

RESEARCH ON SOIL POLLUTION WITH HEAVY METALS FROM MAIN SOURCES OF POLLUTION COUNTY DAMBOVIȚA

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Abstract

Metal transfer in the atmosphere, soil, vegetation, water and sediment from different sources, such as metallurgy, mining, quarrying and processing waste deposits and tailings dams, but also combustion of liquid, and solid waste. A part of total metals in the environment there as part of the natural background. Potentially toxic metals resulting from anthropogenic activities cause severe disturbance of ecosystems and therefore pollution sources must be identified, long-term pollution potential should be expected to be taken to reduce or stop pollution. Soil contamination with metals from various industrial activities is currently a major problem. Due to interactions between different environmental compartments, soil pollutants in all compartments redistribute implications on the functioning of natural biotic systems and human health. How metals are distributed and sustained change depending on physical-chemical properties of metals and environmental parameters. Today it is accepted that a number of features are its unique metals (some metals have remanence, toxicity) and that these unique properties, considered as principles to be considered in risk assessment work.

Key words: pollution, heavy metals, remanence, ecosystem

Pollution by heavy metals also presents a danger to human health, animals, following the participation of heavy metals in proportion too large chain. This pollution is produced locally in small areas or larger depending on the origin or source of pollution: emissions from industrial platforms from different plants, irrigation with sewage sludge or municipal application on agricultural land, fertilized with phosphate fertilizers; use of pesticides, emissions from vehicles, application of treatments in orchards and vineyards.

Action each heavy metal in soil depends on its mobility, which in turn is greatly influenced by environmental reaction, most mobile heavy metals are very acidic environment, only molybdenum and selenium are more mobile in alkaline medium.

Soils were also different capacities able to store heavy metals less active depending on texture and humus content, which depends on the cat ion exchange capacity and volume according to edaphic, reaction (pH). There are industrial areas where industrial emissions of pollutants exceed the acceptable limits, the problems of impact on health in those areas of the law is alarming. In industrial zones, different soil deposited waste can contain significant concentrations of heavy metals and significant quantities of synthetic organic products, according to the technological process applied. Attention is directed mainly to the presence of heavy metals such as Cd, Cu, Hg, Ni, Pb, Zn,

because of their toxicity at low concentrations. Some of the key issues of the designation limits of toxicity are the origin and form of the metal in the ground because there is no equality between metals of different origin in terms of mobility and bioavailability.

Soil organisms can accumulate heavy metals on the soil to separate the anthropogenic geological abundance expressed by certain indices (Lacatusu, R. and Ileana, Ghelășe, 1994).

Intensity of human impact is given by the ratio of fund size and human impact pedological and chemical. Some of the key issues of the designation limits of toxicity are the origin and form of the metal in the ground because there is no equality between the metal different origin in terms of mobility and bioavailability.

Human harmful elements and heavy metals such value exceeded a certain limit may be considered toxic. Meanwhile, many elements, called biogenic important to have a live body, but in high concentration or high dose, which can become toxic. The degree of toxicity is measured by the negative effect on concentration unitary element.

Solubility of heavy metals is strongly dependent on soil acidity. Thus, your soil pH is determined by the nature of the soil, biological and chemical processes occurring in soil, plants, fertilizers used, mineral and organic acids, carbon dioxide resulting respiration in the soil by plants, animals and decomposition of inorganic substances under the action of microorganisms etc.

During the summer your soil pH is lower, due to increased activity of microorganisms that causes the accumulation of mineral salts and organic soil, and in colder weather and high rainfall, the pH is increased further.

MATERIAL AND METHOD

It chose four sampling points considered significant in terms of pollution to River County. In their choice we take into account the specificities of each operator, the factory representative for Special Steel Metallurgy, Thermal Power Doicești energy industry, Romcif Fieni produce cement and Priseaca forest was chosen to highlight its role in environmental protection.

To determine the pH's, 5 - 10 g finely ground mortar (possibly sieved) weighed on an analytical balance is poured into 150 200 ml Berzelius beaker then add 50 ml of KCl 0.1 N, $T_t = 0.0056 \text{ g / ml}$, $F = 1.0000$. Shake for 15 minutes on a magnetic stirrer, and allow resting for 1 hour at room temperature for rinsing. It then read the pH using pH meter site, after prior calibration of the device.

To assess the concentration of heavy metals in soil samples collected according to the methodology of collection, make in the laboratory are weighed and kept in oven at a temperature of 105°C. Then weigh 12 g dry soil and sifted through a sieve of 2 mm, is placed in a 100 ml Berzelius beaker (porcelain crucible), then add 5 ml concentrated nitric acid. It is mineralized over a sand bath until the nitric acid is evaporated.

Remove from the bath and allow to cool, adding 2 ml perchloric acid and further mineralization. Residue repeats with 10 ml of 4% nitric acid by heating it gently to hasten dissolution. After cooling, filter through blue band filter type in 25 ml flask. Wash with distilled water then filled volumetric flask with distilled water and read with X-Ray Fluorescence(EDXRF).

RESULTS AND DISCUSSIONS

COS collection point (*table 1*) were obtained at pH values between 6,1 - 6,2 indicating a slightly acidic nature of soil. Lead concentration recorded values between 680,40 mg / kg 0-20 cm depth (COS 1) representing the maximum and minimum depth of 20 to 40 cm 45,35. A significant amount of lead concentration was recorded at a depth of 0-20cm collection points from thermal Doicești and Romcif Fieni. If we follow the table data observed that the lead content is similar at both sampling depths, if the highest value was found in COS and the lowest was determined to Priseaca. However, for each collection point lead concentration was significantly lower at a depth of 20-40cm. It's noted that the pH affects the concentration of lead only in the first 20 cm of soil. Is, pH between 6 and 6,2 massive influence of lead concentration in soil. Perhaps the greatest depth is involved in other environmental factors which cancel the effect of PH.

Table 1

The total content of toxic heavy metals

Collection point	Results of determination					
	Profile (cm)	pH	Pb (mg/kg)	Cd (mg/kg)	Zn (mg/kg)	Cu (mg/kg)
COS Targoviste	0- 20	6,2	680,50	24,5	157,25	200,15
	20 – 40	6,1	290,00	11,20	77,45	97,80
Thermal Power Doicești	0- 20	6,0	400,25	18,0	140,50	112,45
	20 – 40	6,2	190,20	7,34	81,67	60,50
Romcif Fieni	0- 20	6,0	368,21	15,25	138,24	105,12
	20 – 40	6,0	176,00	7,90	72,11	70,33
Forest Priseaca	0- 20	6,5	105,70	10,10	100,10	80,13
	20 – 40	6,5	45,35	4,50	49,80	23,75

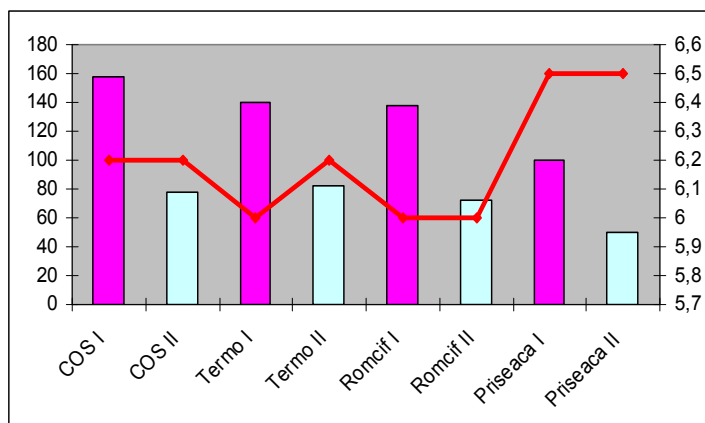


Figure 1 Total lead content (mg / kg) and pH at the point of collection site

Regarding cadmium can be seen from the chart below that have been most values close to achieving Winery Special Steel was 24.5 mg / kg and lowest in the forest to Priseaca 10.10 mg / kg. The value pH between 6 and 6.3 affects the surface accumulation of cadmium in the top 20 cm of soil, while the next has no influence. The depth is greater the lower the concentration of metals.

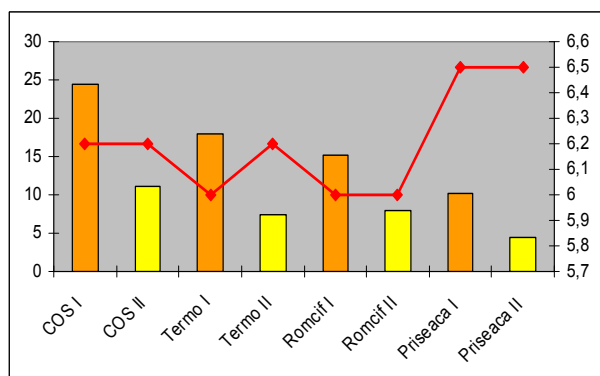


Figure 2 Total content of cadmium (mg / kg) at the point of harvest and pH

Zinc has the highest concentration in the first two inches of 157.25 mg / kg. Specifically is that in all three significant collection industry have obtained similar values in the first depth, also obtained high value and Priseaca forest.

pH influenced the accumulation of zinc in the second layer of 40 cm Romcif collection point.

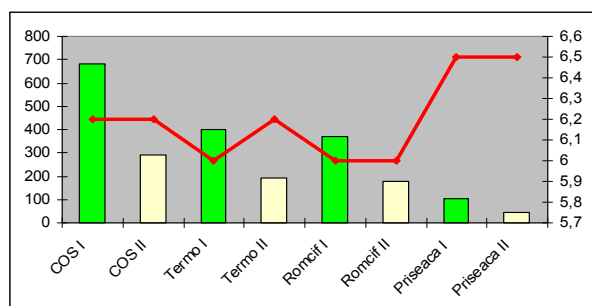


Figure 3 Total zinc content (mg / kg) at the point of harvest and pH

As the largest copper values were obtained throughout the first 20 cm, which shows that the surface soil is more environmentally friendly, since depth is greater the lower the concentration of metals. The pH affects the concentration all the metal surface in the first twenty inches, and more in depth has no influence. Keep order, Shopping recording highest of 200.15, followed by thermal

plants with Doicești 112.45, 105.12 Romcif Fieni and minimum value for the first deep forest Priseaca being 80.13 mg / kg.

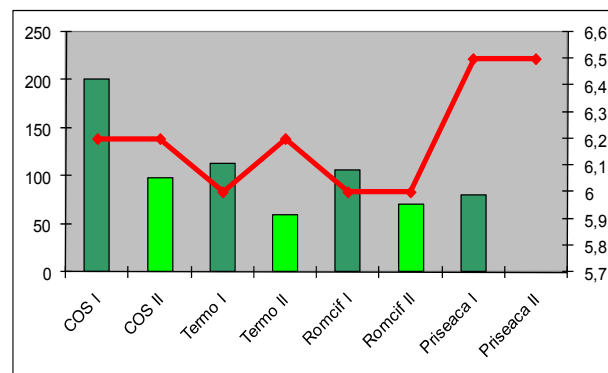


Figure 4 Total copper content (mg / kg) at the point of harvest and pH

CONCLUSIONS

Heavy metal content was significantly higher in 0-20 cm depth to a depth of 20-40 cm. pH influenced the visible accumulation of heavy metals studied in the first 20 centimeters of soil. The greatest concentration found in all cases studied and for all metals was achieved in COS Târgoviște. The lowest concentration was determined to lead. Priseaca Forest recorded the lowest values in both the first 0-20 cm and 20-40 cm in the next. All three Sources County the main pollution must make investments for environmental protection, both to reduce soil t of other environmental factors.

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