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STUDY OF AMINO CONTENT OF THE *BETA VULGARIS CILCA* PLANT IN PB AND CD CONTAMINATED SOIL

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Abstract

This study was conducted in the laboratories of the College of Education for Women, Department of Biology during the 2018-2019 growth season for the purpose of explaining the potential effects of both the elements of Cadmium and Lead in growth and some physiological characteristics of Chard *Beta vulgaris cilca* and the reflection of these effects on the amino content in the vegetable and seeds of the plant, The results showed that when adding the elements cadmium and lead in different concentrations (30,20,10) mg/kg and (500, 250, 125) mg/kg, respectively, to the soil, the amino acids (Aspartic, Alaninee, Valine, Tryptophan, and Phenyl Alaninee) in the vegetative growth stage and in the harvest and seeds phase obtained A significant increase in concentrations of these acids except for aspartic in the seeds did not show its concentration only in the treatment with lead at a concentration of 250 mg / kg soil as it reached 28.149% compared with the control treatment according to the Duncan polynomial test at a 5% probability level.

Key words : Amino Acid, Heavy metal, *Beta vulgaris*.

Introduction

Soil pollution is expressed as the change taking place in many of the soil specifications, adding foreign matter to the soil, and heavy elements are also polluted by the accumulation of organic waste in them, and that soil pollution is a critical indicator of continuing to maintain the ecosystem with the necessary nutrients (Kizilkaya, 1998; Molina, 1997).

Among the polluting or polluting elements are Co, Zn, Pb, Hg, Cu, Cr, and they accumulate in the soil to reach the plant and its seeds and other components. The presence of these pollutants in the environment is very dangerous because it affects the health and life of humans, animals and plants whose components are not sustainable Often decomposition, therefore, is present in the soil for a long time (Lasat, 2002).

Man and his activities are among the most important sources of pollution with heavy elements through waste produced from dye factories, as well as from refractory metals, mines, power plants, waste organic materials, waste from untreated drug factories and pesticide and oil industry (EPA/ROC, 1994; Jackson & Alloway, 1995).

The heavy elements present in the soil formed as a result of its transformation from its primary sources or through its association with chemical compounds and finally these elements are released as a result of physical, chemical and biological activities (Chen *et al.*, 2000; Schwed, 2001).

Cadmium is one of the most important heavy elements with high toxicity through its transmission through the food chain (Hiroyuki *et al.*, 2000; Kirkham, 2007). There are also several factors that affect cadmium and its movement. El-Shafie and El-Shika (2002) founds that reducing the pH relative to the soil leads to a significant increase in the concentration and absorption of cadmium in the parts of the plant compared to those plants that grow In an alkaline medium, Trifu (2004) was considered to be a factor for absorbing cadmium from the soil.

The accumulation of lead in plant tissues leads to a multiplication of physiological, chemical and biological functions in the plant, either directly or indirectly, and causes plant toxicity by changing the permeability of the cell membrane, as well as leading to preventing and germination of seeds, elongation of roots, seedlings growth, plant growth, transpiration, chlorophyll production and protein plant content (Huang & Huang, 2008; Mohammad, 2003; Olivares & Elizabeth, 2003).

Amino content in the plant

Amino acids are the basic unit that is important for building protein, because when proteins are digested inside the body or cells, they are converted to amino acids and amino acids are simple organic compounds that contain the COOH group and the NH_2 group, and are formed in plant cells The animal is natural, as amino acids work to withstand environmental conditions from opposite stress, heat, thirst, storms, salinity and many conditions that lead to changes in plant growth and lead to a decrease in the quantity and quality of the crop, as it has an important role and prominent functions in the plant in addition to using As long as it is in the process of biosynthesis and playing vital roles in the plant, in general the sizes of the twenty amino acids differ and differ dynamically according to the developmental and physiological state in the plant cell, in addition to the biodegradation of the amino acids (Tatjana *et al.*, 2015). Metabolism in the plant being the structural unit of the protein as it transports and stores nitrogen, and that arginine acid has an important role in plant resistance to difficult conditions such as thirst, salinity, heat, and cold. It also has an important role in cell division, root formation, and polyamide formation, as well as in the formation of chlorophyll, an essential acid in the plant and an important source of urea (Mansour, 200).

Phenylalanine (Ph) One of the important acids in the plant is Aspartic acid, which is a non-essential amino acid, and it is an alpha-amino acid found in mammals as it enters the urea cycle, is found in plants and helps in the cycle of glucose synthesis (Mohammad, 2003).

Alanine (Al) is a non-protein amino acid. The synthesis of phenyl alanine has not been widely discovered in the plant despite interest in developing alternative methods to produce natural compounds (Moraghan, 1993).

Valine (Va) is an essential amino acid and this acid has stimulating effects and also acts as a stimulant, and affects the speed of root formation, seed formation and the speed of plant growth (Moraghan, 1993).

Tryptophan (Tr) is one of the important amino acids in the plant through its formation of active Auxins that help plant growth and also helps in early crop production (Tatjana *et al.*, 2015).

Materials and Methods

Field work

The study was conducted at Tikrit University, College of Education for women, Biology Department laboratories for the purpose of explaining the potential effects of both cadmium and lead in the amino content in leaves and seeds of chard *Beta vulgaris cilca*. Seed source: *Beta vulgaris cilca* seeds were obtained from the local market.

The parameters used

The coefficients were chosen for each of the elements of cadmium and lead by three concentrations for each component, which is (30,20,10) mg / kg of cadmium soil, and lead by three concentrations are also (500,250,125) mg / kg of soil as well as the comparison treatment (without addition) After weighing these concentrations, they were mixed with the soil by (6) replications for each treatment.

Agriculture and irrigation

Plastic pots were chosen with a diameter of 22 cm and a height of 19 cm and accommodate 7 kg of soil. After cleaning the pans were marked according to the treatments and repeaters, then the soil was mixed with fertilizer super phosphate and urea at a concentration of 40 parts per million, equivalent to 0.2 mg / pot. The seeds of chard *Beta vulgaris cilca* were planted on 11/8/2018 in plastic pots and watered with tap water by 75% of the field capacity and weight control using the scale every time the plant was watered and the watering process continued throughout the trial period and after 10 days of planting The number of seedlings was reduced to 3 seedlings / pots and after 125 days the plant was extracted taking into account the use of water to clean the plant and the use of the sieve to prevent the loss of any part of the roots where the height of the plant and the length of the root groups were measured. Thoughtful traits:

After 45 days of planting, three replications were taken from each treatment for the purpose of conducting some tests related to the illiteracy content of the leaves of the plant in the vegetative growth stage, as the plant was extracted and put in tagged paper bags and each of the following tests were performed: -

The yield stage (harvest): After 125 days of planting, mature plants were extracted in the final growth stage and some tests were carried out as shown below:

Detecting the type and concentration of amino acids in the leaves and seeds of plants

The leaves and seeds of the plant were dried for the purpose of revealing the type and concentration of amino acids, as in the following method: Mill the leaves and seeds of the dried plant were pulverized, then sifted and taken 5 g, then added 50 ml of 80% ethyl alcohol and left in the refrigerator for 5 minutes, after which the sample was placed in the Soxhelet for an hour after adding 50 ml of ethyl alcohol and the filtrate was taken from the sample and evaporated to dryness by Evaporated rotary evaporator.

Results and Discussion

Detecting the type and concentration of amino acids in the leaves and seeds of the plant

Aspartic acid (As)

Aspartic acid is considered naturally present in the plant, and from table 1 the results show that the aspartic acid is present in the chard plant in the vegetative growth stage of the plant but in small quantities as in the treatment of cadmium concentration of 10 mg / kg of soil as the difference is not significant while treatment with cadmium with a concentration 20 mg / kg of soil increased significantly compared to the control treatment according to the Duncan polynomial test, while the rest of the treatments are cadmium at a concentration of 20 mg / kg of soil and lead with a concentration of (500,250,125) mg / kg of soil, the acid did not appear, and the reason for this is that its amount is less than the sensitivity of a device As for the HPLC, at the harvest stage, a significant increase in gm was obtained All the mentioned treatments except for the treatment of lead at a concentration of 500 mg / kg of soil was not significant, and that this increase is probably because the concentrations used for heavy elements stimulated an increase in the productivity of this acid in the chard plant as this acid improves the plant's resistance to diseases, while we find the acid concentration in seeds The chard plant was low in all treatments so that the apparatus could not read it except for the treatment of lead at a concentration of 250 mg / kg of soil was higher compared to the control treatment according to the Duncan polynomial test at the 5% probability level.

Alanine (Al)

In table 1 we notice a significant decrease in the acid concentration in the cadmium treatments at a concentration of 10 mg / kg soil and lead (250,125) mg / kg soil, while a rise in cadmium at a concentration of 30 mg / kg soil occurred and the increase was significant in relation to the acid of the yin compared with the control As for the treatment of cadmium with a concentration of 20 and lead of 500 mg / kg of soil, it was insignificant compared to the control coefficient, according to the Duncan polynomial test at the 5% probability level in the vegetative growth stage of the plant. While in the harvest stage, all treatments were significantly elevated except for cadmium at a concentration 30 mg / kg soil and lead at a concentration of 5 00 mg / kg soil in comparison with the control treatment, while it was found that the concentration of this acid in chard seed table 3 has a significant increase compared with the control treatment except for the lead at a concentration of 125 mg / kg soil and was not significant, and the decrease in the mentioned concentrations was It has led to the formation of this acid, while the increase in its concentration gave an incentive to this acid to protect the plant at extreme temperatures, lack of oxygenation, dehydration, shock of heavy elements, and some vital pressures. Also, the high levels of yin in the plant indicate a change in the metabolism process that is considered Necessary in the metabolism Secondary, In some leguminous plants *â-alanine* is involved in protecting against the toxicity of heavy elements and free radicals (Moraghan, 1993).

Valine (Va)

When observing the concentrations found in table 1, it was found that there was a significant decrease in all treatments except lead (500 mg / kg soil), because it neglects that its concentration is less than the concentration of the device used in the examination in the stage of vegetative growth, while we find when harvesting the chard plant and after conducting checks on it We find that all transactions have a significant increase in this acid compared to the control treatment except for cadmium at a concentration of 30 mg / kg soil in which there was an unimportant decrease compared to the control treatment, and an increase in the treatment with lead was that this acid helps in the growth of seeds and the speed of formation of roots, we note in Plant seeds height Intensive in its concentration in the treatment of cadmium at a concentration of 10 mg / kg soil and lead at a concentration of 500 mg / kg soil and this rise was due to its role in an aid in seed growth and the speed of root formation, while the rest of the transactions occurred a significant decrease in the acid concentration compared with the control treatment according to The Duncan multinomial test is at the 5% probability level and this decrease may be due to the fact that the toxicity of heavy elements has weakened the appearance of this acid concentration, and we find that this increase may be due to the effectiveness of different physiological amino acids in reducing the effect of water stress in the plant as it increases the Hormone production T plant that promotes growth of Auxins, Cytokinins and Gibberellins (Eun *et al.*, 2000).

Tryptophan (Tr)

Table 1: The effect of soil contamination with cadmium and lead on the amino content of chard plant in the vegetative growth stage.

Amino Acid	Control	Cdppm			Pbppm		
		10	20	30	123	250	500
As	0.053 b	0.049 b	NO	2.528 a	NO	NO	NO
Al	0.894 b	0.022 d	0.73 b	1.857 a	0.034 d	0.113 60	0.994 b
Va	2.404 b	0.103 d	3.601 a	0.73 c	0.181 d	0.133 d	NO
Tr	1.228 c	0.138 e	5.551 a	0.245 d	0.266 d	0.591 a	3.816 b
Ph	3.978 b	0.229 d	1.806 c	1.75 c	0.215 d	0.736 d	5.159 a

Similar letters mean that there are no significant differences in them at the 5% probability level according to the Duncan polynomial test.

Table 2: Effect of soil contamination with cadmium and lead on the amino content of chard plant at the harvest stage.

Amino Acid	Control	Cdppm			Pbppm		
		10	20	30	123	250	500
As	0.08 f	50.215 b	15.978 c	11.184 d	3.133 e	152.21 a	0.703 f
Al	0.85 e	10.332 b	1.946 d	0.203 e	7.429 c	30.799 bc	0.227 e
Va	1.042 d	7.11 b	3.16 c	0.087 e	7.532 b	20.442 a	3.066 c
Tr	2.001 d	20.1 a	8.791 c	1.269 d	21.606 a	12.624 b	12.034 b
Ph	2.489 d	2.429 d	7.394 b	2.637 d	9.692 a	8.727 ab	5.106 c

Similar letters mean that there are no significant differences in them at the 5% probability level according to the Duncan polynomial test.

Table 3: Effect of soil contamination with cadmium and lead on the amino content of chard seedlings.

Amino Acid	Control	Cdppm			Pbppm		
		10	20	30	123	250	500
As	NO	NO	NO	NO	NO	28.149 a	NO
Al	7.673 e	0.43 C	10.413 d	19.083 b	7.103 e	12.58 c	28.164 a
Va	7.889 c	0.535 e	9.826 b	5.48 d	5.923 d	7.719 c	16.075 a
Tr	4.989 d	0.91 e	5.014 d	25.403 b	5.49 d	11.165 c	28.326 a
Ph	0.918 c	0.367 c	4.84 b	4.213 b	2.159 d	8.522 a	4.272 b

Similar letters mean that there are no significant differences in them at the 5% probability level according to the Duncan polynomial test.

Through our observation of the concentrations found in table 1 in the vegetative growth stage of the treatments used when adding different concentrations of heavy elements to the plant we note that there are differences in the concentration of tryptophan acid so we notice a significant decrease in all treatments except for the treatment of cadmium at a concentration of 20 mg / kg soil and lead at Concentration is 500 mg / kg of soil in which there is a significant increase in the acid concentration and perhaps this rise helps to ward off toxicity from the plant in the vegetative growth stage, as we notice in the harvest stage its concentration increases significantly compared to the control treatment according to the Dunkin polynomial test at the level of necessity The 5% excluding cadmium at a concentration of 30 mg / kg soil in which there was an insignificant decrease, while we find that the acid concentration in the seeds of chard plant when adding the element cadmium at a concentration of 20 mg / kg soil in which there was an insignificant rise and lead at a concentration of 125 mg / kg soil also increased However, the increase is not significant, but the rest of the transactions occurred in which a significant increase occurred except for the cadmium at a concentration of 10 mg / kg soil in which there was a decrease, but it was significant compared to the control treatment and evolution of the plant, As he found the plants when sprayed acid tryptophan amino ornamental plants will lead to an increase in many of the qualities and an increase in the content of tissues.

Phenylalanine (Ph)

From what was shown in table 1 in the vegetative growth stage of chard plant when adding heavy elements to the soil, we notice a significant decrease in the concentration of acid in the vegetative stage except for treatment with lead at a concentration of 500 mg / kg soil in which a significant increase occurred compared with the control treatment. As for table 2 for chard plants at the harvest stage, we notice a significant increase in the concentration of phenylalanic acid in the treatments used, with the exception of treatment with cadmium at a concentration of (30,10) mg / kg of soil, the height was not significant compared to the control treatment. As for the seeds we find There is an increase in all concentrations used and this increase is significant except for the treatment of cadmium 10 mg / kg soil in which there was an insignificant decrease and perhaps the decrease of this acid in the vegetative stage of chard plant is due to being the cause of tension on the tissue and thus a toxic cause of the plant (Jackson and Alloway, 1995).

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