

研究报告

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天然黏土联合磷肥对农田土壤镉铅污染原位钝化修复效应研究

In-situ immobilization of cadmium and lead in a contaminated agricultural field by adding natural clays combined with phosphate fertilizer

关键词: [污染土壤](#) [镉](#) [铅](#) [钝化](#) [海泡石](#) [膨润土](#) [磷肥](#)

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摘要: 为研究天然黏土联合磷肥对农田土壤镉铅污染的原位钝化修复效应,在天津市某地开展了田间示范实验,以油麦菜、油菜和萝卜为模式作物,以海泡石、膨润土和磷肥等作为钝化修复材料,研究其对蔬菜可食部位生物量、镉铅含量和土壤中镉铅形态分布的影响,考察其对土壤镉铅污染的原位钝化修复效果.结果表明:磷肥、海泡石/磷肥复配、膨润土/磷肥复配可提高供试蔬菜可食部位生物量,其中对油麦菜和油菜的生长促进作用要明显优于对萝卜的生长促进作用;钝化材料可不同程度地降低供试蔬菜可食部位镉铅含量,其中以海泡石/磷肥复配效果最佳,可使油麦菜和油菜地上部镉含量降低至国家食品卫生标准限定值以下;钝化材料可不同程度降低农田土壤中可交换态镉铅含量,增加残渣态镉铅含量.综合评价表明采用天然黏土联合磷肥原位钝化修复农田镉铅污染有效可行.

Abstract: In-situ immobilization field experiments were carried out in a cadmium and lead contaminated agricultural field in Tianjin. *Lactuca sativa* L., *Brassica campestris* L. and *Raphanus sativus* were selected as model vegetables. Phosphate fertilizer, natural clays such as sepiolite and bentonite, and composites of the above were employed as immobilization materials for heavy metal pollution. The effects of immobilization materials on the biomass of vegetables, the concentrations of cadmium and lead in the edible parts and speciation transformation of cadmium and lead were investigated. It was found that the phosphate fertilizer and its composite with sepiolite or bentonite could increase the biomass of vegetables. All the immobilization materials decreased the cadmium and lead contents in the vegetables to different degrees. The composite of sepiolite and phosphate fertilizer had the best performance, and the contents of cadmium in *Lactuca sativa* L. and *Brassica campestris* L. were below the level of national standard for food safety. All the immobilization treatments inhibited the bioavailability of heavy metals by reducing the contents of exchangeable fractions and increasing the residual fraction of heavy metals. Therefore using natural clays combined with phosphate fertilizer is efficient for the in-situ remediation of cadmium and lead contaminated agricultural fields.

Key words: [polluted soil](#) [cadmium](#) [lead](#) [immobilization](#) [sepiolite](#) [bentonite](#) [phosphate fertilizer](#)

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