



Heavy metal contamination of zinc and lead in Region 1 and 2 of the main city of Ardabil

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ABSTRACT

To Main Security Healthy food the population At Now Growth the world With Attention To Limited to be References Earth, To Syntactic ThatLeast The Khryb On Environment Life It Leave One From Affairs Important To the count The Comes. The aim of this study was to determine the Amount Density Metals Heavy On And Lead At square Of the original Region 1 and 2 city Ardebil. At This Research To intended purposeCheck Condition Density Metals Heavy On And Lead At square Of the original Area One And Two City Ardabil, Beginning Position SampleVector From Soil And plants At square Of the original City Ardabil determination Was 10 Square Selection Respectively. Data Of Result FromResearch By Soft Applications SPSS Decomposition And Analysis Statistics Was. From Test Correlation Pearson To determination CorrelationSample And And Test T Single Sample Oh you To Check Meaning Arrow to be Sample And And Test Kolmogorov Smirnov To determinationnormal to be Data And Use Was. The results showed that the concentrations of heavy metals zinc and lead in the measured and is significant lower than the EPA standard. Results of statistical analysis and comparison with national standards of Iran showed that the concentrations of heavy metals zinc and lead in the field of measurement than the standard less significant, and only the heavy metal lead in the growing field of size meters higher than the standard level was observed. The results of Pearson correlation between concentration of heavy metals zinc and lead in the soil and the plant did not show.

Keyword:

heavy metals, soil, main squares, the city of Ardabil

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INTRODUCTION

To Maine Security Healthy food the population At Now Growth the world With Attention To Limited to be References Earth, To Syntactic ThatLeast The Khryb On Environment Life It Leave One From Affairs Important To the count The Comes. Increase Activities Industrial CombinedWith Production pollutant And From Sentence Metals Heavy One From Difficulties Serious At Now Spread Ago On Man Evening Present Is (Torabiyani, 1381, 124). The direct impact of air pollutants on plants, animals and soil could ecosystem structure and function as self-regulatory abilities they affect. So in this regard can put the effect on quality of life. Pathfinder elements in the atmosphere by human activities such as burning fossil fuels and wood, industrial activities and high-temperature incineration of waste and waste is released. Combustion of fossil fuels me the original as Ba And V and C o and N i and S c and M o and S n And S b and g, and in particular H and M n C r and C u And Z n and A sForm. Smoke and steam output of gasoline may be a variety of content and Z n N i and C u and C d and P b is (Samara, 2003, 41). Heavy metal pollution is a major environmental problem and is usually caused by industrial activities, such as the exploitation of mines, gas discharge process, energy, fuel, fertilizer and pesticides and processing of municipal solid waste. Obviously, this phenomenon has increased with industrialization and modernization communities (Erfanmanesh, 1379, 74). Despite the differences in behavior in terms of mobility and ability to absorb heavy metals in soil, in most cases the output through leaching or absorption by plants is much less than the amount of their entry into the soil. This will slow the accumulation of heavy metals in soil and is detectable effects of earlier decades. Because of the accumulation process is almost irreversible, long-term reduction in soil quality, and ultimately the destruction of agricultural lands (the F-ion, 1385, 48). Heavy metal pollution not only directly on the physical and chemical properties of the soil, but also reduces the biological activity and declining access soil nutrients influence, but also a serious risk to human health from entering the food chain and environmental security through penetration underground waters are (Buisson, 1999, 99). Many heavy metals in small amounts in Soil and plants are found. The trace elements as a result of weathering of rocks naturally into the environment. They can be washed into surface waters or into the ground or be absorbed by plants, They can be in the form of gas into the atmosphere or soil components such as clay or organic matter Knnd.rftar bind heavy metals in soil in the sense that can contaminate the ground water level and can enter the food chain are also important (the New Year, 1385, 16). Heavy metals such as environmental pollutants are the properties of these metals can be noted that stability can often organic materials and chemical and biological processes decompose in nature. One important result of this stability and concentration of heavy metals in food animals or tissue from the food use (Petty, 1998, 85). Heavy elements from various sources, may eventually reach the surface soil and their subsequent fate depends on the soil physicochemical properties and main Dard.mtghyrhay soil contaminants are involved in the movement are: the values of pH, oxidation potential revival,

organic matter, clay minerals and carbonates and salt is (Byvsvn, 1999, 118). Metals Heavy asFactors dangerous And pollutant Environment Environment Case Attention And evaluation Great The The Anne de. this Metals From ThroughWater, soil And Air To Intermediate References Different Natural And artificial To Cycle Nature Enter By And effects short Time And Tall TimeDangerous At They create The Them. so, To the subject one Hazard serious At Continuation Life Creatures Live Considered The Are. MetalsHeavy From pollutant Of stable And Tough Environment Environment count The Future, Because Is not Can As Infected Regulators To FromThrough Chemical Or Processes Bio At Nature Analysis Are. One From results Stability important this Metals, Aggregation Bio Metals At the chain Food The Is. At Result this Process Amount Metals At Member higher At the chain Food The Can until the several Equal Those That AtWater Or Air Found The Are Reach And At Result Threat On health Plants And Animals That From this materials Food Use The They Is The (See Tavakoli, 1390, 55). These metals Potential Infected The soil And Water And Have And can With Distributed Become And Aggregation At PlantsAnd animals By Man Case Consumption The Are (Vsystv, 2002, 48). In this study, the concentration of heavy metals zinc and lead in the main plaza area was a city of Ardabil.

Research Methodology

In this study to evaluate the concentration of heavy metals zinc and lead in the main squares District and the city of Ardabil, the position of the samples of soil and plants in the main city of Ardabil was set up and 10 were selected. The next step was to take samples of soil and plants. This means that each of 10 soil samples and 10 samples of plants (cedar and pine) for both lead and zinc was removed element will have a total of 40 samples. Changes in the main squares of heavy metals were measured in spring 1394. Soil samples are transported to the laboratory and then aerated and dried, crushed and passed through the 2 mm sieve. Sample digestion and release element method was recommended by Esposito, accordingly, taking into account soil moisture, soil samples 5/12 ml to 2 g of nitric acid was added 4 M. Sample overnight in the bath Mary at temperatures of 80 ° C was maintained, then the solution is passed through filter paper and concentration of lead and zinc by atomic absorption spectrometry in laboratory Water, Soil, Fertilizer And plant were determined Bostanabad (Esposito, 1982, 41). To measure the amount of heavy metals in plants g dry sample was weighed in Furnace Chinese Were cast. inside of Furnace At 550 ° ° C for 6hours The The Then we Slightly Water Distillers Additional And 5 mm Liter acid 2 normal hydrochloric Additional and one Hours At 180 ° ° C Heatwe gave Then inside of Balloons 50 mm Liters Transferred and to Volume The Accomplish And Azkaghz Filtered we gave. For Size Making Zinc and Lead At Extract Smooth By With Device Absorption Atomic directly Reading Was.



Samples of soil and plant in the spring, The location of the point of sampling the area's main squares one and two are in Ardabil Fields of law, the army mobilized, Ali soldier, war, veterans, Sinai, Jerusalem, the mother, the worker was determined. These fields were chosen because of exposure in the crowded vehicles. Then, sampling of surface soil plants was carried out.

In this study, a general list of the main squares District and the city of Ardabil were prepared and geographical location of the device GARMINGPS models were recorded under the metric system. Therefore, the required data and field studies were conducted through sampling and analysis. To search for the information you need on the subject of literature and information sources, such as reputable sites online, papers, books related organizations were used.

To gather the information.

- Using experimental data
- The use of library resources

- using Internet
- Sampling field
- GPS

Data Of Result From Research By Soft Applications SPSS Decomposition And Analysis Statistics Was. From Test Pearson To Determine the correlation between samples and one sample t test sample for meaningful review and Kolmogorov-Smirnov test for normality of the data and analysis of variance was used to examine the average concentration of data.

Pearson

Pearson product-moment correlation coefficient in the name or rank correlation coefficient of zero is also called, is introduced by Srkarl Pearson. This factor to determine the relationship, type and direction of the relationship between two variables or a variable distance or relative distance and a relative variable is used. Several methods can be used to calculate the coefficient defined computational equivalent(Habibi, 1392, 91).

Pearson correlation coefficient between -1 and 1 change. If $r = 1$ Represents Relation The straight Full Among Two Variable Is, Relationship Thestraight Or Positive To This Articles That If One of the variables increase (decrease) will also increase (decrease) finds.

$r = -1$ Also Existence One Relation The Reverse Full Among Two Variable And sign The A. Relation The Reverse Or Negative sign The The ThatIf One Variable Increase Will The Tghyrdygr reduced and vice versa. When the correlation coefficient of zero indicates that there is no linear relationship between two variables (Habibi, 1392, 91).

1 (no correlation between the lack of a linear relationship between two variables, but it can not be concluded as independent variables. When Pearson's correlation coefficient between the two variables is zero, these variables are independent only if the distribution is normal variable.

2) correlation between two variables only indicate whether a variable is to increase or decrease the impact on the increase or decrease in another variable, but this correlation does not necessarily imply a causal relationship between variables is not. For example, if a study two variables have a high positive correlation between height and education We can not conclude that people with higher educational levels are taller. So should causal relationship between the concepts of solidarity and distinction. In other words, there may be two

variables are correlated but do not need another one of the variables of cause and effect, In addition, other factors can also affect the correlation coefficient(Habibi, 1392, 92).

A factor analysis of variance

For comparing two or more of (the impact of an independent variable grouping a bit dependent variable) of the test used (Habibi, 1392, 92).

Note: This test should be little dependent and independent variables grouped levels is limited.

Variance analysis hypotheses may both apply, as follows:

- There are significant differences between groups of variables: the average of the dependent variable by variable factor in creating change or groups are equal.
- There is cause and effect relationship between variables: if the means of the dependent variable in the groups created by variable factors are not equal, it means that the independent variable on the dependent variable values in a group of variables. If such factor is the impact of these two variables (dependent and independent) You can have a causal relationship. In analysis of variance, The dependent variable is quantitative and qualitative factors are variables. Factor, can also be the subjects or the subjects (Habibi, 1392, 93).

Data from the concentration of zinc and lead in soil and plant

Table 1 shows data from the concentration of zinc and lead in soil

Test #	View Sample	The entire ppm	Test #	View Sample	Overall Lead ppm
1	Ghods	75	1	Ghods	44
2	Veterans	87.5	2	Veterans	36
3	Sina	52.5	3	Sina	28
4	Mobilization	57.5	4	Mobilization	48
5	Mother	52.5	5	Mother	39
6	Jihad	85	6	Jihad	45
7	worker	75	7	worker	30
8	Army	82.5	8	Army	48
9	Ali soldier	85	9	Ali soldier	39
10	Shariati	62.5	10	Shariati	46

Table 2 shows data from the concentration of zinc and lead plant

Test #	View Sample	The entire ppm	Test #	View Sample	Overall Lead ppm
1	worker	18	1	worker	125
2	Jihad	32	2	Jihad	110
3	Mother	24	3	Mother	95
4	Mobilization	36	4	Mobilization	130
5	Ali soldier	33.5	5	Ali soldier	120
6	Ghods	41	6	Ghods	125
7	Army	28.5	7	Army	140
8	Shariati	29	8	Shariati	135
9	Sina	36.5	9	Sina	130
10	Veterans	48	10	Veterans	110

In this section to review and explain the information in the form of descriptive statistics such as mean, standard

deviation, range, maximum, minimum and paid according to sex. As seen in Table 1 of Each Square 10 Soil And 10 Plant

To Each Two Element Lead And On Lifted Is. The results showed that the highest amount of zinc in the soil samples in the field ppm 5/87 victims, the greatest amount of zinc in plants are veterans in the field of 48 ppm. The highest amount of lead in the soil on the report and the mobilization of the value of 48 ppm and the maximum amount of lead in plants in the military field to the value of 140 ppm were observed.

Test data normality

Test Kolmogorov Smirnov normal to be Distribution Data And And sign The A. that's mean That Distribution One Adjective At One Sample And Comparison The A. If Data And Has Distribution normal Ar e Possible Use From Test Parametric Existence has it And At Other If not, Must From Test Nonparametric Use We.

Table 3 The normality of the data

	The plant	Lead plant	Beneath	Lead dust
Number	10	10	10	10
Average	65/32	122	5/71	2/40
Standard deviation	51/8	58/13	003/14	11/7
Most positive difference	126/0	112/0	141/0	136/0
Most negative gap	113 / 0-	187 / 0-	199 / 0-	203 / 0-
Kolmogorov Smirnov	397/0	593/0	628/0	643/0
The significance level	997/0	874/0	825/0	803/0

With Attention To Test Kolmogorov Smirnov Data Of Zinc and lead in Soil And Plant Level Meaning You have More From 05/0 to Is That sign Donor Meaning Arrow Absence Data And The Is. The data are normal.

The results of statistical comparison with the standard EPA Study of zinc in the soil

Table 4 shows the result of one-sample t-test to compare the soil standard EPA

	Test t	Degrees of freedom	The significance level	The mean difference	Value Ratio: 200	
					O 95%	
					Lowest	Topmost
On	017 / 29-	9	0.000	5/128:	51 / 138-	48/118

Test results showed that the mean T a sample of the soil at 1% to about 99%, ie there is a significant difference. As the average zinc in soil is less than the relevant standard.

Table 5 one-sample t-test results to compare the soil with a national standard

	Test t	Degrees of freedom	The significance level	The mean difference	Value Ratio: 500	
					O 95%	
					Lowest	Topmost
On	761/96	9	0.000	5 / 428-	5178 / 438-	4822 / 418-

Test results showed that the mean T a sample of the soil at 1% to about 99%, ie there is a significant difference. As the average zinc in soil is less than the relevant standard.

Study of zinc in plants

Table 6 result one sample t-test to compare the existing standard plant EPA

	Test t	Degrees of freedom	The significance level	The mean difference	Value Ratio: 300	
					O 95%	
					Lowest	Topmost
On	289 / 29-	9	0.000	35 / 267-	441 / -273	258 / 261-

Test results showed that the mean T a sample of the plant at 1% to about 99%, ie there is a significant difference. So

that the relevant standard is lower than the average of the existing plant.

Table 7 shows the result of one-sample t test to compare the existing plant with a national standard

	Test t	Degrees of freedom	The significance level	The mean difference	Value Ratio: 400	
					O 95%	
					Lowest	Topmost
On	428/136	9	0.000	35 / 367-	4412 / 373-	2588 / 361-

Test results showed that the mean T a sample of the plant at 1% to about 99%, ie there is a significant difference. So

that the relevant standard is lower than the average of the existing plant.

Evaluation of Pb in soil

Table 8 one-sample t-test results for comparison with the standard of lead in soil EPA

	Test t	Degrees of freedom	The significance level	The mean difference	Value Ratio: 50	
					O 95%	
					Lowest	Topmost
Lead	356/4	9	002/0	8/9	88 / 14-	71 / 4-

Test results showed that lead levels do not have a sample of soil at 1% to about 99%, ie there is a significant difference.

So that the lead levels in the soil below the relevant standard.

Table 9 one-sample t-test results for comparison with the national standard of lead in soil

	Test t	Degrees of freedom	The significance level	The mean difference	Value Ratio: 100	
					O 95%	
					Lowest	Topmost
Lead	579/26	9	0.000	8/59	8897/64	7103 / 54-

Test results showed that lead levels do not have a sample of soil at 1% to about 99%, ie there is a significant difference.

So that the lead levels in the soil below the relevant standard.

Evaluation of Pb in plants

Table 10 one-sample t-test results for comparison with a standard lead plant EPA

	Test t	Degrees of freedom	The significance level	The mean difference	Value Ratio: 300	
					O 95%	
					Lowest	Topmost
Lead	446/41	9	0.000	178	71/187	284/168

Test results showed that lead levels do not have a sample of the plant at 1% to about 99%, ie there is a significant

difference. As lead levels in plants is less than the relevant standard.

Table 11 one-sample t-test results for comparison with a standard lead plant in Iran

	Test t	Degrees of freedom	The significance level	The mean difference	Value Ratio: 30	
					O 95%	
					Lowest	Topmost
Lead	422/21	9	0.000	92	2847/82	7153/101

Test results showed that lead levels do not have a sample of the plant at 1% to about 99%, ie there is a significant difference. As lead levels in plant Higher than the relevant standard.

Pearson correlation test

Table 12 Correlation between Zn and Pb in soil and plants

		Zn	Lead plant	The soil	Lead in soil
Zn	Pearson scores The significance level Number	1 10	027 / 0- 941/0 10	011/0 977/0 10	368/0 295/0 10
Lead plant	Pearson scores The significance level Number	027 / 0- 941/0 10	1 10	421/0 226/0 10	369/0 294/0 10
The soil	Pearson scores The significance level Number	011/0 977/0 10	421/0 226/0 10	1 10	164/0 651/0 10
Lead in soil	Pearson scores The significance level Number	368/0 295/0 10	369/0 294/0 10	164/0 651/0 10	1 10

According to Table 12, the significance of solidarity made up of 05/0, which reflects the fact that between the zinc and lead in the soil and plant statistically significant correlation does not exist.

Conclusion

This study aimed to determine Amount Density Metals Heavy On And Lead At square Of the original Region 1 and 2 city Ardebil. According to the results of research and data from the lab indicates that the heavy metals zinc and lead in soil and fields in Zones 1 and 2 of Ardabil city a desirable level is less than the EPA standard was observed. The reason for this is that the city of Ardebil has a low population of the major cities, followed by vehicles less used by citizens, low fuel and produce less heavy metals such as zinc and lead by these vehicles, is . Results of statistical analysis and comparison with standard EPA showed that the concentrations of heavy metals zinc and lead in the measurement of the standard is less significant. Results of statistical analysis and comparison with national standards of Iran showed that the concentrations of heavy metals zinc and lead in the field of measurement than the standard less significant, and only the heavy metal lead in the growing field of size meters higher than the standard level was observed. The results of Pearson correlation between concentration of heavy metals zinc and lead in the soil and the plant did not show. The results of analysis of variance showed a significant relationship between metals in soil and plants that show no significant difference.

References

1. Torabiyani, A., 1381. The effect of irrigation with wastewater on adsorption of heavy metals by leafy vegetables south of Tehran, *Journal of Soil and Water* 16 and 12: 189-196.
2. Erfanmanesh, M. Amini, M., 1385. Contamination of the environment (water, soil, air), Fourth Edition, published by the pillars of page 2.
3. Aghione, M., Servants, H., 1385. Mass balance modeling of cadmium and lead in the area of arable land, *Journal of Science and Technology of Agriculture and Natural Resources*.
4. New Year, A., 1385. Physicochemical characteristics of the soil and the amount and distribution of heavy elements available in some watershed Siahroud Gilan, thesis, research of Ahvaz.
5. Tavakoli Mohammadi, Mohammad Reza, God, A true Prtany, B, border guards, M., 1390. Assessment of heavy metal contamination in Zanjan province using GIS, The thirtieth meeting of Earth Sciences.
6. Samara, C, TH. Kouimtzi, RT, Sitouridou T G. Kaniias and V. Simeono V, 2003. Chemical mass balance source apportionment of PM₁₀ in an industrialized urban area of northern Greece, *Atmospheric Environment*, 37 (1), 41_540.
7. Boisson, Jarutens, M. Mench and J. Vangronsveld. 1999. Evaluation of hydroxyapatite as a metal immobilizing soil additive for the remediation of polluted soils.
8. Peetty G, 1998. Irrigation with Reclaimed Municipal Wastewater a guidance manual. University of California: California state water resources control board: PP (3_2), (13_1), (13_2.)
9. Wcislo, E, Ioven, D, Kucharski, R. and Sdzuj, 2002. Human Health risk assessment case study: an abandoned metal smelter site in Poland. *Chemosphere*: 507_515.
10. Sposito G, Lund J, Chang AC, 1982. Trace Metal chemistry in Aired Zone Field Soils Amended Sewage sludge. I. Fractionation of Ni, Cu, Zn, Pb in soil phases. *Soil Sci. Soc. Am. J.* 46: 260_264.