Mini Review
Volume 9:11, 2022

Journal of Environmental Analytical Chemistry

ISSN: 2380-2391

Evaluations of a Hazard of Conceivably Toxic Compounds in Agriculture Research Soil and Water

Nadir Osem*

Department of Environmental Science, King Saud University, Riyadh, Saudi Arabia

Abstract

Contamination of soil with potentially toxic elements (PTEs) is gaining attention around the world due to its obvious toxicity and risks to local residents. Soil PTE distribution, source, and environmental risk assessments are thus the first steps toward high-efficiency pollutant degradation and sustainable utilisation. The current study assessed the environmental risk of As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn in Al-Ahsa soils in eastern Saudi Arabia using a variety of contamination indicators and multivariate methods. 30 surface soil samples were collected from palm fields irrigated with groundwater and treated sewage water for analysis. From 1985 to 2021, Landsat images of Al-Ahsa showed an increase in total vegetative area and residential area, but a decrease in bare land area.

Keywords: Contamination • Sewage • Groundwater • Pollutant

Introduction

Soil contamination is defined as the excessive deposition of toxic elements such as Hg, Cd, Pb, Cr, As, Zn, Cu, Ni, Sn, and V into soil and water as a result of natural or anthropogenic activities, resulting in severe environmental degradation. Excess PTEs in soil are caused by a variety of factors, including natural sedimentation and precipitation, irrigation with contaminated water derived from urban and industrial waste, and the use of various fertilisers and pesticides in agricultural practises. Potentially toxic soil elements can enter the human body through skin absorption and dust inhalation, potentially causing serious health problems, especially in children [1].

PTE toxicity in soil kills microorganisms that improve soil fertility and nutrition. Arsenic toxicity causes cancers of the liver, skin, blood, and prostate gland in humans. Hg toxicity causes Minamata disease, as well as other physiological effects and carcinogenic effects on the brain, skin, and lung, whereas Pb causes cancers of the central nervous system, the lungs, and the intestine. Cadmium accumulates in soils as a result of the widespread use of phosphate fertilisers and then enters food chains, causing Alzheimer's disease and lung, gastrointestinal, breast, and renal cancer in humans. The Kingdom of Saudi Arabia (KSA) has one of the fastest-growing economies in the Gulf region, with industries ranging from petrochemicals to oil and gas to agriculture and pharmaceuticals [2].

Al-Ahsa is the most significant and oldest oasis on the Arabian Peninsula. Al-Ahsa is approximately 320 kilometres from Riyadh and 75 kilometres from the Arabian Gulf coast. Al-Ahsa includes the densely populated and industrialised cities of Al-Hofuf and Al-Mubaraz, as well as over fifty villages. Al-Ahsa is built on a sedimentary sequence of carbonates, evaporates, and subordinate marl and shale with a total thickness of 800-2500 m that rises and slopes toward the Arabian Gulf. The groundwater system in this area is made up of three partially interconnected aquifers: the Neogene aquifer complex with a total thickness of 180 m, the Khoper aquifer beneath the Neocene with a depth between 180 and 250 m, and the Umm-err Radium at the base [3].

There are few studies in the literature, especially those examining the risk assessment of PTEs and their associated human health hazards. discovered a high enrichment in Cu, Zn, pb, and Ni in Al-ash Oasis cultivated soil and attributed the pollution to agriculture production and the use of varying irrigation water quality. Investigated the health risks associated with As, Cd, Ni, Pb, Cr, and Sb in Hassidic Brown Rice and found that As and Pb concentrations in all samples exceeded the FAO and WHO maximum allowable limits. The contamination of soil with PTEs, as well as their hazardous effects on the soil and humans, must be evaluated on a regular and ongoing basis [4].

Researchers can use PCA to condense large datasets with many variables into fewer principal components that can be easily visualised and analysed. This method helps us understand the main processes involved in soil contamination and its potential sources. In this case, PCA revealed two major components that explained 71.32% of the total data variance. The first component was responsible for 51.85% of the total variation. It is closely related to Cr, Cu, Hg, Cd, Ni, and Pb. The second component, on the other hand, accounted for 19.48% of the total variance and was strongly related to Zn and Cu. The PCA results indicated that the investigated PTEs came from a combination of natural and anthropogenic sources. Agricultural chemicals and fertiliser overuse could be potential anthropogenic sources of Hg, As, Cd, and pub [5].

Literature Review

Pearson's correlation coefficient is the most commonly used coefficient for determining a linear relationship between two variables. This study used Pearson's coefficient to determine the correlation between PTEs in order to determine their possible sources. The correlation coefficient matrix is listed. The positive correlations between several pairs of PTEs, such as Pub-Cr, pub-Hg, pub-Cd, pub-Ni, and Cu-Zn, indicated that these PTEs came from similar sources, most of which were natural, due to the weathering of clay minerals (hydrous aluminium silicates) in the soil. Cu and Zn, on the other hand, had weak and negative correlations with the remaining HMs, indicating different sources [6].

Discussion

With 12,000 hectares, l-Ash is the largest agricultural area in Saudi Arabia's Eastern Province. Deep, non-saline homogenised loamy soils in a

***Address for Correspondence:** Nadir Osem, Department of Environmental Science, King Saud University, Riyadh, Saudi Arabia, E-mail: nadirosem23@gmail.com*

Received: 02 November, 2022, Manuscript No: jreac-23-85958; **Editor Assigned:** 04 November, 2022, PreQC No: P-85958; **Reviewed:** 16 November, 2022, QC No: Q-85958; **Revised:** 21 November, 2022, Manuscript No: R-85958; **Published:** 28 November, 2022, DOI: 10.37421/2380-2391.2022.9.398

low plain watered by many fresh-water springs in Al-Ash plain; some patches have a high water-table, indicating that the soils are wet. The Al-Ash oasis is an arid area with year-round temperature, humidity, evaporation, and precipitation variations, with long and extremely hot summers. The average temperature and evaporation rate are both extremely high at 43°C and 12 mm, respectively, and humidity drops to a minimum of 20%. Winters, on the other hand, are extremely cold, with daytime and night-time temperatures of 20-28°C and 8-10°C, respectively [7].

Conclusion

Landsat images, as well as several pollution indices and multivariate tools, were used to investigate the land use pattern and hazardous concentrations of PTEs in agriculture soil of the Al-Ash oasis. According to the assessment, the investigated soil was severely enriched, highly contaminated, and posed a high environmental risk with Hg. The RI findings indicated that the soil samples indicated a moderate PTE risk. Cu, As, Cd, and Pub enrichment in the study area ranged from moderate to negligible. Multivariate statistical methods revealed that the PTE sources were a combination of natural and human effects, originating primarily from weathering of earth materials and atmospheric deposition, as well as sewage and agricultural activities. There was no discernible difference between soils samples collected from farms irrigated with treated sewage water. And those irrigated with groundwater in terms of PTE contamination. The concentration levels of PTEs in Al-Ash soil must be monitored on a regular basis in order to measure the accumulation of HM and prevent their increase, specifically Hg, As, and Sr. Farmers should also use bio fertilizers and manure to reduce their reliance on chemical fertilisers and pesticides.

Acknowledgement

None.

Conflict of Interest

There is no conflict of interest by author.

References

1. Shah, Afzal, Suniya Shahzad, Azeema Munir and Mallikarjuna N. Nadagouda, et al. "Micelles as soil and water decontamination agents." *Chem Rev* 116 (2016): 6042-6074.
2. Alexander, Martin. "How toxic are toxic chemicals in soil?." *Environ Sci Technol* 29 (1995): 2713-2717.
3. Geissen, Violette, Hans Mol, Erwin Klumpp and Günter Umlauf, et al. "Emerging pollutants in the environment: A challenge for water resource management." *Int Soil Water Conserv Res* 3 (2015): 57-65.
4. Damalas, Christos A. and Ilias G. Eleftherohorinos. "Pesticide exposure, safety issues, and risk assessment indicators." *Int J Environ Res Public Health* 8 (2011): 1402-1419.
5. Törnqvist, Rebecka, Jerker Jarsjö and Bakhtiyor Karimov. "Health risks from large-scale water pollution: Trends in Central Asia." *Environ Int* 37 (2011): 435-442.
6. Obery, Angela M. and Wayne G. Landis. "A regional multiple stressor risk assessment of the Codorus Creek watershed applying the relative risk model." *Human and Ecological Risk Assessment: An International Journal* 8 (2002): 405-428.
7. Elgallal, M., L. Fletcher and B. Evans. "Assessment of potential risks associated with chemicals in wastewater used for irrigation in arid and semiarid zones: A review." *Agric Water Ma nag* 177 (2016): 419-431.

How to cite this article: Osem, Nadir. "Evaluations of a Hazard of Conceivably Toxic Compounds in Agriculture Research Soil and Water." J Environ Anal Chem 9 (2022): 398.