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EFFECT OF PHOSPHATE FERTILIZERS APPLICATIONS ON TRANSLOCATION OF Some HEAVY METALS FROM SOIL TO OLIVE Trees

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Abstract

Mineral fertilizers, which are indeed an important nutrient sours, used for enhanced food production. Phosphate fertilizers remains the main sours of some heavy metals such as U, Th, and Cd, among others. On other hand, uranium, thorium and cadmium cadmium are always in soils. The purpose of thisresearch is to clarify transfer these elements from soil to plant organs. Towenty eight ,surface and subsurface soil samples, and Fourty two olive (Olea European L.) plant samples were collected from eastern and western Rosette area north Egypt,to evaluate the objective of this study . The results detected in soil and olive cultivars near Rosetta estuary at two sides were relatively high .The three metals in western side were higher than at the other eastern side. Also, The U ,Th , and Cd content of olive tree organs at the western side were higher than that found at the other eastern ones . The highest values of Uranium, Thorium and Cadmium were found obtained by olive roots. Total uranium, thorium and cadmium in western soil samples were relatively higher than that found in the eastern side.

Keywords: Phosphate fertilizers - Uranium -Thorium –Cadmium.

1. Introduction

Phosphate, like potassium and nitrogen is an essential element for plant growth. During thelast two decades,80-90 % of world phosphate rock output had been used in the fertilizer industry (Dissanayake and Chandrajith, 2009).

Phosphate fertilizers are produced by acidulation of crushed and powdered phosphate rock. Single superphosphate (ssp) is produced by the use of sulphouric acid, while triple superphosphate (Tsp.) uses phosphoric acid for acidulation, **(Sparks, 2003).** Phosphate fertilization remains the main source of some toxic elements, and soil contamination **(Schnug and Lottermoser, 2013)**.Metals such as Uranium (U), Thorium (Th) and Cadmium (Cd) have been found to be significantly high in some of the final products.

Roelionuclides (uranium and thorium) are also carried through phosphate fertilizers and have become accumulated in soil and plant organs. So, there may be multiplied risk to human population via food chain (**Abojassim and Hady, 2016)**.In Germany, the use of phosphate fertilizer from 1951 to 2011 has resulted approximately 14000 t of uranium on agricultural land corresponding to 1 Kg of uranium per hectare, (**Schnug, 2012**).

Due to the presence of these toxic elements that have a major negative impact on the environment of many countries have enforced stringent laws on the maximum permissible levels of the toxic elements in fertilizer products. The present work was conducted to evaluate the toxic elements uranium, thorium and cadmium in phosphate fertilizers, soil pollution and its translocations in olive tree organ(s).

2. Materials and Methods

Twenty eight soil samples surface (0-30 cm) and subsurface (30-60 cm) depths were collected from soil In both eastern and western sides of Rosette estuary area at distances 1000 , 2000 , 3000 , 4000 , 6000 , 8000 and 10000 m. Also forty two plant samples were collected from the same distances of eastern and western sides of Rosetta estuary (Fig.1).

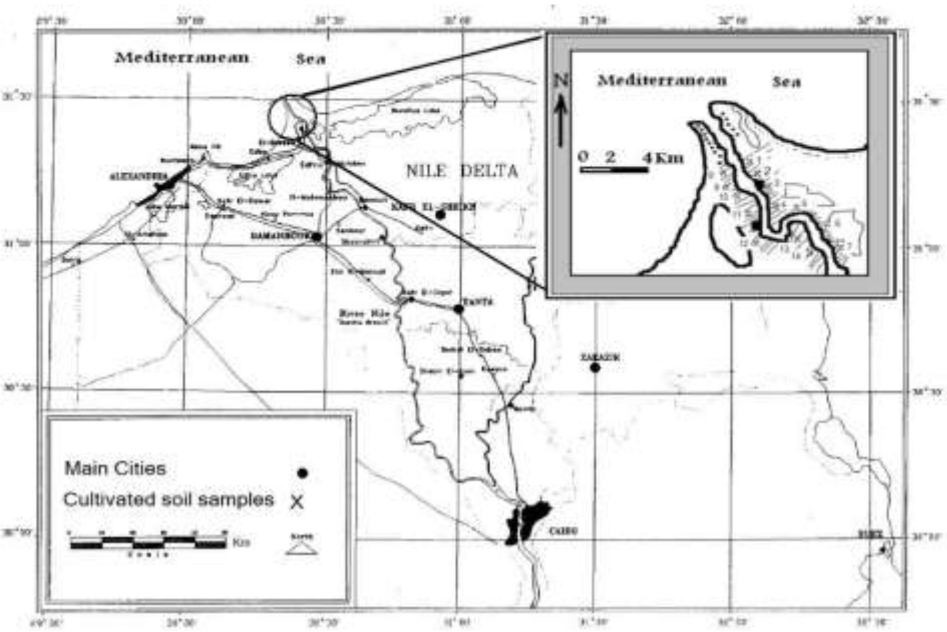

Fig. 1: Localization of the Nile delta and map of the studied are.

The soil samples were air dried, ground passed through 2mm sieve and analyzed according to Jackson (1973). Thorium, uranium and cadmium were determined in Nuclear Materials Authority; total uranium and thorium were determined by gamma ray according to Matolin (1991) and total cadmium was determined using inductively coupled spectra photometer plasma (HCP-OES) Jackson (1973). .

The olive (Olea European L.) plant samples (3-4 years ago) were segregated, into (root , stems and leaves), dried at 70 ^{oC} and representative portions were digested using mixture of $HClO_4$ and H_2SO_4 . The resultant solution was determined for uranium according to Bouda (1988) , thorium according to Chalmers (1970) and cadmium as was previously mentioned in soil analysis.

3. Results and Discussion

3.1. Some Physical and chemical properties of the studied soil area

Data presented in Tables (1& 2) showed same physical and chemical properties of soil samples that located at different distances in the eastern rosette side (kafer El Shikh Governorate) in two layers (0-30 cm) and (30 - 60cm). The data showed that sand fraction slightly decreased with increasing the distanced to southern direction in two (surface and surface) layers, while silt and clay percentage were consequently increased. Generally, loamy sand texture was dominant in soil area samples. Organic matter (O.M) values in the investigated soil samples were ranged from (0.1% to 1.3%) and from (1.2% to %1.5 %) after and before phosphate fertilizer application. Conspicuously, it deserves to mention that the organic matter percentage in the subsurface (30-60cm) layers were higher than that in surface one (0-30 cm). The soil reaction of kafr Elsheikh Governorate soil samples was slightly alkaline, or pH values, ranged from 7.4 to 8.0 at the two layers after and before phosphate fertilizers application.

3.2. Soil uranium, thorium and cadmium status in the kafer El Shikh Governorate studied area.

The total uranium concentration in soil samples were mostly within the average range of uranium concentration measured in different types of soil(1-10 mg/kg) Kock –Steindl and Prohl (2001) .Data of Tables (1&2) showed that the uranium content was slightly higher in surface soil samples after application of phosphate fertilizers. The highest uranium content was (3.13 mg/kg)found in the surface soils samples at 1000m distance, after phosphate fertilizers application , and the least was (0.50 mg/kg) found in subsurface soil samples. These results were due to the large quantities of uranium contained in phosphate fertilizers that was expected to enrich agricultural soil in uranium after application of the fertilizers .Guzman et .al (2006),noted that the uranium concentration in phosphate fertilizers used on Mexican lands ranged between70 and 200 mg /kg. They were of the view that it is capable of generating toxic effects in all trophic levels if 2.1 mg /L are surpassed in soil and 20 µg/L in the water supply (USEPA, 1996).

Table (1) Some soil properties and contents of Uranium, Thorium and Cadmium (mg/kg) in Cultivated soil samples at different distance in Rosetta Eastern side, (before phosphate fertilizersapplication) .

S. No	DepthCm	Partial size dis.			TextureClass	O.M %	pH	U	Th	Cd
		Sand %	Silt %	Clay %	Lemay			Mg/ kg		
1	0-30	83.2	11.0	6.8	sand	0.1	7.9	3.10	12.0	0.26
	30-60	76.2	16.0	7.8	sand	0.4	7.6	2.50	14.0	0.18
2	0-30	81.4	9.8	8.8	sand	1.0	7.7	1.00	8.5	0.36
	30-60	81.6	9.9	8.5	sand	1.2	7.6	3.00	11.0	0.29
3	0-30	82.5	8.2	9.3	sand	1.1	7.5	3.00	8.0	0.26
	30-60	82.5	8.2	9.3	sand	0.8	7.4	2.00	11.0	0.26
4	0-30	79.4	10.2	10.4	sand	1.1	7.4	2.90	9.0	1.42
	30-60	89.8	9.8	10.4	sand	1.2	7.8	2.00	11.0	1.28
5	0-30	70.2	14.0	15.4	sand	0.3	8.0	1.00	9.0	0.28
	30-60	65.2	15.9	18.9	sand	0.2	8.0	0.50	12.0	0.18
6	0-30	70.5	15.7	13.7	sand	1.3	7.3	1.00	8.0	0.54
	30-60	68.3	14.9	16.8	sand	1.2	7.5	2.00	11.0	0.62
7	0-30	68.3	15.9	15.8	sand	0.4	7.6	1.00	8.5	0.23
	30-60	67.2	17.0	15.8	sand	0.2	7.5	2.00	5.0	0.15

Table (2) Some soil properties and contents of Uranium, Thorium and Cadmium (mg/kg) in Cultivated soil samples at different distance from Rosetta eastern side, (after phosphate fertilizers application).

S. No	Depth Cm	Particle size dis .			Texture Class	O.M %	pH	U	Th	Cd
		Sand %	Silt %	Clay %				Mg/ kg		
1	0-30	83.2	11.5	6.5	Loamy sand	0.2	7.8	3.13	12.22	0.25
	30-60	78.5	17.2	7.9	Loamy sand	0.3	7.7	2.53	14.15	0.17
2	0-30	82.5	9.7	8.8	Loamy sand	1.1	7.9	1.02	8.66	0.35
	30-60	81.5	9.8	8.7	Loamy sand	1.5	7.8	3.05	12.01	0.30
3	0-30	82.7	8.1	9.2	Loamy sand	1.4	7.5	3.04	8.01	0.27
	30-60	82.5	8.0	9.5	Loamy sand	0.7	7.4	2.05	11.20	0.25
4	0-30	80.0	9.8	9.9	Loamy sand	1.0	7.5	3.01	8.50	1.45
	30-60	87.7	11.8	10.5	Loamy sand	1.3	7.8	2.04	11.50	1.30
5	0-30	75.5	12.5	12.0	Loamy sand	0.2	8.0	1.07	9.03	0.20
	30-60	70.2	11.3	8.5	Loamy sand	0.5	8.0	1.00	12.01	0.17
6	0-30	70.5	15.7	13.7	Loamy sand	1.2	7.5	1.09	7.90	0.54
	30-60	70.0	14.8	16.2	Loamy sand	1.2	7.5	2.08	11.03	0.63
7	0-30	72.5	14.3	13.2	Loamy sand	0.9	7.6	1.50	8.50	0.24
	30-60	73.9	12.3	14.8	Loamy sand	0.5	7.5	2.35	5.90	0.16

The uranium content ranged between (0.50and 1.10 mg / kg) and (1.00 and 3.13 mg/kg) after and before phosphate fertilizers applications , respectively . It is quite evident that uranium values were higher in soil samples before phosphate fertilizers application than that found by before its addition. These results many attributed to the phosphate fertilizers application that the accumulation of uranium in surface soils . These results were in agreement with Takada et. al (2006),they reported that about 90% of uranium input to the field was attributed to superphosphate.

The Thorium contest slightly increased with phosphate fertilizers application than meanwhile, the thorium values in subsurface were higher than that obtained by surface ones. Data of Tables (1& 2) showed that the highest thorium value (14.15 mg /kg)was found in subsurface soil samples after phosphate fertilizers application and the least (8 mg/kg) was found in surface soil samples . These observations may be attribulad to the associated radioactive minerals (zircon and monazite) that found in the samples area (Schulz (1995).

Regarding the cadmium contents in surface and subsurface layers , ones. Van kauwenbergh(2002),has considered about 16 elements that are associated with phosphate rocke and phertilizers are potentially hazardous to human health . Also van Kauwenbergh (2007) showed that approximately 25 % of cadmium in the highly weathered zone of the Togo phosphate deposit is associated with the calcite component and that phosphate and cadmium tend to concentrate during the leaching of carbonate-bearing beds and removal of calcite. Dissanayake and Chandrajith (2009) revealaed that the phosphate and cadmium of some sedimentary phosphate rockes in at Egypt (Abu Tartur) ranged between 3 to 10.5 mg /kg while the average of P2O5 was29.9 %. The cadmium values in Tables(1&2) ranged between (0.15 to1.42 mg /kg) and (0.145 mg/ kg) in the soil at samples of kafr El Shcikh Governorate before and after phosphate fertilizers application , respectively.

With respect to the same physical and chemical properties of soil samples located at the western rosette side (Behera Governorate), data in Tables (3 & 4) showed also, that the sand fraction decreased with increasing the distances in lehe two surface and subsurface layers were silt and clay percentage were also increased. The soil textures were loam and sandy loam in the surface and subsurface soil samples in Beehera Governorate area.

Organic matter (O.M) values in the soil samples were increased with increasing distances. The highest organic matter was 3%and the least was 1%. The organic matter that found at Behera governorate area were slightly higher than that obtained by the other of Rosette side. The soil reaction of Behera governorate soil samples was slightly alkaline , as pH values ranged between (7.4 to 8.2)at the two layers , before phosphate fertilizers application .

3.3. Soil uranium, Thorium and Cadmium status in Behera Governorate studied area.

The total Uranium values at Behera Governorate soil samples were more than two times higher that obtained in the other Rosette eastern side. Uranium concentrations were mostly in the world average value (1-8 mg/kg). These results are in agreement **(IAEA 1999).** However, the high uranium concentration values at western rosette side of Behera Governorate may be ascribed to some radioactive minerals (zircon and monazite) that are found in black-sands at Rosetta branch area . The heavy mineral concentrations at western side were noticed to be higher than that at the eastern side **(Ammar et al 1983).** The highest and least uranium values were (7.50 and 0.5 mg /kg) and (7.69 and 0.79 mg/kg)at western Rosetta soil samples, before and after phosphate fertilizers application , respectively.

Thorium content in the western side (Behera Governorate) before and after was higher than that found at eastern Rosetta side . Meanwhile , the Thorium content in the eastern and western sides at the subsurface soil samples were higher than that found in the surface ones . Date of Tables (3 & 4) exhibited that the higher and least thorium contents were(21 and 5mg

/kg and (20.95 and 4.50)in the surface and surface soil samples before and after phosphate fertilizers application . These results showed that thorium content was not affected by phosphate fertilizers additions.

Table (3) Some soil properties and contents of Uranium, Thorium and Cadmium (mg/kg) in Cultivated soil samples at different distance in Rosetta western side, (before phosphate fertilizersapplication) .

S. No	Distance m	Depth Cm	Partic. Size dis .			Texture Class	O.M %	pH	U	Th	Cd
			Sand %	Silt %	Clay %				Mg/ kg		
1	1000	0-30	73.2	17.0	9.8	Sandy Loam	1.0	7.8	6.54	12.0	0.26
		30-60	63.2	27.0	9.8	Sandy Loam	1.9	7.9	5.90	21.0	0.23
2	2000	0-30	47.0	41.3	11.7	Loam	1.4	8.2	3.50	9.0	0.26
		30-60	50.9	37.3	11.7	Sandy Loam	1.1	7.9	2.45	11.0	0.25
3	3000	0-30	52.9	37.3	15.6	Sandy Loam	1.3	7.9	2.30	9.0	1.08
		30-60	53.2	32.6	14.6	Sandy Loam	1.2	8.0	3.50	10.5	1.06
4	4000	0-30	52.1	33.6	13.7	Loam	1.6	7.4	0.50	9.0	0.24
		30-60	50.0	34.3	15.7	Loam	1.6	7.4	0.60	11.0	0.31
5	6000	0-30	54.9	29.4	15.6	Sandy Loam	2.8	7.5	1.60	10.0	0.38
		30-60	52.9	30.2	17.3	Sandy Loam	3.0	7.4	0.75	12.0	0.24
6	8000	0-30	56.8	27.5	15.6	Sandy Loam	2.3	7.4	7.50	9.0	0.34
		30-60	53.2	30.2	16.2	Sandy Loam	2.0	7.5	2.00	11.5	0.32
7	10000	0-30	52.9	31.4	15.6	Sandy Loam	3.0	7.8	5.50	8.0	0.22
		30-60	50.2	32.6	17.2	Loam	3.0	7.8	1.50	5.0	0.19

Table (4) Some soil properties and contents of Uranium, Thorium and Cadmium (mg/kg)in Cultivatedsoil samples at different distance in Rosetta western side,(after phosphate fertilizers application)

S. No	Distance m	Depth Cm	Partial size dis .			Texture Class	O.M %	Ph.	U	Th	Cd
			Sand %	Silt %	Clay %				Mg/ kg		
1	1000	0-30	73.5	16.8	9.7	Sandy Loam	1.0	7.2	6.62	12.20	0.27
		30-60	73.5	27.0	9.6	Sandy Loam	2.0	7.9	5.50	20.95	0.22
2	2000	0-30	47.1	41.6	11.3	Loam	1.5	7.9	3.03	9.89	0.25
		30-60	59.3	37.3	10.8	Sandy Loam	1.3	7.9	2.95	11.20	0.20
3	3000	0-30	44.7	32.4	13.9	Loam	1.2	8.20	2.42	9.95	1.15
		30-60	52.8	32.6	15.6	Loam	1.1	8.00	3.59	10.00	1.06
4	4000	0-30	55.0	29.4	16.6	Loam	1.5	7.50	0.90	9.30	0.25
		30-60	53.9	29.5	14.8	Loam	1.4	7.5	0.89	11.20	0.31
5	6000	0-30	55.7	29.5	14.8	Sandy Loam	2.0	7.4	1.58	10.12	0.20
		30-60	56.4	28.8	17.3	Sandy Loam	3.0	7.4	0.79	12.12	0.20
6	8000	0-30	50.3	31.9	14.6	Sandy Loam	2.4	7.5	7.69	9.80	0.30
		30-60	52.3	31.4	17.8	Sandy Loam	2.0	7.6	2.99	12.00	0.30
7	10000	0-30	53.5	29.2	17.3	Sandy Loam	2.8	7.6	5.00	7.50	0.23
		30-60	55.3	29.2	15.1	Loam	3.0	7.6	2.30	4.50	0.19

Cadmium contents in the western rosette side ranged between (0.19 and 1.08 mg /kg) and (0.19 and 1.15 mg/kg)in the surface and subsurface soil samples , before and after phosphate fertilizers apparition respectively. It is evident that cadmium at the surface soil samples were higher than that found in subsurface ones. These results agreed with **willions and David (1997).** They mentioned that the use of phosphate fertilizers was alsoconsidered as cadmium enrichment factor in soils and groundwater.

3.4. Uranium, Thorium and Cadmium in olive plant.

Uranium ,thorium and cadmium contents in olive plants organs (root, stem and leaves) were clearly showed preferential accumulation of these elements in olive roots more than the other organs (stem and leaves) , and followed the order root >stems > leaves, respectively for olive trees grow at the eastern and western Rosette areas. Tables (5& 6) showed that the uranium content in plants organs were corresponding with the mean uranium contents in (surface and subsurface) soil samples . The concentration ratios (CR) in olive root ranged between (0.15% and 5.9 %) and (6.5 % and 9.6%) before and after phosphate fertilizers applications , respectively. The (CR) of uranium decreased with stem and leaves. These results were in agreement with **Cook et..al (2007).** They reported that root uranium concentrations were 3 to5 times higher than the shoot uranium concentrations in severely contaminated agricultural plants. The percentages of stem uranium relative to root plants ranged between (19.02% and 89 %)as plants roots.

The data presented in Tables (5& 6) exhibited that uranium contents in olive (root ,stem andleaves) were slightly higher after phosphate fertilizers applications than its before fertilize addition **Guzman et . al (2006)** reported that the concentration of content uranium in corn titivated areas was due to intensive fertilizer application in the high plane of Mexico, where it increased from 15% to 20% in uranium content. It has been show that the concentration of uranium correlates with the P2O5 concentration of fertilizers.

Table (5): The concentration and transfer of (U, Th and Cd) heavy metals in olive (root , stem , andleaves), at different distances from Rosette eastern side (Kafr El sheikh Governorate) before phosphate fertilizers application .

S. No	Distance m	Root		Stem			Leaves		
		Content mg /kg	Trans. Soil/Root	Content mg /kg	Relative to soil (%)	Trans(root/ stem) (%)	Content mg /kg	Relative to soil (%)	Trans stem/ Leaves (%)
Uranium									
1	1000	0.16	5.93	0.10	1.79	6.50	0.03	3.70	30.00
2	2000	0.14	6.36	0.09	0.95	6.64	0.05	2.29	53.76
3	3000	0.11	4.40	0.09	2.50	9.09	0.03	1.32	34.74
4	4000	0.11	4.58	0.02	2.08	1.81	0.01	0.12	15.00
5	6000	-	-	-	-	-	-	-	-
6	8000	0.01	0.66	0.05	0.33	7.14	0.01	0.66	20.00
7	10000	0.01	0.66	0.02	0.13	6.63	0.01	0.66	50.00
Thorium									
1	1000	0.38	2.88	1.95	1.47	51.31	0.03	15.38	60.97
2	2000	0.27	2.64	1.03	0.99	38.14	0.02	12.61	32.19
3	3000	0.11	1.13	0.93	0.96	93.00	0.08	5.47	29.71

4	4000	0.11	1.04	0.50	0.50	50.00	0.05	83.00	28.62
5	6000	0.07	0.65	0.09	0.09	16.66	00	00	00
6	8000	0.06	0.62	0.02	0.21	33.33	0.01	7.57	79.12
7	10000	0.07	1.04	0.01	0.11	14.28	0.00	00	00
Cadmium									
1	1000	0.19	80.00	0.05	23.81	26.32	0.03	14.29	60.00
2	2000	0.19	59.38	0.09	28.13	47.37	0.05	15.63	55.56
3	3000	0.16	61.54	0.10	38.36	62.50	0.02	7.69	20.00
4	4000	0.18	13.33	0.09	6.67	50.00	0.02	1.48	22.22
5	6000	0.15	78.95	0.10	52.63	66.67	0.09	47.37	90.00
6	8000	0.28	47.46	0.25	42.37	89.29	0.03	5.08	12.00
7	10000	0.09	45.00	0.04	20.00	44.44	0.02	10.00	50.00

Table (6): The concentration and transfer of (U, Th and Cd) heavy metals in olive (root, stem, andleaves), at different distances from Rosette eastern side (Kafr El sheikh Governorate) after phosphate fertilizers application .

S. No	Distance m	Root		Stem			Leaves		
		Content (Mg /kg)	Trans (Soil/Root)	Content (mg/kg)	Relative to soil	Trans (Soil/Stem)	Contentt mg /kg	Relativee to soil	TransSoil/ Leaves
Uranium									
1	1000	0.26	9.60	0.25	9.69	94.69	0.02	0.70	8.00
2	2000	0.24	8.26	0.15	6.25	63.22	0.05	2.45	32.68
3	3000	0.22	8.84	0.22	8.84	100.0	0.04	2.54	15.83
4	4000	0.20	8.20	0.26	0.77	9.95	0.02	2.57	7.69
5	6000	00	00	00	00	00	00	00	00
6	8000	0.10	6.66	0.08	5.33	80.00	0.04	2.53	50.00
7	10000	0.10	6.53	0.09	5.76	89.79	0.06	3.94	62.22
Thorium									
1	1000	0.38	29.38	0.32	26.23	85.86	0.02	15.38	60.97
2	2000	0.67	68..72	0.38	39.17	58.84	0.12	12.61	32.19
3	3000	0.21	22.42	0.17	18.42	82.15	0.05	5.47	29.71
4	4000	0.33	33.90	0.29	29.00	85.54	0.08	83.00	28.62
5	6000	0.20	19.80	0.18	17.33	87.50	00	00	00
6	8000	0.20	12.84	0.09	9.57	74.59	0.07	7.57	79.12
7	10000	000	00	00	00	00	00	00	00
Cadmium									
1	1000	0.20	80.00	0.14	56.00	70.00	0.12	48.00	85.71
2	2000	0.29	87.87	0.19	57.57	65.51	0.18	54.54	94.73
3	3000	0.25	96.15	0.17	65.38	68.00	0.14	53.85	82.35
4	4000	1.02	75.55	0.69	51.11	67.64	0.53	39.25	76.81
5	6000	0.02	86.96	0.17	73.91	85.00	0.12	52.17	78.58
6	8000	0.44	75.86	0.35	60.34	79.54	0.20	34.45	57.14
7	10000	0.70	100.00	0.11	55.00	55.00	0.09	45.50	81.81

It was noted that the thorium series contributes only in a minor way to the radioactivity in phosphates compared to the uranium series (Hussein, 1994).The thorium content in olive roots ranged between (0.05 and 0.38 mg /kg) and between (0.12 to 0.67 mg /kg) before and after phosphate application at (kafer Elsheikh Governorate) Rosette eastern side. It was quite evident that thorium values in olive roots were higher after phosphate fertilizers applications than before its addition. The highest thorium values were in roots, and the least were in olive leaves. The CR in olive organs ranged from 0.01% to 2.8 % for roots, stems and leaves after phosphate fertilizers applications , and from 0.2 % to 2.9 % for the olive organs before phosphate fertilizers applications.

The accumulation of heavy metals in some vegetables after phosphate fertilizer application was studied by **yodeled et .al (2006);** they found that roots and shoot accumulation of the heavy metals by the plants had also increased after fertilizer application , with Cd and Pb particularly higher . Among the heavy metals, Cadmium showed the highest transfer at the eastern side.

Tables (7 and 8) illustrated the contracted the contractions the three heavy metals (U, Th and Cd), in olive organs (roots, stem and leaves), after and before phosphate fertilizer application ,at western Rosetta side (Behera Governorate). The CR in olive tree organs ranged between (3.2 % and 6.5 %), (1.6 %and 5.5 %)and (0.33 % and 2.2 %). (root, stem and leaves), respectively. The higher uranium content was 0.31 mg/kg found in roots , and the least was 0.01 mg/kg found in olive leaves . It is obvious that the higher uranium translocation was 93.61 % from root → to –stem and the least was 26.0 % from stem –to- leaves . The uranium in olive (root, stem and leaves), organs was higher after phosphate application that that obtained before its addition, at all distances . These results was argument with **(Harmon and Laughlin, 2003).** They reported that the uranium apart, from the terrestrial environment by plants, is a complicated function of various interleafed biotic and abiotic factors. Also , plant properties have huge influence on uranium uptake and may vary between cultivars of the same species . Also, the relationship between uranium accumulations in plants (root , stem and shoot) and the metals content in the substrates. Plants grown in U- indicted soil showed clear association between U- accumulation and substrate content (available fraction)and the metal . Thetranslation of uranium to leaves was however marginal **(Prise et ..al, 2013).**

Table (7) The concentrations and transfer of (U, Th and Cd) heavy metals ,from soil to olive organs(Root , stem , and Leaves) ,at different distances in Rosetta western side before phosphoric Fertilizers application.

S. No	Distance m	Root		Stem			Leaves		
		Contentmg /kg	Trans Soil/Root %	Contentmg /kg	Relative to soil %	Trans root/ Stem(%)	Contentmg /kg	Relativeto soil %	Trans Stem/Leaves %
Uranium									
1	1000	0.31	5.16	0.29	4.83	93.54	0.01	0.15	3.44
2	2000	0.11	5.21	0.09	4.30	81.81	0,01	0.48	11.11
3	3000	0.14	4.67	0.09	3.10	64.28	0.01	0.15	11.11
4	4000	0.05	6.55	0.05	5.55	63.33	0.01	1.11	20.00
5	6000	0.04	3.27	0.02	1.68	50.00	0.01	0.84	50.00
6	8000	0.25	4.71	0.12	2.24	48.00	0.07	0.25	58.30
7	10000	0.16	4.41	0.09	2.43	56.25	0.03	0.72	33.33
Thorium									
1	1000	0.22	1.33	0.10	0.61	45.45	0.05	0.31	50.00
2	2000	0.01	0.08	0.01	0.07	88.88	0.01	0.04	62.50
3	3000	0.20	2.16	0.12	1.20	60.00	0.05	0.53	41.66
4	4000	0.12	1.17	0.09	0.87	75.00	0.05	0.48	55.55
5	6000	0.03	2.52	0.02	1.68	66.66	0.01	0.84	50.00
6	8000	0.13	2.43	0.08	1.45	61.53	0.02	0.37	25.00
7	10000	0.12	1.18	0.09	1.36	75.00	0.02	0.30	22.22
Cadmium									
1	1000	0.21	87.5	0.09	37.50	42.86	0.05	20.83	55.56
2	2000	0.23	59.09	0.08	36.36	61.38	0.02	9.09	25.00
3	3000	0.95	85.59	0.39	35.14	41.05	0.15	13.51	38.46
4	4000	0.09	32.14	0.08	28.57	88.89	0.02	7.47	25.00
5	6000	0.03	15.00	0.02	25.00	66.67	0.01	35.00	50.00
6	8000	0.18	60.00	0.10	33.33	55.56	0.06	20.00	60.00
7	10000	0.11	50.00	0.08	36.36	72.73	0.03	27.27	37.50

Table (8) The concentrations and Transfer of (U, Th , and Cd) heavy metals from soil to olive (root , stemand leaves) organs, at different distances in Rosette western side after phosphate fertilizers application .

S. No	Distance m	Root		Stem			Leaves		
		ContentMg /kg	Trans Soil/Root(%)	ContentMg /kg	Relativeto soil (%)	TransRoot/ Stem(%)	ContentMg /kg	RelativeTo soil %	Trans stem/ Leaves %
Uranium									
1	1000	0.60	0.96	0.40	6.46	66.66	0.02	0.32	5.00
2	2000	0.21	0.78	0.20	9.17	95.23	0.02	0.57	10.00
3	3000	0.24	0.82	0.15	5.17	62.50	0.03	0.03	20.00
4	4000	0.05	0.90	0.04	7.27	80.00	0.02	3.63	50.00
5	6000	0.04	0.39	0.03	2.20	55.32	0.005	0.42	16.66
6	8000	0.35	0.73	0.35	7.32	100.00	0.24	5.05	68.57
7	10000	0.16	0.45	0.08	2.28	50.00	0.05	1.48	62.50
Thorium									
1	1000	0.32	1.93	0.30	0.18	93.75	0.20	1.21	66.66
2	2000	0.86	2.60	0.19	1.19	73.08	0.08	0.80	42.10
3	3000	0.32	3.28	0.15	1.50	46.76	0.05	0.51	33033
4	4000	0.62	6.20	0.40	4,00	64.52	0.15	1.50	37.50
5	6000	0.18	1.65	0.13	1.18	71.43	00	00	00
6	8000	0.32	3.12	0.16	1.60	52.19	0.15	1.46	93.75
7	10000	0.31	5.16	0.13	2.30	41.94	0.02	3.00	15.38
Cadmium									
1	1000	0.20	80.00	0.14	56.00	70.00	0.10	40.00	71.43
2	2000	0.20	76.92	0.13	50.00	45.00	0.12	46.15	92.21
3	3000	1.00	73.46	0.99	73.52	19.00	0.76	71.03	16.76
4	4000	0.22	75.62	0.14	50.00	68.63	0.08	28.50	57.14
5	6000	0.29	93.55	0.04	12.40	13.79	0.02	6.45	50.00
6	8000	0.30	90.91	0.17	5.52	56.67	0.15	45.45	88.24
7	10000	0.19	90.48	0.11	52.38	57.89	0.06	28.57	54.54

The Thorium content in olive trees (root, stem and leaves) grown in the western side were slightly higher than that found in the other side (Kafer Elsherkh Governorate) ,after and beforephosphate fertilizers application . Also, thorium content in olive organs were higher afterfertilizers application than that obtained before, ones. **Guzman et al. (2006),** in their study on contamination of growing areas was due to the intensive fertilizer application, where theoccurrence of phosphate was approximately 100 times greater in the agrictural areas comparedto the non –agricultural areas . The higher thorium content was found in olive roots, and the least were also found in the leaves. Thorium translocation from soil to olive organs was higher in roots more than in stem or leaves. The thorium translocation percentage from root –to – stem was greater than from stem –to – leaves .

As mentioned earlier, cadmium has been intensively studied for its impact on the environment. Plants are known to show highly variable capacities to absorb and translocate metals in plants organs. The higher and lower Cd contents in olive plant were (0.95 and 0.01 mg/kg) and (1.00 and 0.02 mg/kg) found before and after phosphate fertilizers applications, respectively. Relatively the highest Cd contents were detected in root and the lower in olive leaves. These results were agreement with **Mortvedt and Beaton(1995);** they reported that plant species different considerably in their ability to take up Cd. Soil application of TSP containing Cd resulted in increased Cd of pasture species, especially in roots,they also found greater Cd uptake by raddish.

The highest and lowest cadmium translocations from soil-to- olive plant organs were(87% and 7.43%) and (93.55% and 6.45%) found in olive roots and leaves, before and after TSP applications. It is clear that the highest Cd translate transpiration olive roots than the stem and leaves organs. The variable capacities to absorb and translocate cadmium from soil to olives organs due to phosphate fertilizers greatly differ. **(Oyedel et . al 2006).**They showed that the Cd,Pb and Hg content of the soil had increased significantly with the addition of phosphate fertilizers(14%-60%) over control .Root and shoot accumulation of the heavy metals by the plants organs had also increased after fertilizers applications, with Cd and Pb being particularly high.

4. Conclusion

Some potentially toxic metals and trace elements present in agricultural soils. Low level of these elements accrues naturally in soil and some are essential elements. Application of inorganic fertilizers such as phosphorus fertilizers contain different quantities of potentially toxic heavy metals (thorium, uranium, and cadmium…..etc).Cultivated soil samples from the both two Nile sides (eastern and western) at different distances from Rosetta estuary and Olive plant ((Olea European L.) samples. The total uranium and thorium at western side soil samples were more than two times higher that obtained in the other Rosetta eastern side. Uranium values increased in surface soil samples after phosphate fertilizers applications. Thorium values in subsurface were higher than in surface, ones. Thorium values were higher than uranium, and the cadmium values were the lowest at eastern and western side's soil samples. Cadmium contents increased in soil samples affected by phosphorus fertilizers. .Total (uranium, thorium and cadmium) content in soil samples were mostly within the world average range. Uranium .thorium and cadmium contents in olive plants organs (root, stem and leaves) were clearly showed preferential accumulation of these elements in olive roots more than the other organs (stem and leaves), and followed the order root >stems > leaves, respectively. Thorium translocation from soil to olive organs was higher in roots more than in stem or leaves . The three elements (uranium ,thorium and cadmium)translocation percentage from root –to –stem was greater than from stem –to – leaves .

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