

## 施用有机物料对土壤镉形态的影响

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## Cadmium fractions in soils as influenced by application of organic materials

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**摘要** 采用室内培养试验, 研究作物新鲜秸秆和腐熟猪粪对模拟镉(Cd)污染的土壤中Cd形态转化的动态影响。结果表明, 各处理土壤交换态Cd含量随培养时间均逐渐降低。碳酸盐结合态和铁锰氧化物结合态Cd含量先增加后降低, 而有机质结合态和残渣态Cd含量则逐渐增加。添加秸秆可增加土壤交换态Cd含量, 但随时间延长, 增幅逐渐降低, 猪粪则可降低土壤交换态Cd含量。添加有机物后土壤交换态Cd含量的变化主要是由有机质结合态或残渣态Cd含量的变化而引起。秸秆和猪粪对土壤Cd形态的转化与土壤胡敏酸(HA)和富里酸(FA)的变化有关。秸秆对能活化土壤Cd的FA增加幅度大于对能钝化土壤Cd的HA增加幅度, 降低HA/FA比, 但降幅随时间逐渐减少; 猪粪在整个培养阶段对HA增加幅度均大于FA的增加幅度, 增加HA/FA比。秸秆和猪粪均可降低潮土pH而提高红壤pH, 但只有猪粪可通过提高红壤pH降低Cd向交换态转化。添加秸秆和猪粪后, Cd由低活性态向交换态转化与HA/FA呈显著负相关。

**关键词:** 秸秆 猪粪 镉 富里酸 胡敏酸 Ph

**Abstract:** A soil incubation experiment was conducted to study the effects of fresh straw or composted pig manure application on the fraction of cadmium (Cd) in soils. Results showed that exchangeable Cd in soils decreased with the incubation time, carbonate and oxide bound Cd first increased and then decreased, whereas organic bound and residual Cd increased with incubation time. Application of straw increased the exchangeable Cd, but this increase weakened with the incubation time. Application of pig manure decreased exchangeable Cd. The variation of exchangeable Cd was mainly affected by organic bound or residual Cd. The effect of straw or pig manure on the transformation of Cd fraction in soils was related with the changes of soil humic acid (HA) and fulvic acid (FA). When straw was applied, the increase of FA in the soils was more than HA and therefore HA/FA ratio decreased. While when pig manure was applied the increase of HA in the soil was more than FA and HA/FA ratio increased during incubation period. Results also showed that straw or pig manure amendment significantly influenced soil pH, but only pig manure could reduce Cd solubility by increasing soil pH in acid Ferralsols. The transformation of Cd in soils applied with straw or pig manure from low mobility fractions to exchangeable fraction was negatively correlated with HA/FA.

**Keywords:** straw; pig manure cadmium humic acid fulvic acid pH

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