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Evaluation of some heavy metals accumulation within the soil and crops around industrial town of Shahr-e-Kord

MEHRAB YADEGARI[1] and AFSANEH KARIMIPOUR DEHKORDI[2]

[1]Faculty of Agriculture, Islamic Azad University- Shahrekord Branch- Shahrekord (Iran).
[2]Master Science of Environmental Science, (Iran).

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ABSTRACT

To study the amount of heavy metals at Shahr-e-Kord industrial town, the experiment was conducted in 2010. The region of investigation located 10 Km from Shahr-e-Kord (latitude 32 ^{0} 44 $^{/}$ N, 2100 m asl), located at about 100 km of Isfahan and 500 km of the capital town of Iran. The existing of different manufactories such as carton, paper, production of sugar, providing textile, making ceramic tile, sanitary facilities, dyeing industry, dairy products, metal industry and cladding of metals causing the increase in spreading the heavy metals like Ni, Pb, Cr and Cd in this region. Although in most cases plants which grow in agricultural soils including heavy metals, they keep more metals in their tissues. However, the main objective of implementing and investigating this research was to clarify the amount of absorption of heavy metals such as Ni, Pb, Cr and Cd in agronomy crops inclusive: Wheat (*Triticum aestivum* from *Gramineae* family), Turnip (*Brassica napus* L. from *Cruciferae* family) and range plants inclusive: Tragacanth (*Astragalus* sp from *Leguminosae* family), Sojak (*Scariola orientalis* from *Compositae* family) surroundings of Shahr-e-Kord industrial industrial-town. Therefore after the accomplishment of the required studies, sample stations have been accidentally chosen at the distance of 100, 300, 600, 1000, 2000, 3000 and 5000 meters from the North, South, East and West of research area. Sampling of aerial, land construction and soils existed in this region has been done. Five samples have been taken at each station and then the average of these samples was evaluated at laboratory. Analyzing the soils from sample stations indicated that the maximum concentration existed among metals regularly related to Ni (1926 ppb), Cd (504 ppb), Pb (122 ppb) & Cr (78 ppb). Nevertheless at most cases the maximum concentration existed among heavy metals regularly associated with Ni, Pb, Cr and Cd in shoots of plants. Range plants accumulated more heavy metals than agricultural crops in their organs. The maximum concentration of heavy metals was regularly observed in the North, West, East and South respectively. In the most cases the amount of heavy metals concentration was more than it would be the root part of plants in which range plants (Tragacanth, Sojak) have higher concentration than agronomy crops (Wheat, Turnip). Among different plants accumulated concentration of metals were observed in Tragacanth, Sojak, Wheat, and Turnip respectively.

Key words: Agronomy and Range Plants, Heavy metals, Pollution, Shahr-e-Kord industrial town, Soils.

INTRODUCTION

Due to different industrial activities and releasing of the large amount of pollutants particularly heavy metals (specially Ni, Pb, Cr, Cd), across environment by absorption and accumulation of them in soils and plants, since poisonous and danger of heavy metals and the percentage of absorption and accumulation of them in soils resulted in aerial and underground plant organs, generally in food product of region and eventually the entry of them into food chain and the effect of them through the air and food of social health, it is necessary to investigate and recognize the widespread of them and plenty of elements such as Ni, Pb, Cr and Cd in soils and plants. Manage optimized performance which results in prevention of the entry of them into environment and food chain and suggestion of implanting the suitable vegetation. Nowadays, environmental studies specially in the

case of examining environmental pollutants, food chain and social healthy have significant role and the shortage of this research well felt. It is essential that content of absorption and accumulation of heavy metals existed on the almost industry output and crust specified to ensure society, soil, water healthy, specially the region resident feeding it as well. Consequently, the possibility of contamination in the future must be analyze and assessed. It is necessary that the reason for choosing the metals such as Ni, Pb, Cr and Cd in recent research is to consider the presents of this elements on the most industrial output and also the existing plenty of them in the crust. By the way these metals follow by special standard and absorption of them is due to atomic absorption machinery well down with less error. The plants chosen in this research are suitable indicators for recognizing soil and environment pollutions, basically existed in human and domestic foods that can directly or indirectly have effective role of human health. Cd can affect kidney, liver, bone and feminine reproduction system which is in the shape of different composition at minds battery and coloration products. Cr can cause different kinds of cancer and changes the erupting processes such as the altering in the growth of root, stems and leaves affecting the production of vegetarian dry material. In legumes, triple leaflet can be more effective than the others. Cr led to changing photosynthetic, absorption, water consumption, and nutrition in plants. More over in garden grass, rice, tomato, sunflower, popcorns, broad bean and sorghum, the accumulation of Cr in the roots is more than that in the air organs (Shanker *et al.,* 2005 (.Lead is deposited in the atmosphere as a result of production of mines, battery industry, fossil fuels, coloration and glass industries which spread out plant species and eventually it would be entered to human body through different ways. The most important effect of Lead in human body is disorder in nerve system, decrease in nervous communication and behavior problems. Ni is predominantly produced from the consumption fossil fuels released of mines, refineries, factories and different industries. Ni such as the other heavy metals causes to disturbance in plant feeding, water need, photosynthesis & photo morphogenesis. (Seregin and Kozhevnikova, 2006). In spite of more toxicity of lead than cadmium connected regulation, the maximum permitted concentration of lead determined more than the maximum concentration of cadmium in soil. The reason for this refers to different behavior of these elements in soil and plant. In the same concentration of lead and cadmium in soil, the concentration of cadmium in plant will be much more than the concentration of lead because absorption of cadmium through plant to be performed more than absorption of lead. Average amount of this for surface soils is more than those which are in sub soils. Cadmium in plants exists as chelates or compound by dioxide manganese acid with two capacities. The maximum amounts of lead take from soil centralize in root and little of quantities of it reach the upper plants parts. During time, ordinarily concentration fixed, but as a result of long-term usage of chemical agricultural materials and human activities, cadmium and lead increase specially in urban regions (Hung *et al.,* 2007). In Iran, the value of heavy metals concentration in plants which is harmful for human health for lead and cadmium is less than 5 and 0.1 ppb respectively and in case of chromium and nickel, data is not available. The maximum average amount of nickel in surface soils is related to China (92 ppm), the highest average concentration of this, in Legume and Gramineae plants, linked to perennials legumes (7.2 ppm), the highest amount of it at plant nutritive parts come up in wheat crust (3.6 ppm), the maximum of it, in American and European countries soil is registered 3200 ppm in British industry areas (Gobran *et al.,* 1999). A few amount of cadmium depending upon kind of plant don't disturb in growth. Conversely, at high amount (up to 500 µ mol), has negative effect on plants growth and sprouting depending to variety, plant organ, essential elements required plant, time planting and poisonous emergence time of cadmium (Goncalves *et al.,* 2009).

The maximum degree of cadmium all across the world had been in industrial soil regions in Belgium (1781 ppm). Among measured elements, chromium has special situation in soils. In this manner, this element is very active and mobile and usually its quantity is changeable between 5 ppm up to several percentages in soil. Toxicity sign appeared in those plants that have usually had more than 1 ppm Chromium in plant leaf (Pendias and Pendias, 2000). The amount of chromium is too much in these plants root. Because the movement of chromium from root to air organs is negligible, one percent chromium nearly

absorbed by plant root transported to air organs (Gobran *et al.* 1999). The highest average of this metal at surface soil in Bulgaria (221 ppm), at food plants, it had been related to upper legumes organ. The maximum amount of polluted soils in the world by lead related to Greece (18500 ppm (. The maximum amount of that at nutritive plant sections, in potato (3 ppm), amount Gramineae grains in wheat and oats (0.64 ppm), the highest world average in this metal at Gramineae and Leguminosae surfaces is in legumes (8 ppm), and the maximum amount of this metal at plant organ, existed polluted regions has been reported at upper organs of Gramineae in Canada. Lead is poisonous around 50-100 ppb leading to both enzyme effects and declining in the growth. Cadmium is poisonous more than 50-100 ppb resulting in decreasing photosynthesis (Gobran *et al.,* 1999). The maximum amount of chromium, nickel, cadmium and lead at plants organs have been regularly reported 0.45, 51, 26 and 28 ppm (Pendias and Pendias, 2000). Videa *et al.,* (2004) indicated that heavy metals (Cr up to 100 ml gram per liter, Cd, Cu and Ni up to 500 ppb) concentration and Zn up to 500 ml gram per liter lead to killing effect on alfalfa seed germination. Karnitz *et al.,* (2007) reported that sugar beet inferred as an optimized accumulating for Cu, Cd, Cr and Pb. Chromium basically associated with elements such as iron, sulfur adsorbed to plant. Videa *et al.,* (2009) examined the movement of heavy metals on human food chain, they realized that cadmium and lead absorbed to plants like rice and making problems for human. Chromium seldom transported to air organs as compared to nutritional plants. Adding wastewater to cultivated soil in which alfalfa produced because of being several years does not affect the value of Fe, Zn and Cu existed in air organs. However, alfalfa is known as a plant which is tolerant to heavy metals (Su *et al.,* 2004). Sawaf (2005) reported that wastewater lead to growth in the length of shoots, increase in the number of leaves, growth in dry plant weight in shoots. In general many researchers showed the effects of the heavy metals and therefore emphasis the role of them in human foods (Videa *et al.,* 2002, 2004, 2009).

MATERIAL AND METHODS

Since studying and clarifying the history of research in Iran, the world, and providing geographical and topographical plans, geological data soil science, phytology, geographical, climatology and different human activities; sampling stations rely on research purposes, have been accidentally chosen which are 100, 300, 600, 1000, 2000, 3000, 5000 meters far from the North, South, East and West of Shahr-e-Kord s industrial region. Geographical situation is 50°51 Northern longitude, 32° 17] Eastern latitude and 2049 meters higher than sea level.

The measurement of heavy elements absorbable in soil

Among the heavy metals absorbable in soil, lead and chromium has been taken from a method called AAAC-EDTA and famous as extracting the mixture of Acetate ammonium and Ethylene De Amine tetra Acetic. For measurement of absorbable cadmium and nickel in soil the decoction with De ethylene Three Amine pentad acetic acid method served and after shaker similar previous method the data by ppb unity was registered.

The measurement of heavy elements in plants

The method of obtaining heavy metals in shoots is called wet digestion (W.D) in which vegetarian organs beside an acid mixture digested and the measurement of extract obtained by atomic adsorption machine in such a way that called graphic furnace has been done. Most of methods done according to international standard book performed (3). The samples of soil and plant dried in an oven in 70ÚC. Then by using sieve number 230 particles which are smaller than 63 micron and are tiniest grains in this research separated from soil samples. By using agate mortar or silicate mortar, Soil and plant samples powered and homogenized. The reason for choosing for metals such as Cd, Pb, Cr and Ni in common investigations is considering presents of these elements in most output of the research region industry and the plenty of them incrust as well. The metal mobility coefficient is equal to heavy metal concentration on air organ divided by the same heavy metal concentration on root organ. translocation factor was measured by followin

formulla:
((The concentration of heavy metal in shoots/ The concentration of heavy metal in roots))

The calculation of data obtained experiment has been done by statistic software such as SPSS, SAS, and Excel 2007. means comparisones seperated with Duncan‘ s multiple range test at $P \leq 0.05$ level.

RESULTS AND DISCUSSION

The most and least amount of cadmium in soil was obtained in North and south respectively but in means comparisons we observed that groups were similar. The most and least amount of lead and chromium in soil around of pollution center in north and east was measured. The maximum and minimum concentration of nickel in west and east was measured (table 1). In means comparisons of heavy metals of Tragacanth shoots, the amounts in north were the most, in this character, We don't see any significant difference just nickel between means groups (table 2). Plants that diminish of transpiration with subterranean structure have more tolerance to cadmium and lead. The perennial plants more tolerance to heavy metals than turnip. Tolerance depends to sowing parameters, seed dormancy properties, irrigation, harvesting, rotation and old of plants (Marchiol *et al.,* 2004). Murifah (2008) in study of cadmium concentrations, reported that by increasing of cadmium the fresh weight, dry weight, size of shoots, length of roots and leaf area index after 10 days in pumpkin were decreased. To study of medicinal plants under pollution places by heavy metals, Zheljazkov *et al.,* (2008) reported that the plants that have subterranean structures have more tolerance to heavy metals accumulation and aggregation of heavy metals from subterranean structures to shoots were decreased. In avalution of pollution range of nickel, zinc, copper, lead, in soils of Bejing, Chen *et al.,* (2005) showed that position and old of soils are the most important parameters to pollution especially for lead and copper. In research of south soils in Italia Adamo *et al.,* (2002) reported that total of concentration of chromium, lead, nickel and copper especially in top soils in urban areas were upper than international standards. In means comparisons in shoots of wheat, the most and least amounts were measured in north and south respectively. We see the significant differences in means comparisons and chromium in all means lower than other means (tables 2-5). This result is similar to other researchers (Abollino *et al.,* 2005, Huang *et al.,* 2007 and Shanker *et al.,* 2005). Just nickel other consentrations of heavy metals in soil samples in east and west regions were similar. Plants made more aggregation of metals in shoots especially range plants than roots (tables 6-7). Results showed that amuont of heavy metals in nourth>west>east>south but almost of this differences in means comparitions were similar, this point in east and west region around of pollution center were very clear (tables 8-10). In almost characters we see the significant differences between tragacanth with annuals plants and between sojak with other plants (tables 11-14). There were meaningful differences among suberranean structures. Videa *et al.,* (2002) reported that the most aggregation between nickel, cadmium, zinc and copper in shoots was obtained for nickel. The upper concentration of this metal was 437ppm in pH=7.1. Bretzel and Calderisi (2006) in study of soil around of roads in Italy, reported that the most pollution was obtained from Lead and because it, places around roads not sutable for sowing. In mixed cropping systems, the amount of heavy metals in vegtables crops, result to inhibit use of them and in these crop concentarion of zinc>lead>copper>nickel> chadmium (Pandey and Pandey, 2008), but resulsin wheat wasn't same

Table 1: Means of heavy metals measured (ppb) in soil samples around 5 Km of pollution center

Place	Cd		Pb		Cr		Ni	
North	504 ± 520.3	a	122 ± 19.3	a	78 ± 6.97	a	1695 ± 323.3	a
South	39.7 ± 6.1	a	37.5 ± 0.42	b	33 ± 3.3	b	1593 ± 369	a
East	57.7 ± 17	a	32.3 ± 6.5	b	30.5 ± 5.96	b	415 ± 14.13	b
West	60.7 ± 17	a	36.3 ± 6.5	b	35.5 ± 5.97	b	1926 ± 159.5	a

Table 2: Means of heavy metals measured (ppb) in root and shoot of Tragacanth (*Astragalus* sp from *Leguminosae* family) samples around 5 Km of pollution center

Place	Cd				Pb				Cr				Ni			
	S		R		S		R		S		R		S		R	
North	4695 ± 2101	a	19953 ± 10551	a	881.4 ± 365.2	a	978.6 ± 548	a	670.6 ± 276	a	727.1 ± 362.8	a	2375 ± 990.2	a	4860 ± 617.1	a
South	2451 ± 1096.7	a	10415 ± 5507.9	a	460.1 ± 190.7	a	510.8 ± 286	a	350 ± 144.1	a	379.6 ± 189.4	a	1240 ± 516.9	a	2537 ± 322.1	b
East	2817 ± 1260.6	a	11972 ± 6330.9	a	528.9 ± 219	a	587.1 ± 329	a	402.3 ± 165.5	a	436.3 ± 217.7	a	1425 ± 594.1	a	2916 ± 370.3	b
West	3756 ± 1680.8	a	15962 ± 8441.3	a	705.1 ± 292.3	a	782.9 ± 438	a	536.5 ± 220.8	a	581.7 ± 290.3	a	1900 ± 792.2	a	3888 ± 493.7	a

R= Root and S = Shoot

Table 3: Means of heavy metals measured (ppb) in root and shoot of Wheat (Triticum aestivum from Gramineae family) samples around 5 Km of pollution center

Place	Cd				Pb				Cr				Ni			
	S		R		S		R		S		R		S		R	
North	2866 ± 205.2	a	12191 ± 4899	a	691 ± 43.2	a	1393 ± 314.6	a	549.3 ± 28.3	a	904.9 ± 99.3	a	7210 ± 2184.5	a	4374 ± 555.3	A
South	1103 ± 493	b	4687 ± 2478	b	207 ± 85.9	b	229.9 ± 129	b	157.5 ± 64.8	b	170.8 ± 85.2	b	557.9 ± 232.6	b	1142 ± 144.9	B
East	1268 ± 567.3	b	5387 ± 2848	ab	238 ± 98.5	b	264.2 ± 148	b	181.1 ± 74.5	b	196.3 ± 97.9	b	641.3 ± 267.3	b	1312 ± 166.6	B
West	1690 ± 756.4	b	7183 ± 3798	ab	317 ± 131	b	352.3 ± 197	b	241.4 ± 99.3	b	261.8 ± 131	b	855.1 ± 356.4	b	1750 ± 222.1	B

Table 4: Means of heavy metals measured (ppb) in root and shoot of Sojak (Scariola orientalis from Compositae family) samples around 5 Km of pollution center

Place	Cd				Pb				Cr				Ni			
	S		R		S		R		S		R		S		R	
North	4226 ± 1891	a	17958 ± 9497	a	793.3 ± 329	a	880.7 ± 494	a	603.5 ± 248	a	654.4 ± 326.5	a	2138 ± 891.2	a	4374 ± 555.3	A
South	2206 ± 987.1	a	9374 ± 4957	a	414.1 ± 172	a	459.7 ± 258	a	315 ± 129.6	a	341.6 ± 170.4	a	1116 ± 465.2	a	2283 ± 289.9	B
East	2535 ± 1135	a	10775 ± 5698	a	475 ± 197	a	528.4 ± 296	a	362.1 ± 149	a	392.7 ± 195.9	a	1283 ± 534.7	a	2624 ± 333.3	B
West	3381 ± 1513	a	14366 ± 7597	a	634.6 ± 263	a	704.6 ± 395	a	482.8 ± 199	a	523.5 ± 261.2	a	1710 ± 712.9	a	3499 ± 444.3	A

Table 5: Means of heavy metals measured (ppb) in root and shoot of Turnip (Brassica napus L from Cruciferae family) samples around 5 Km of pollution center

Place	Cd				Pb				Cr				Ni			
	S		R		S		R		S		R		S		R	
2579 ± 184.7		a	10972 ± 4410	a	621.9 ± 39	a	1254 ± 283	a	294.4 ± 26	a	814.4 ± 89	a	6489 ± 1966	a	3937 ± 499.8	A
937.9 ± 421		b	3993 ± 2112	b	176.4 ± 74	b	195.8 ± 110	b	134.2 ± 55	b	145.5 ± 73	b	475.3 ± 198.2	b	972.7 ± 123.5	C
1080 ± 483.3		b	4590 ± 2427	ab	202.8 ± 84	b	225.1 ± 126	b	154.3 ± 63	b	167.3 ± 84	b	546.4 ± 227.7	b	1118 ± 141.9	C
1440 ± 644.4		b	6120 ± 3236	ab	270 ± 112	b	300.1 ± 168	b	205.7 ± 85	ab	223 ± 111	b	728.5 ± 303.7	b	1491 ± 189.3	B

Table 6: T -Tests (LSD) of Means of heavy metals (ppb) in soil samples around 5 Km of pollution center

		North				South				East			
		Cd	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**
South	Cd	2.36*											
	Pb		11.55**										
	Cr			15.46**									
	Ni				0.54								
East	Cd	2.27*				2.63*							
	Pb		11.62**				2.1*						
	Cr			13.69**				0.97					
	Ni				10.18**				8.44**				
West	Cd	2.25*				3.7**				0.33			
	Pb		11.1**				0.48				1.15		
	Cr			12.25**				0.97				1.57	
	Ni				1.66				2.2*				24.98**

* and **: significant at the 5 and 1% levels of probability, respectively

Table 7: T-Tests (LSD) of Means of heavy metals (ppb) in plants samples around 5 Km of pollution center

		North				South				East			
		Cd	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**
South	Cd	3.8**											
	Pb		9.77**										
	Cr			11.1**									
	Ni				11**								
East	Cd	3.2**				0.7							
	Pb		8.68**				1.14						
	Cr			9.73**				1.2					
	Ni				10.1**				1.2				
West	Cd	1.7				2.2*				1.5			
	Pb		6.1**				3.38**				2.32*		
	Cr			6.5**				3.55**				2.44*	
	Ni				8**				3.6**				2.5*

Table 8: T-Tests (LSD) of Means of heavy metals (ppb) in shoots of plants samples around 5 Km of pollution center

		North				South				East			
		Cd	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**
South	Cd	4.7**											
	Pb		7.3**										
	Cr			7.7**									
	Ni				6.89**								
East	Cd	3.8**				0.86							
	Pb		6.2**				0.89						
	Cr			6.5**				0.9					
	Ni				6.6**				0.75				
West	Cd	1.84				2.5*				1.72			
	Pb		3.7**				2.65*				1.8		
	Cr			4**				2.66*				1.83	
	Ni				5.93**				2.6*				1.8

Table 9: TF (translocation factor, ppb) in plants samples around 5 Km of pollution center

	North				South				East				West			
	Cd	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**
Tragacanth	0.23	0.9	0.9	0.48	0.23	0.9	0.9	0.47	0.24	0.9	0.91	0.49	0.24	0.9	0.92	0.48
Wheat	0.23	0.49	0.6	1.4	0.23	0.9	0.9	0.48	0.23	0.89	0.91	0.47	0.22	0.9	0.9	0.49
Turnip	0.22	0.49	0.6	1.2	0.22	0.89	0.87	0.47	0.22	0.89	0.9	0.46	0.21	0.89	0.89	0.48
Sojak	0.21	0.48	0.6	0.48	0.22	0.87	0.88	0.49	0.22	0.87	0.89	0.45	0.21	0.89	0.89	0.48

Table 10: T-Tests (LSD) of Means of heavy metals (ppb) in roots of plants samples around 5 Km of pollution center

		North				South				East			
		Cd	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**	**Cd**	**Pb**	**Cr**	**Ni**
South	Cd	4.5**											
	Pb		8**										
	Cr			8.9**									
	Ni				14.5**								
East	Cd	3.7**				0.77							
	Pb		7.2**				0.75						
	Cr			7.8**				0.8					
	Ni				12**				1.2				
West	Cd	2.08*				2.3*				1.6			
	Pb		5.3**				2.21*				1.5		
	Cr			5.5**				2.4*				1.64	
	Ni				7.1**				3.65**				2.5*

Table 11: T-Tests (LSD) of Cadmium (Cd) concentration (ppb) in shoots of plants (Tragacanth, Wheat, Sojak and Turnip) samples around 5 Km of pollution center

		North			South			East			West		
		Tragacanth	**Wheat**	**Sojak**	**Tragacanth**	**Wheat**	**Sojak**	**Tragacanth**	**Wheat**	**Sojak**	**Tragacanth**	**Wheat**	**Sojak**
North	Wheat	2.29											
	Sojak	1.41	0.48										
	Turnip	2.65*	0.88	0.88									
South	Wheat				2.97*								
	Sojak				0.44	2.64*							
	Turnip				3.4**	0.67	3.4**						
East	Wheat							2.97*					
	Sojak							0.44	2.64*				
	Turnip							3.4**	0.67	3.12**			
West	Wheat										2.97*		
	Sojak										0.44	2.64*	
	Turnip										3.4**	0.67	3.12**

Table 12: T-Tests (LSD) of Lead (Pb) concentration (ppb) in shoots of plants (Tragacanth, Wheat, Sojak and Turnip) samples around 5 Km of pollution center

		North			South			East			West		
		Tragacanth	Wheat	Sojak	Tragacanth	Wheat	Sojak	Tragacanth	Wheat	Sojak	Tragacanth	Wheat	Sojak
North	Wheat	1.37											
	Sojak	0.47	0.82										
	Turnip	1.87*	3.15**	1.37									
South	Wheat				3.2**								
	Sojak				0.47	2.86*							
	Turnip				3.68**	0.71	3.37**						
East	Wheat							3.2**					
	Sojak							0.47	2.86*				
	Turnip							3.68**	0.62	3.37**			
West	Wheat										3.23**		
	Sojak										0.43	2.87*	
	Turnip										3.71**	0.72	3.37**

(Athar and Ahmad, 2002). We see the concentration of nickel>cadmium>lead>cromium. In study by peris *et al.,* (2008) there were significant differences between chromium by cobalt and copper by cadmium. In our research we see the significant differences between range and agronomy plants (tables 11-14). It seems that the suberranean structures results the most agregation of heavy metals in plants, from roots to aerial parts in plants. the tranclocation of heavy metals make less (Bose and Bhattacharyya, 2008) and there are correlation between concentration of cadmium in leaves and rhizosphere (Lorenz *et al.,* 1997). The most T.F in Tragacanth (*Astragalus* sp) was seen. This plant has more heavy metals in roots and shoots than other plants and turnip has the lower heavy metals concentrations of in above and underground structures and amount of TF than other plants (tables 8-9). The most aggregation of heavy metals in path of dominant wind that is in shahr-e-kord region in western south and result that the most amount of heavy metals were in shoots in nourth vector. Outputs of manufacturings in regions often are lead and nickel. Only cadmium in nourth was more than other metals that we think because for more obtain by plants. we can suggest that however the amount of heavy metals that mesured in this research are lower that international standard but because pollution of manufactures are considerable and must decrease the pollution outputs from them and sowing of range and perennials plants must do in developing programs in this region.

CONCLUSION

This study showed that heavy metals in industrial region in Shahr-e-Kord city however is lesser than international amount in world but the amount of metals especially Nickel and Cadmium were high. In regions, northern and western regions around pollution center had the most heavy metals that evaluated in this study. In plants, range plants accumulated most heavy metals especially Tragacanth (*Astragalus* sp). In general roots had higher amount of heavy metals than shoots. We suggested that by planting of range plants can decreased the heavy metals around of this region in Shahr-e-Kord and then diminish the diseases engendered by them.

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