

孙剑辉,王国良,张干,李军,柴艳.黄河表层沉积物中有机氯农药的相关性分析与风险评价[J].环境科学学报,2008,(2):342-348

黄河表层沉积物中有机氯农药的相关性分析与风险评价

Correlation analysis and risk assessment of organochlorine pesticides in surface sediments from the Yellow River

关键词: [有机氯农药](#) [沉积物](#) [相关分析](#) [黄河](#)

基金项目: [河南省重点科技攻关项目\(No0624440040\)](#)

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摘要: 利用GC-ECD检测了黄河中下游干支流23个表层沉积物中的有机氯农药,探讨了有机氯农药含量与沉积物粒度、TOC之间以及有机氯农药组分之间的相关性,评价了有机氯农药的污染水平和生态风险.结果表明:沉积物中有机氯农药总含量范围为 $0.35\sim 22.92\text{ng}\cdot\text{g}^{-1}$,其中HCHs与DDTs的含量较高,分别为 $0.09\sim 12.88\text{ng}\cdot\text{g}^{-1}$ 和 $0.05\sim 5.03\text{ng}\cdot\text{g}^{-1}$.干流中有机氯农药的含量从中游到下游呈逐渐升高趋势,主要支流中的含量为:新蟒河>金堤河>汜水>伊洛河>沁河.沉积物中粘土、TOC、六氯苯、HCHs、九氯、 β -硫丹类农药含量与有机氯农药总含量之间显著相关,在决定有机氯农药含量和分布上起着重要的作用.HCHs和六氯苯、反式氯丹、硫丹类农药,氯丹和九氯、硫丹硫酸盐类农药;六氯苯和 β -硫丹含量显著相关,很可能具有相似的分布机制和输入来源;而DDTs与其它类农药含量不相关,其分布和来源可能不相同.与沉积物风险评估值对比,黄河表层沉积物中的有机氯农药存在一定的生态风险.

Abstract: Organochlorine pesticides (OCPs) in twenty-three surface sediment samples from the middle and lower reaches of the Yellow River were analyzed by GC/ECD (Gas chromatography with electrochemical detection). The correlations between the concentration of OCPs, the granularity of sediments, and total organic content (TOC) are discussed, and the correlations among various components of the OCPs were also studied. The contamination level and risk were assessed with risk evaluation criterion. The results show that the range of total OCPs concentration was $0.35\sim 22.92\text{ng}\cdot\text{g}^{-1}$. The concentrations of HCHs and DDTs were much higher than other compounds and varied over $0.05\sim 5.03\text{ng}\cdot\text{g}^{-1}$ and $0.09\sim 12.88\text{ng}\cdot\text{g}^{-1}$, respectively. The contamination level of OCPs in sediment increased from the middle to the lower reaches along the Yellow River. The total OCPs in the main tributaries followed the sequence: Xinmang River > Jindi River > Si River > Yiluo River > Qin River. Strong correlations were found between the total OCPs and clay ratio, TOC, hexachlorobenzene, HCHs, nonachlor, β -endosulfan in sediments, and the correlations played an important role in determining the level of OCPs in the sediment. The correlations between HCHs and each of hexachlorobenzene, trans-chlordane, endosulfan pesticides were strong, the correlations between chlordane and each of nonachlor, endosulfan-sulfate were also strong, the same as the correlation between hexachlorobenzene and β -endosulfan. These results indicated that the OCPs possibly have the same or similar sources and distribution mechanisms. However, DDTs had weaker correlations than other compounds, which suggest that the distribution and sources of DDTs differ from other OCPs. Comparing the ERL and ERM values from the risk evaluation, OCPs in the surface sediments from the middle and lower reaches of the Yellow River pose a risk to consumers of bottom feeders.

Key words: [organochlorine pesticides](#) [sediments](#) [correlation analysis](#) [Yellow River](#)

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