

SOIL CONTAMINATION WITH HEAVY METALS IN THE SH. RASHIDOV DISTRICT OF DZHIZAK REGION AND METHODS OF THEIR DECREASE FROM THE SOIL COMPOSITION

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ANNOTATION

Sh. Rashidov district is one of the territories where the quality of agricultural land has decreased, the main land of the district is located not far from the city center, industrial enterprises pollute the soil with various pollutants, the natural balance is disturbed and the ecological environment is polluted.

Soil ecology (factors of soil formation, dynamics and evolution of soils; ecological functions of soils; soil productivity; soil ecosystems; influence of anthropogenic factors on the state of soils; succession processes in soil ecosystems)

When determining the field composition and assessing the composition of the soil of the Sh. Rashidovsky district during field studies conducted in July 2020, 9 samples of soil layers 0-30 cm, 30-50 cm and 50-70 cm were taken from the sample.

Analysis of soil contamination with heavy metals in the territory shows that a slight increase in the MPC for soils was observed for honey, zinc, chromium, nickel, cobalt and arsenic. The increase occurred mainly in the upper layer of 0-30 centimeters. Concentrations of all other heavy metals do not exceed the MPC, which confirms the conclusions drawn in the review section of the study on the low informative value of heavy metals in environmental monitoring.

Key words: *soil, chemical composition, quality indicators, heavy metals, mineralization, ions, fertile layer.*

INTRODUCTION

Currently, the problem of soil pollution with heavy metals is relevant in the technogenic and agricultural sectors. Heavy metals are among the main pollutants in the environment. Many substances of this group, such as lead, copper, zinc, cadmium, can cause immunological, oncological and other diseases, even in very small quantities. Studies by scientists from different countries have shown that about 70% of heavy metals enter the human body with food [1].

Sorption cleaning of soils from heavy metals (studied by A.I. Vezentsev and others Scientific Bulletin No. 3 (43) 2008 Belgorod State University) The article presents the results of a study of the ability of clays of the Belgorod region to absorb Pb (II) and Cu (II) ions from water and buffer soil hoods. In the course of the experiment, the optimal ratio of clay: soil was established, at which the cleaning of the soil from heavy metals is most effective. These authors have not studied soil cleaning with other types of heavy metals.

The composition of heavy metals in the soils of the Mangistau region was studied (Pavlichenko L.M. et al., 2016). Analysis of soil data and soil maps of the Mangistau region made it possible to identify the main factors affecting the level of their ecological degradation, to identify the main types of soil pollution and salinization. Indicators of soil bonitet in the region are very low, which is associated with a low humus content in zonal soils and the presence of negative signs of increased salinity. Only in some parts of the province used for irrigated arable land are the quality indicators higher. In this study, it was determined that heavy metals such

as cadmium, copper, lead and zinc are higher than the MAC. The rest of the types of heavy metals in the soil have not been fully studied by them.

Heavy metals of soils from exhausted deposits at the Zauralsky Bashkir mine (studies by Gazizov L.R. et al., 2009) to determine soil contamination with heavy metals Cu, Zn, Fe, Mn, Co, Cd, Pb, Ni. The reasons for the increase in the MPC of these heavy metals are not fully understood.

In 2018-2019, she developed a set of indicators on the main properties of gypsum soils and seasonal dynamics of biological activity, indicators of degradation on the topic "Gypsum soils of the Jizzakh desert and their biological activists" in the Jizzakh region Makhkamova D. Yu., A researcher at the biological faculty of the National University of Uzbekistan.

Researcher Z. U. Rakhmatov conducted research on the topic "Development and implementation of methods aimed at preserving, increasing the fertility of irrigated soils in the Jizzakh desert, preventing and controlling salinity and improving all soil properties." In the study, these researchers did not study the contamination of the soils of the Jizzakh region with heavy metals. From the literary analysis of research works, I revealed the following:

The above studies did not study the level of contamination of the soils of the Jizzakh region with heavy metals and its causes.

In the future, it is necessary to develop scientific and practical recommendations to reduce the pollution of soils in the Jizzakh region with heavy metals, which is important for the region. The purpose of this work is to study changes in the composition of heavy metals in the soil of Sh. Rashidovsky district of Jizzakh region and the importance of their impact.

MATERIALS AND METHODS.

2.1. Survey object.

The main lands of the Sh. Rashidov region are located around the city of Jizzak and in the northeastern part, which is the administrative center of the Jizzakh region. The total area of irrigated land in the district is 34690 hectares, of which: non-saline lands - 8935 hectares (25.8%), saline lands - 25755 hectares (74.2%). The object of the study was the light gray soils of the Sh. Rashidovsky region. Today Sh. Rashidovsky district is one of the territories where the quality of agricultural land has decreased, the main land of the district is located near the city center, industrial enterprises pollute the soil with various pollutants, the natural balance is disturbed and the ecological environment is polluted.

The use of chemicals by people in economic activities and their contribution to the cycle of anthropogenic transformations in the environment is constantly growing [1,3]. Pollutants according to (GOST 17.4.1.0283) in soil are divided into three classes:

Class I (high risk) - As, Cd, Hg, Se, Pb, F, benz (a) pyrene, Zn;

Class II (moderately hazardous) - B, Co, Ni, Mo, Cu, Sb, Cr;

Class III (low risk) - Ba, V, W, Mn, Sr, acetophenone.

Heavy metals are far ahead of common pollutants such as carbon dioxide and sulfur in terms of pollution and are second only to pesticides. In the future, they may be more hazardous than nuclear waste and solid waste. Soil pollution with heavy metals is associated with their widespread use in industrial production. Due to imperfect cleaning systems, heavy metals enter the environment, including the soil, polluting and poisoning it.

Soil is the main medium in which heavy metals accumulate. Heavy metals fall to the ground through both atmospheric air and water. It is a secondary source of pollution of the Earth's oceans and the surface atmosphere. Heavy metals can be assimilated through the soil and into food. According to the monitoring results, more than 40 elements of the periodic table were found in the soil. Including: V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Mo, Cd, Sn, Hg, Pb, Bi and others.

The largest suppliers of metal-containing waste are enterprises for the smelting of non-ferrous metals (aluminum, aluminum oxide, copper-zinc, lead, nickel, titanium-magnesium, mercury, etc.), as well as enterprises for the processing of non-ferrous metals (radio engineering), electrical engineering, instrument making, galvanic sky, etc.).

2.2. Sampling process.

Since the contours of Sh. Rashidovsky district represent certain points that do not change, they were designated as sampling points. This is shown in the area of irrigated land in Sh. Rashidovsky district (Figure 1). Field sampling was carried out on July 27, 2020.

When determining the field composition and assessing the composition of the soil of the Sh. Rashidovsky district during field studies conducted in July 2020, 9 samples of soil layers 0-30 cm, 30-50 cm and 50-70 cm were taken from the sample. - gram glass.

2.3. Applied methods. Sample analysis methods.

The hydrogen index of the soil composition pH was determined in the field.

For the analysis of soil samples, atomic absorption, gas chromatographic, photometric, photocolometric, gravimetric, spectrophotometric, titrimetric and other physicochemical methods were used [11].

Mineralization was determined by gravimetric method. The detection method is based on gravimetric determination of solutes and is determined by filtering the sample to constant weight at a low temperature (105-110 ° C) for water with a low mineral content (105-110 ° C) and at 150 ° C, evaporation and drying. remainder [11].

Methods for the analysis of heavy metals. Heavy metals are detected by photometric and photocolometric methods. For example, the formation of a colored complex compound in the presence of copper xylenol was determined based on the formation reaction of a yellow alkali complex in ferric medium.

According to the results of field and laboratory studies and observations, the sources and level of soil contamination in Sh. Rashidovsky district were established.

RESULTS AND DISCUSSION

3.1. Qualitative indicators of soil of Sh. Rashidovsky district.

On the basis of the analysis, the qualitative indicators of the soils of the Sh. Rashidovsky region, soil contamination with heavy metals were studied. 3.1. The parameters of the soils of the experimental site in Sh. Rashidovsky district are given in tables 1 and 2.

During the survey of soil pollution with heavy metals, the concentration of heavy metals in the soil in three layers (0-30 cm, 30-50 cm and 50-70 cm) of agricultural land was analyzed.

Research has shown that the content of copper in soils is as follows. At point No. 1 in the 0-30 cm layer - 700 mg / kg (21.2 MPC), in the 30-50 cm layer - 62 mg / kg (1.88 MPC), in the 50-70 cm layer - 31 mg / kg (0.94 MPC).

The zinc content is at point No. 1 in the 0-30 cm layer - 570 mg / kg (24.8 MPC), in the 30-50 cm layer - 92 mg / kg (4 MPC), in the 50-70 cm layer - 54 mg / kg (2.8 MPC) figure-2.

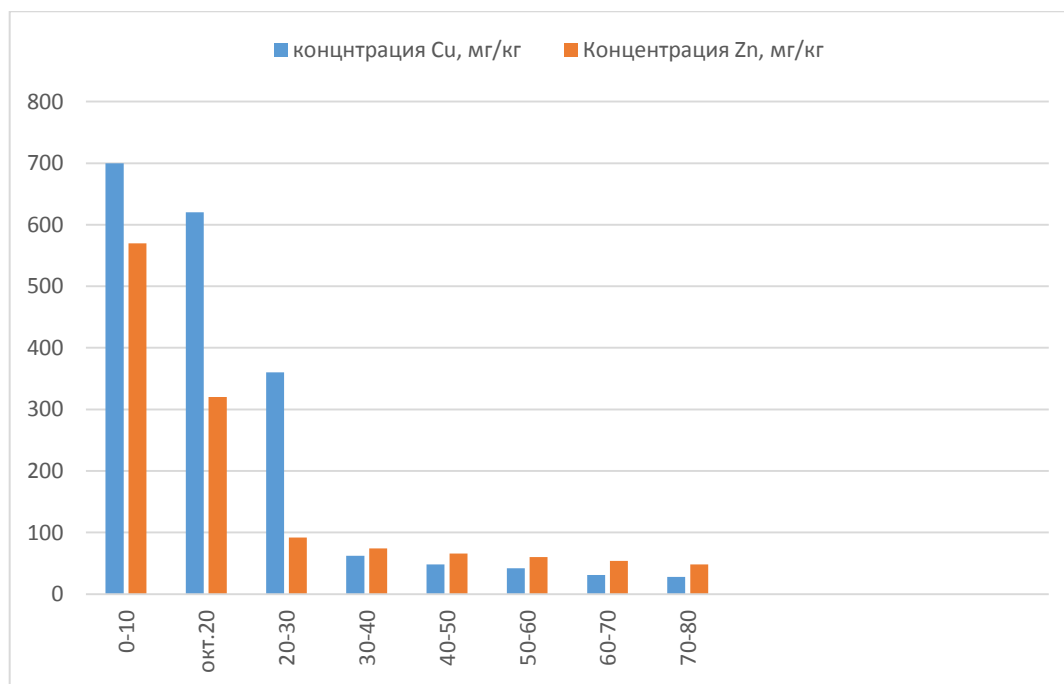


Figure-2. Concentration of honey and zinc in the soils of agricultural land in Sh. Rashidov district

The analysis results show that the concentration of honey is 21.2 times higher in the 0-30 cm layer, 1.88 times in the 30-50 cm layer, the zinc concentration is higher in the 0-30 cm layer. 24.8 times, in the 30-50 cm layer. cm. 4 times in a layer of 50-70 cm. 2.8 times from the MPC norm.

The concentration of chromium at point No. 1 in the 0-30 cm layer is 760 mg / kg (3.8 MPC), in the 30-50 cm layer - 170 mg / kg (0.85 MPC), in the 50-70 cm layer - 100 mg / kg (0.5 MPC). The concentration of manganese in the layer in the 0-30 cm layer is 520 mg / kg (0.35 MPC), in the 30-50 cm layer - 140 mg / kg (0.09 MPC), in the 50-70 cm layer - 75 mg / kg (0.05 MPC). The concentration of chromium is exceeded in

layers of 0-30 cm. 3.8 times from the MPC norm, the concentration of manganese does not exceed in three layers (Fig-3).

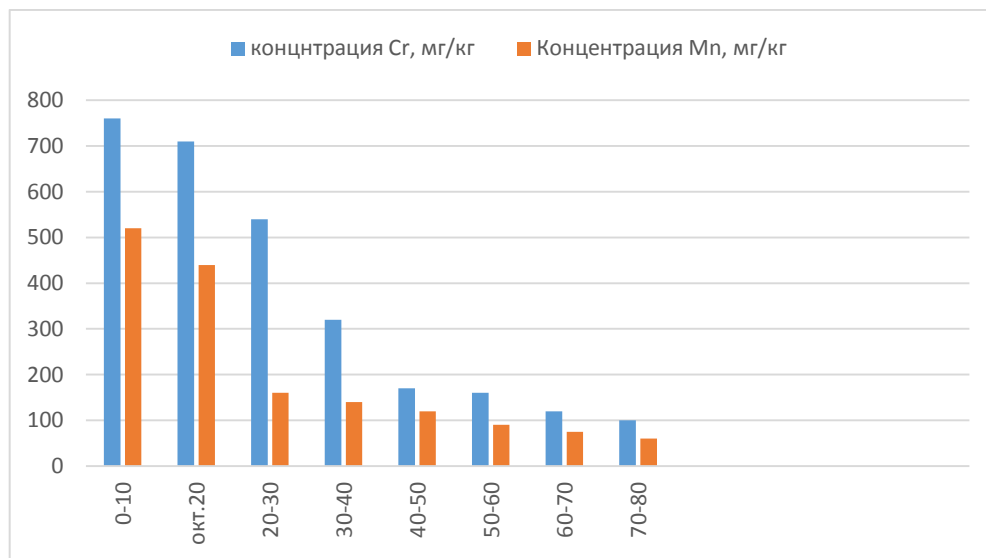


Figure-3. Concentration of chromium and manganese in the soils of agricultural land in Sh. Rashidov district

Nickel concentration at point No. 1 in the 0-30 cm layer is 590 mg / kg (6.9 MPC), in the 30-50 cm layer - 100 mg / kg (1.18 MPC), in the 50-70 cm layer - 32 mg / kg (0.38 MPC). Exceed the MPC from the norm 6.9 times in the 0-30 cm layer, 1.18 times in the 30-50 cm layer (Figure-4).

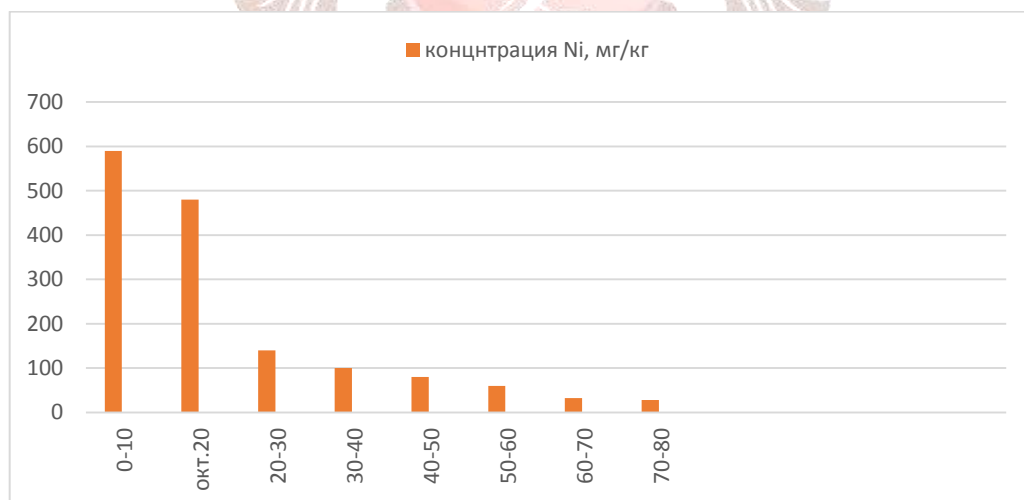


Figure-4. Nickel Concentration in Soils of Agricultural Lands of Sh. Rashidovsky District

The concentration of cobalt at point No. 1 in the 0-30 cm layer is 24.0 mg / kg (4.8 MPC), in the 30-50 cm layer - 5.6 mg / kg (1.12 MPC), in the 50 -70 cm - 2.7 mg / kg (0.54 MPC). The concentration of arsenic in the layer in the 0-30 cm layer is 15 mg / kg (7.5 MPC), in the 30-50 cm layer - 17 mg / kg (8.5 MPC), in the 50-70 cm layer - 12 mg / kg (6.0 MPC). The concentration of cobalt is exceeded in layers 0-30 cm. 4.8 times, in layers 30-50 cm. 1.12 times, the concentration of arsenic is exceeded in the layer 0-30 cm. 7.5 times, in the layer 30-50 cm. 8 , 5 times, in layers of 50-70 cm. 6.0 times from the MPC norm (Figure-5).

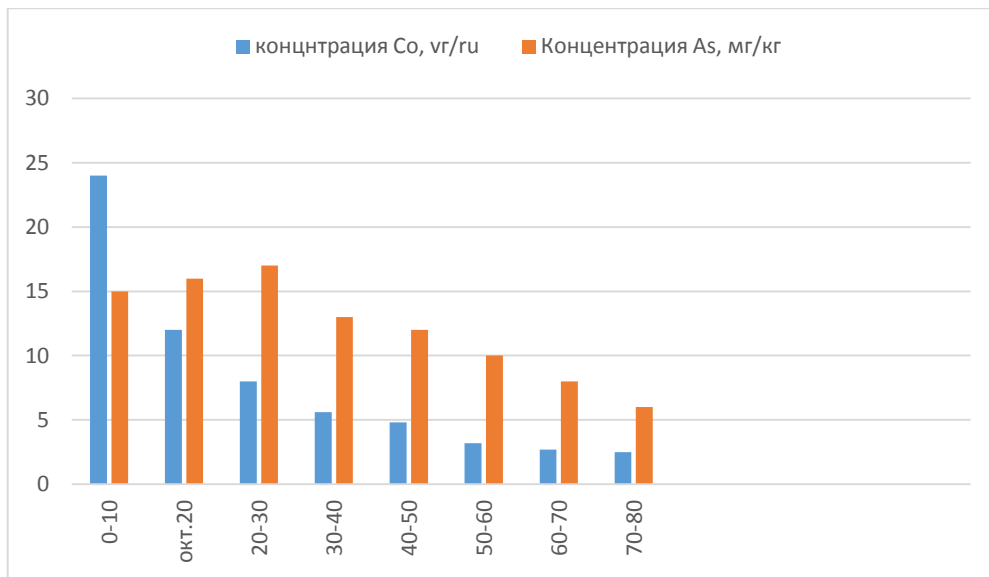
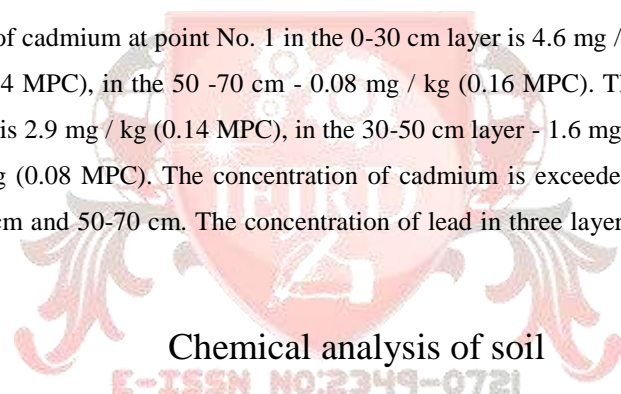


Figure-5. Concentration of cobalt and arsenic in soils of agricultural land in Sh. Rashidov district

The concentration of cadmium at point No. 1 in the 0-30 cm layer is 4.6 mg / kg (9.2 MPC), in the 30-50 cm layer - 0.2 mg / kg (0.4 MPC), in the 50 -70 cm - 0.08 mg / kg (0.16 MPC). The lead concentration in the layer in the 0-30 cm layer is 2.9 mg / kg (0.14 MPC), in the 30-50 cm layer - 1.6 mg / kg (0.08 MPC), in the 50-70 cm layer - 1.6 mg / kg (0.08 MPC). The concentration of cadmium is exceeded in layers of 0-30 cm. 9.2 times, in layers of 30-50 cm and 50-70 cm. The concentration of lead in three layers does not exceed the MPC norm (Fig-6).



Chemical analysis of soil

№ п/п	Layer, cm	Chemicals in soil, $\mu\text{g} / \text{g}, \text{mg} / \text{kg}, \text{g} / \text{t}$															
		Li	Be	B	Na*	Mg*	Al*	P	K*	Ca*	Sc	Ti*	V	Cr	Mn	Fe*	Co
1	0-30	170	14,0	160	14000	38000	100000	2400	19000	21000	63,0	3000	4100	760	520	54000	24,0
2	30-50	39,0	4,0	110	11000	8300	25000	410	5600	8100	14,0	450	390	170	140	24000	5,60
3	50-70	16,0	1,6	85,0	7400	4800	13000	240	3300	6000	6,5	270	200	100	75,0	11000	2,70
	MPC													200,0	1500		5,0

№ п/п	Layer, cm	Chemicals in soil, µg / g, mg / kg, g / t														
		Ni	Cu	Zn	Ga	As	Se	Rb	Sr	Y	Zr	Nb	Mo	Ag	Cd	In
1	0-30	59,0	70,0	57,0	22,0	15,0	37,0	99,0	13,0	26,0	27,0	5,9	220	0,70	4,60	0,110
2	30-50	10,0	62,0	92,0	5,5	17,0	8,9	21,0	13,0	27,0	11,0	1,9	20,0	0,29	0,20	0,011
3	50-70	32,0	31,0	54,0	3,2	12,0	7,4	13,0	10,0	9,1	65,0	1,4	16,0	0,25	0,08	0,008
	MPC	85	33	23		2,0									0,5	

№ п/п	Layer, cm	Chemicals in soil, µg / g, mg / kg, g / t														
		Sn	Sb	Te	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho
1	0-30	1,70	0,63	0,27	2,4	330	50,0	74,0	9,6	42,0	8,6	1,8	10,0	1,6	11,0	2,60
2	30-50	0,91	0,47	0,08	0,6	80,0	6,8	12,0	1,8	7,60	1,7	0,2	1,7	0,2	1,6	0,36
3	50-70	0,69	0,50	0,09	0,3	58,0	3,3	6,3	0,8	3,70	0,7	0,1	0,6	0,0	0,6	0,15
	MPC															

№ п/п	Layer, cm	Химическая вещества в почве, мкг/г, мг/кг, г/т														
		Er	Tm	Yb	Lu	Hf	Ta	W*	Re	Pt*	Au*	Tl	Pb	Bi	Th	U
1	0-30	8,20	1,20	7,9	1,2	2,2	0,1	9,4	0,0	0,0	<0,05	0,2	2,9	0,3	3,8	16
2	30-50	1,10	0,18	1,3	0,2	1,0	0,0	2,1	0,0	0,0	<0,05	0,0	1,6	0,1	1,2	9,1
3	50-70	0,44	0,082	0,6	0,1	0,8	0,0	1,7	0,0	0,0	<0,05	0,0	1,6	0,0	0,9	6,7
	ПДК											20				

FINDINGS

Analysis of soil contamination with heavy metals at the research site in Sh. Rashidovsky district shows that most of the pollutants were found in soil samples. Analysis of soil contamination with heavy metals in the territory shows that a slight increase in MPC for soils was observed for honey, zinc, chromium, nickel, cobalt and arsenic. The excess occurred mainly in the upper layer of 0-30 centimeters. Concentrations of all other heavy metals do not exceed the MPC, which confirms the conclusions drawn in the review section of the study on the low informative value of heavy metals in environmental monitoring. There are several methods of recultivation of soils contaminated with heavy metals and other pollutants:

- removal of the contaminated layer and its burial;
- inactivation or reduction of the toxic effect of pollutants using ion exchange resins, organic substances that form chelate compounds;
- liming, application of organic fertilizers that absorb pollutants and reduce their intake into plants.
- application of mineral fertilizers (for example, phosphate fertilizers, reduces toxic the action of lead, copper, zinc, cadmium);
- growing crops resistant to pollution.

At present, in the world practice for the ecological refining of fertile soils, mineral aluminosilicate adsorbents are increasingly used: various clays, zeolites, zeolite-containing rocks, etc., which are characterized by high absorption capacity, resistance to environmental influences and can serve as excellent carriers for fixing on the surface of various compounds during their modification.

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