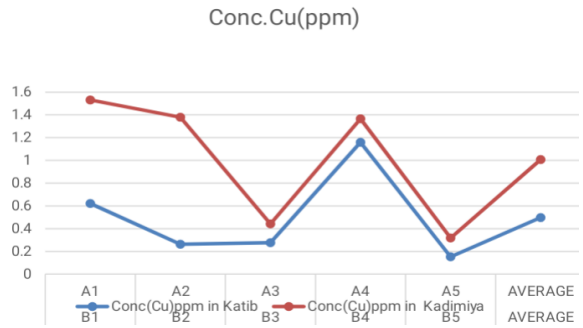

Figure 10. Concentration of (Cu).

As shown in the previous figures, the concentrations of the samples heavy elements were taken from the regions of Kadhimiya and Khati.

CONCLUSIONS

We can conclude from this study that the sampleA_2 (Muedinus) has the highest absorption value of Cd and found the plant in the sample B_4 (Rashad) has less value in the absorption of Cd, and the highest absorption value in the sample B1 (soil of ALKhateb region) from Pb and the law absorption value in the sample A_2 (Muedinus), from the Cu the highest absorption value in the sampleB_4 (Rashad), and found the less absorption value in the sampleA_3 (Jarrir).

The heavy elements (Cd, Cu, and Pb) concentrations in the studied plant are within the range allowed. To increase the environment, allow are ness of the citizens and to enable them to live in peace, more research for this study in all regions of Baghdad should be done.

Disclosure and conflict of interest: The authors declare that they have no conflicts of interest.

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