环境科学学报
ACTA SCIENTIAE CIRCUMSTANTIAE

研究报告

郑向群,郑顺安,李晓辰.叶菜类蔬菜土壤铬(III)污染阈值研究[J].环境科学学报,2012,32(12):3039-3044

叶菜类蔬菜土壤铬(Ⅲ)污染阈值研究

Pollution threshold value of soil chromium (Ⅲ) for leafy vegetables

关键词：铬(III) 叶菜 阈值 潮土 红壤

基金项目：公益性行业(农业)科研专项(No.200903015)

作 者 单位

郑向群 农业部环境保护科研监测所/农业部产地环境与农产品安全重点开放实验室/天津市农业环境与农产品安全重点开放实验室,天津 300191

郑顺安 农业部环境保护科研监测所/农业部产地环境与农产品安全重点开放实验室/天津市农业环境与农产品安全重点开放实验室,天津 300191

李晓辰 天津城建学院环境与市政工程系,天津 300384

摘要：以2种典型土壤(天津潮土与江西红壤)和9种常见叶菜(油菜、茼蒿、菠菜、生菜、芹菜、空心菜、苋菜、小白菜、油麦菜)为研究对象,通过盆栽试验揭示不同铬(Cr^{3+})污染土壤和叶菜Cr累积的相关性规律,寻求符合绿色蔬菜生产要求的土壤Cr(III)污染阈值.结果表明:叶菜属于对重金属富集能力较强的蔬菜,对叶菜重金属污染的评价应该重点考察食品卫生标准的临界值.通过叶菜与潮土及红壤中Cr(III)含量之间的回归方程,可得出符合国家食品卫生标准的土壤Cr阈值预测区间,潮土为104.387~300.741 mg·kg^{-1},红壤为157.621~401.031 mg·kg^{-1}.芹菜、苋菜和空心菜对土壤质量的要求较高,而茼蒿在土壤Cr含量超过土壤环境质量标准3级标准的情况下仍可达标.根据计算出的阈值,可以为叶菜类蔬菜基地建设的地点选择和污染农田土壤的治理目标提供科学依据.

Abstract：Pollution threshold value of soil heavy metal is the basis for risk assessment of agricultural product in growing fields. This study was conducted to investigate the relationship between pollution in soil and leafy vegetables by pot experiments, and to pinpoint the threshold value of chromium (Cr Ⅲ) for safe and green vegetable production. Red soil and fluvo-aquic soil were selected to be tested soils and 9 kinds of common leafy vegetables, including Rape (*Brassica campestris* L.), garland chrysanthemum (*Chrysanthemum coronarium* L.), spinach (*Spinacia oleracea* L.), lettuce (*Lactuca sativa* L.), celery (*Apium graveolens* L.), water spinach (*Ipomoea aquatica* Forsk), edible amaranth (*Amaranthus mangostanus* L.), pakchoi (*Brassica chinensis*), and leaf lettuce (*Lactuca sativa* L. var. crispa), were taken as experimental materials. The results indicated that leafy vegetables showed high accumulation capabilities for heavy metals, and consequently their threshold values should be determined as the maximum levels of heavy metals in foods. Prediction intervals of threshold limits of Cr in two types of soils can be achieved by simulated regression model, which were 104.39~300.74 mg·kg^{-1} in fluvo-aquic soil and 157.62~401.03 mg·kg^{-1} in red soil, respectively. It can be concluded that leafy vegetables growing on fluvo-aquic soil had higher accumulation capabilities of Cr than those growing on red soil. Celery, edible amaranth and water spinach growing on both types of soils had high accumulation capabilities of Cr, while garland chrysanthemum's accumulation capabilities was comparatively low. Predicted threshold value of Cr in soil can be referenced for management for growing fields of leafy vegetables and determination of the target of soil pollution control.

Key words：chromium (Ⅲ) leafy vegetable threshold value red soil fluvo-aquic soil

主办单位：中国科学院生态环境研究中心

单位地址：北京市海淀区双清路18号 邮编：100085

服务热线：010-62941073 传真：010-62941073 Email：hjkxxb@rcees.ac.cn