DOI : 10.35124/bca.2019.19.1.1597

Biochem. Cell. Arch. Vol. 19, No. 1, pp. 1597-1600, 2019 | www.connectjournals.com/bca | *ISSN 0972-5075*

THE EFFICIENCY OF FLAX PLANT (*LINUM USITATISSIMUM* L.) IN ABSORB ELEMENTAL CADMIUM AND LEAD POLLUTANT SOIL

Saba Abud AL-Kareem Mustafa*, Abid Ahmad AL-Ardeeni and Bdran Adnan Saeed

Departmentof Biology, College of Education for Women, University of Tikrit, Iraq.
*e-mail : bioerdene@yahoo.com

(Accepted 15 January 2019)

ABSTRACT : This study was conducted in the greenhouse and laboratories of Biology Department, Collage of Education for Women, Tikrit University during season of the growth 2017/2018.To examine the efficiency of flax plant (*Linum usitatissimum* L.) in absorb elemental cadmium and lead from contaminated soil during the product stage As a technique in dealing with contaminated soil with heavy elements by plants.Since the results of the study showed that treatment of soil with cadmium concentration (3, 6, 9) mg/kg soil, lead concentration (125, 250, 500 mg/kg) soil led to a reduction in thegrowth of flaxplant, an increase in concentration of heavy elements in different plant parts (the root and vegetative group and grain). It was also noted that the reciprocity element cadmium concentration 9 mg/kg soil gave higher concentration cadmium capacity 0.8 mg/l in flax plant roots relative to the treatment of control of 0.1 mg/l when the lead element of treatment focus 500 mg/kg soil gave the highest increase morale also focused lead element in flax plant roots 19.4 mg/l compared with the treatment of control of 3.2 mg/l by polynomial Duncan test at 5% probability level. Increased concentrations of these elements in the different parts of a flax plant proportional increase concentration in the soil in which they grow.

Key words : Lead, flax plant, efficiency of the absorption, cadmium.

INTRODUCTION

Pollution knows that the term refers to soil or water or any natural resource increase in the concentration of any chemical or physics has been added above the normal level which damage health and environmental impact on the possibilities and financial, social and environmental costs (Stavrianou, 2007). Heavy elements of environmental pollutants and dangerous lie in cumulative capacity antibodies organisms (Mohsen, 2008). At present, most States appointed especially industrial States to deal with these contaminants removed from the water or the soil physical, chemical or biological methods either plants or microorganisms in an effort to reduce pollutionHowever, the cost of processing techniques applied to plants may reach from half to less than 20% of the cost of using physical and chemical technologies that are expensive and time consuming work on changes in the environment (Bishop, 1997). That requires an effective force to clean or remove minerals and is a new technique for clean water and soil systems so Phytoremediation and plant processing technique came also called green technology that can address contaminated sites (Volland *et al*, 2012). They feature many plants in their absorption of contaminants from soil, water, air and accumulation in their tissues, not cause any damage on them and thus play a role in tackling environmental pollution at sites that grow with (Panwar, 1999) *Linum usitatissimum* L. plant that belongs to the family Liniaceae is grown for oil or fiber or both and is a herbal plant around (Franklin, 2009) and research aims to study the efficiency flax plant in absorbing heavy elements cadmium and lead from contaminated soil by selecting any parts of flax plant more accumulation of these elements.

MATERIALS AND METHODS

Create and analyze the soil

Took soil from a farm to a depth (0-30) cm in October of 2017 randomize aerobically and dried up, and then had to go through Learning to sieve with Qatar 2 mm. Soil analysis was performed in the laboratories of the Department of Biology, College of Education and the Department of Agriculture Soil, Tikrit University. To estimate the number of chemical and physical characteristics of the soil as shown in Table 1. Soil was measured as myths the way (Black, 1965) and interactive capacity assessment CEC alkationih and conductivity Electrode EC according to the modalities set forth by Richards (1954), degree of interaction of soil pH by the way (Black, 1965) as well as the appreciation of both

potassium and sodium by using your Flame Photometer and calcium and magnesium by methods described (Richards, 1954) and total nitrogen were estimated using your micro keldal Kjeldal-Micro as described in A.O.A.C. (1980).

Treatment used

Plastic flower pots used with Qatar 30 cm high and 30 cm each planter on 5 kg of dry soil already mixed with urea nitrogen concentration upon (40 mg/kg) soil and fertilizer superphosphate when concentration (40 mg/kg) soil and added cadmium in concentrations (0, 3, 6, 9) mg/kg soil to Body cadmium chloride, and concentrations (0, 125, 250, 500 mg/kg) soil as lead chloride and four replicates for each concentration.

Agriculture and perfume

Flax plant seeds were agricultured in 13/11/2017 in soils of pots treated with different levels of cadmium and lead by 10 seeds/potting flower pots placed randomly under greenhouse conditions, and after 10 days of agriculture relaxed the number of seedlings to 5 seedlings in each planter Pots were irrigated with tap water while preserving moisture content at field capacity to 75% and soil water quantity seized added daily by the balance throughout the experiment, after 75 days at maturity of the plant began the process of extraction of plant by extraction the root of soil aggregates using a sprinkler water special taking into account using a sieve to prevent losing any part of roots and after cleaning the plants root for green groups were separated.

Estimate the concentrations of heavy elements in plants

The elements in concentrations were estimated in plant parts in a way that Jackson had been taking 0.1 g of each sample from the roots and stem and leaf and plant seeds after dried it was digested using sulphuric acid Peru klorik by 3:1, respectively, and then put the form in a water bath at 100 m and estimated the elements heavy Pb, Cd using atomic absorption device as indicated in Jackson (1958).

Statistical analysis

Designed experiment and statistically analysed using random design (CRD) Completely Randomized Design in experiments (ALrawy, 1979 and Alsahoki, 1990) and compared the moral differences between the transaction rates using less moral difference when 5% probability level as Duncan test polynomial Duncan,s New Multiple Roung Test.

RESULTS AND DISCUSSION

The accumulation of heavy elements in plant part

Cadmium

Table 2 shows increase the concentration of cadmium element in different parts of the flax plant compared with control treatment, and this increase is consistent with the findings of the Máthé-Gáspá and Anton (2005). In the presence of heavy elements in the soil leads to increased concentrations of these elements in different plant parts of plants developing in these soils and in turn have a negative impact on its growth, it can also determine the amount of heavy elements absorbed by plants depending on the nature of the soil components and availability The element of genetic susceptibility to suck plant (Henning *et al*, 2011). It was also noted that the reciprocity element cadmium concentration of 9 parts per million increased accumulation of cadmium by 0.8 mg/l at the root of a flax plant is more backlog compared to other plant parts, this is because the roots are able to absorb large amounts of cadmium cadmium movement inside Plants are difficult and paralyzed. Cadmium absorption process is through the green parts and plant root but greater absorption process occur in the roots (Ololade and Ologundudu, 2014). Perhaps because of the higher accumulation in the roots because of the slow movement of cadmium element within the plant, leading to higher accumulation in roots (Benavides *et al*, 2005). The dynamic Assembly of heavy elements is increased concenteration in the soil and this was confirmed by Mahmood (2010) of the soil content of cadmium element when aloft, the content of plant parts from this item is high too, when exposing the plant to the high concentrations of cadmium increases plant Production of Cysteine that surrounds the seed with cadmium metal and assured Sahaibi (2007). When plants absorbed heavy elements is poised to make vegetarian vehicles know plant balmkhlbiat takes seeds contaminated items and keep it inside the gaps in plant tissue cells. The results in Table 2 showed that concentrations of cadmium in root and leaf's vegetative total flax exceeded the allowable limit for the concentration of cadmium in plants in accordance with the WHO World Health Organization classification of 0.1 mg/kg drymateriality and this article demonstrates acceptability absorption the plant of this Item if in addition a few.

Lead :Pb

Table 3 shows that there is increased concentration of moral lead in various parts of the flax plant is in line with the increase of concentration in soil. That lead concentrate to 500 mg/kg gave the highest moral element concentration increases lead in flax plant roots 19.4 mg/

Table 1 : Chemical and physical characteristics of the soil used in the study.

	Bank	Account
1	Sand (%)	36%
2	Silt(%)	40%
3	Clay (%)	24%
4	Contexture	Admixture
5	Organic materiality (%)	2.1
6	Conduction Electric (E.C)	2.10
7	(pH)	7.29
8	Capacity Electronic Commutative(CEC)	17.40
9	Ionic Solvent	
	Cl^-	1.62
	Na^+	0.90
	K^+	0.75
	Mg^{2+}	1.30
	Ca^{2+}	1.10
	Total Nitrogen	30.4

Table 2 : Cadmium element concentration mg/l in different parts of the plant *Linum usitatissimum* L.

Treatment \ Subject		Root	Leg	Leaves	Seed
Control		0.1 c	0.0c	0.0b	0.0b
Cd (mg/kg)	3	0.2b	0.1a	0.1a	0.1a
	6	0.3a	0.3a	0.2a	0.2a
	9	0.8a	0.4b	0.2a	0.2a

*The rates of similar characters imply morally at risk (5%) as Duncan test multi.

Table 3 : Concentration of lead mg/l in the different parts of plant *Linum usitatissimum* L.

Treatment \ Subject		Root	Leg	Leaves	Seed
Control		3.2b	2.6b	1.8c	1.2c
Pb (mg/kg)	125	12.9a	8.6b	3.5b	1.8c
	250	17.3a	13.3a	4.9b	2.5b
	500	19.4a	14.8a	7.9b	3.4b

*The rates of similar characters imply morally at risk (5%) as Duncan test multi.

l compared with the treatment of control by test Duncan polynomial at 5% probability shown in Table 3 that there is a moral element concentration increases lead in various parts of the flax plant is in line with the increase of tissues in soil. That lead to 500 parts per million concentration gave the highest moral element concentration increases lead in flax plant roots 19.4 mg/l compared with the treatment of control by test Duncan polynomial at 5% probability. Notes from the results that there is a positive relationship between the increase in concentration of element in plants with high concentrations in the soil and this added element is consistent with the findings of Qian *et al* (1999). The plant's ability to absorb large quantities of heavy elements in their tissues, sometimes up to 60 mg/kg this is due to the ability of many plants to tolerate high concentrations of heavy elements. Plant bearing mechanisms for high levels of heavy elements may be through balbbetidat link containing sulfhydryl group SH (Cobbet, 2000), or through Mettallothioneins, are proteins found in plant and animal cell play an important role in detoxification through Link to items in the cell (Rauser, 1999). And there is variation in bearing plants for heavy items and effect due to the different tissues of the plant, and that the distribution of heavy metals and poisonous plant parts like roots, stems, leaves and fruits are also different depending on the type of item and its behavior in the process of absorption and movement within the Plant as I explained the results Table 3 concentration of lead showed a clear increase in root and leaf's vegetative totals linen on the allowable limit of lead in plants in accordance with the World Health Organization (WHO) of 0.3 mg/kg dry substance this rise comes as a result of plant growth in the soil contaminated. This element.To plant his linen ability absorption and accumulation of heavy elements andof heavy elements (leadwas in total plant root is higher than in the whole vegetative this was confirmed by Das and Maiti (2007) of different plants in treatment of heavy elements. To these items in total plant root more than total vegetative and vegetative can take advantage of this feature to clean up contaminated soil and thus reduce pollution by heavy elements.

REFERENCES

AOAC (1980) Association of official Agriculture chemists. *Official Methods of analysis*. 13 th Ed., Washington, D. C.

Black Methods of Soil Analysis (1965) Part 2. Amer. Soc. Agron. Inc., USA.

Benavides M P, Gallego S M and Tomaro M L (2005) Cadmium toxicity in Plants. *Braz. J. Plant Physiol*. **17**(1), 21-34.

Bishop J (1997) Phytoremediation: A New Gets Ready to Bloom. *Environmental Solutions* **10**(4), 29-35.

Cobbet C S (2000) Phytochelatin biosynthesis and function in heavy metal detoxification. *Curr. Opin. Plant Biol*. **3**, 211 – 216.

Das M and Maiti S K (2007) Metal accumulation in 5 native plants growing on Abundoned Cu- Talling ponds. *Applied Ecology and Environmental Research* **5**(1), 27-35.

Franklin B (2009) *Flaxseed health benefits and side effects*. http://www.dietaryfiberfood.com/flax_seed.php

Henning B J, Snyman H G and Aveling T A S (2011) Plant–Soil interactions of sludge-borne heavy metals and the effect on maize (*Zea mays* L) Seedling growth. *Water SA* **27**(1), 17-77.

Jackson M L (1958) Soil chemical analysis hall, Inc. Engle wood cliffs, N. J.USA.

Mahmood T (2010) Phytoextraction of heavy metals – the process and Chemical Speciation and Bioavialability **15**(4), 93-100.

Mohsen B and Mohsen S (2008) Investigation of metals accumulation in Some vegetables irrigated with waste water inshare Ray-Iran and toxicological application. *American-Eurasian. J. Agric. Environ. Sci*. **4**(1), 86-92.

Ololade I A and Ologundudu A (2014) Concentration and bioavailability of cadmium by someplants. *African Journal of Biotechnology* **6**(16), 1916-1921.

Panwar B S, Singh J P and Laura R D (1999) Cadmium uptake by cowpea and mungbean as affected by Cd and P application. *Water, Air, Soil Pollution* **112**, 163-169.

Qian Jin – Hong, Zayed Adel, Zhu Yong – Liang, Yu Mei and Terry Norman (1999) Phytoaccumulation of Trace Elements by uptake and Accumulation of Ten Trace Elements by twelve plant Species. *J. Environ. Qual*. **28**, 1445-1455.

Rauser W E (1999) Structure and function of metal chelators produced by plants, the case for organic acids, amine acids, phytin and metallothioneins. *Cell Biochem. Biophys*. **31**, 19-48.

Richards I A (1954) U.S. Dep. Agri. Handbook.

Stavrianou W (2007) The Western Australian Contaminated Sites Act: The Applicability of Risk Assessment as a basis for theAssessment and Management of Site Contamination. www.awu.edu.au pp. 1-92.

Volland S, Schaumlöffel D, Dobritzsch D, Krauss G J and Lütz-Meindl U (2012) Identification of phytochelatins in the cadmium-stressed conjugating green alga Micrasterias denticulata. *Chemosphere* **91**, 448.

Wahaibi Mohamed Bin Hamad (2007) The phenomenon of accumulation of heavy elements in plants (brief review). *Saudi Journal of Biological Sciences* **14**(2), 37-96.

World Health Organization (WHO) (2003) Report the use of wastewater in agriculture – a manual for planners. Regional Office for the Middle East. Regional Centre for environmental health activities. Oman, Jordan.