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TOXIC METALS AND METALLOIDS IN FARMLAND SOIL AND CEREALS IN AN INDUSTRIAL-AGRICULTURAL INTERACTION REGION OF CHINA: CONTAMINATION, SOURCES AND RISKS

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Abstract

Toxic metals and metalloid (TMMs) in soils and crops is a major environmental threat in China, especially in some industrial-agricultural interaction region. In this research, the pollution index and principal component analysis were used to assess the contamination and sources characteristics of the 5 TMMs (As, Cd, Cr, Pb, and Hg) in the study area, the health risk assessment was combined with APCS-MLR model for quantitative evaluation from different sources, and the potential ecological risk index was optimized. Taking a typical industrial-agricultural interaction region in northwest of China: the farmland in Gaolan County, Lanzhou City as an example, three sources were quantitatively apportioned, these being natural (38.19%), industrial discharges (36.02%), as well as coal burning and domestic garbage (25.79%). The soil was moderately contaminated by Cd, slightly contaminated by Hg and Pb, and freely contaminated by Cr and As. Regarding ecological risk, industrial production was the greatest source. As for human health risk, TMMs pose no non-carcinogenic risk, but their natural contribution to carcinogenic risk is unacceptable, and is driven primarily by cereals ingestion. Integrated approaches that combine risk assessment with source identification is very effective in identifying pre-pollutants and important pollution sources. This can provide a good theoretical reference for effective pollution prevention and control.

Key words: ecological risk, farmland, health risk, source, toxic metals and metalloid

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