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A Brief Report on Urban Heavy Metal Ion Accumulation in Soil

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Introduction

Soils contain nearly every known chemical, and their chemical composition is extremely diverse. Organic complexes with metal ions (Fe^{2+}, Cu^{2+}, Mn^{2+}) and associations between clays and humic and non-humic organic substances characterize organic-mineral soil constituents. The pollutants that are released into all soils travel between 20 and 50 kilometers. Sludge from ports, farm waste, wastewater treatment plant sludge, and so on all contribute a significant amount of pollutants to soils. Soil contamination with organic and inorganic compounds is caused by waste from various industrial processes. The accumulation of heavy metals in soil, and consequently in spontaneous flora, is a significant environmental issue because of their high toxicity and long-term stability in the environment. The bioaccumulation of heavy metals may increase the risks to human health through ingesting food, breathing in particles, inhaling particles, and skin absorption. Heavy metals are extremely harmful to living things. Some elements (Co, Cu, Fe, Ni, and Zn) may even be necessary building blocks for proteins involved in various metabolic pathways below a certain point, whereas toxic effects occur above that point.

Description

Heavy metal pollution is a worldwide issue that is currently attracting a lot of attention for industrial sites as well as protected natural areas. Metal and ferrous industries, as well as solid-fuel boilers, cement factories, road transportation, waste dumps, and tailing deposits, all contribute to heavy metal pollution. These industries also release a lot of dust into the atmosphere. Heavy metals in the form of oxides and gases pollute industrial areas in the vicinity of cities. Lead is primarily responsible for pollution in Baia Mare and Zlatna, while cadmium, zinc, lead, and copper are responsible for pollution in Copşa Mică. More than 8000 ha of soil in Copşa Mică was found to be polluted with heavy metals by economic activities with a metallurgical and chemical profile. Of these, 1500 ha contained cadmium, 422 ha contained zinc, 335 ha contained lead, and 32 ha contained copper. Metallurgical activities decreased significantly or even ceased after 1990. In any case, local people develop these terrains, a reality that might influence their wellbeing [1,2].

Some areas of the human body have seen a 200-fold increase in lead concentration over the past two decades, even exceeding the recommended level. The Arcelor Mittal plant and the former non-compliant municipal waste deposit at Tomesti (15.3 ha), which is located 8 km from the city of Iasi, are the primary heavy metals and hydrocarbons-contaminated sites in the studied area. In 2015, the deposit was closed as part of the "Integrated Waste Management System" project, which took steps to protect people's health and the environment as well as the quality of the soil.

Fertilizers, supplements, and pesticides used in food production, as well as gases released into the atmosphere by industry and combustion, can introduce heavy metals into the soil or plants. A lot of plants around the world have been tested in the laboratory and in the field to see if they can bio accumulate heavy metal ions from the soil. Over 400 recognized plant species hyper accumulate metals at this time. Some species and genotypes have the ability to grow on lands that have higher concentrations of heavy metals. These species and genotypes then hyper accumulate the metals, which either naturally occur there or are there because of human activity. Land is particularly affected by heavy metal pollution; Therefore, knowing the concentration of heavy metals in urban areas is useful for accurately determining their pollution levels. Heavy metals released by industrial activities, particularly in urban areas, have been found to pollute soil in a number of studies, posing health risks. People who live in an area with contaminated soils have been observed to suffer adverse health effects [3-5].

Conclusion

The soil in urban residential areas can be polluted by a wide variety of pollutants brought on by human activities and industrial sources. In addition to the direct toxicity of contaminated soil to human health, inhalation or contact with plants from spontaneous flora is very important. According to the findings of this investigation, the concentrations of heavy metals (Cu, Cr(VI), Cd, Ni, Pb, and Zn) found in soil samples taken from Iasi, Romania, point to elevated levels of Pb and Zn that are above the alert thresholds required by Romanian law in specific areas.

The following was discovered when heavy metal levels in some plants were examined:

Heavy metals (Fe, Cu, Cr, Mn, and Zn) were found in varying concentrations, with mint and nettle being notable for their higher iron content and thyme and rattle for their higher zinc content, respectively. Except for primula and plantain, which do not contain Pb and Cd, potentially toxic metals (Pb, Cd, and Ni) are present in plants and infusions in low concentrations. It is essential to analyze and monitor the concentrations of heavy metals in soil and plants from spontaneously edible flora in order to avoid contamination and potentially harmful effects on human health and the environment. The information that was obtained ought to be useful in recommending remediation strategies and controlling heavy metal contamination in soil and plants from spontaneous flora. It is recommended to harvest and use plants from soils that do not contain heavy metal ions, considering the expansion of inhabited areas in the studied metropolitan area, taking into account the potential for plants from the spontaneous flora in the area to accumulate heavy metal ions and their use in medicine.

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