

垃圾堆肥对难溶性磷转化及土壤磷素吸附特性影响

Effects of municipal solid waste composting on solubilization of insoluble phosphate and soil phosphorus sorption characteristics

投稿时间: 2005-5-9 最后修改时间: 2005-8-25

稿件编号: 20060231

中文关键词: 生活垃圾; 堆肥; 难溶性磷; 富磷垃圾肥; 磷素吸附特性

英文关键词: municipal solid waste; composting; insoluble phosphate; P-enriched MSW compost; phosphorus sorption characteristics

基金项目: 国家重点基础研究发展计划项目(973)(2005CB724203); 哈尔滨市攻关项目(2002AA3CN109); 哈尔滨市基金(2005AFXXJ043)

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中文摘要:

在城市生活垃圾进行工厂化堆肥过程中, 加入难溶性磷矿粉, 探讨堆肥对难溶性磷的转化能力及堆肥产品培肥后对土壤磷素吸附特性的影响。结果表明, 加入磷矿粉可使堆肥中活性有机磷、中等活性有机磷、中稳性有机磷、高稳性有机磷及速效磷含量均有不同程度的提高, 与对照相比分别增加212.69%、80.36%、61.21%、62.74%、157.89%。通过电镜观察表明, 堆肥后磷矿粉典型的矿物特征消失, 表面呈蜂窝状。将堆肥后的产品进行培肥试验表明, 富磷垃圾肥处理可明显改善土壤磷素的吸附特性, 与施化肥相比, 最大吸附量(Q_m)下降8.76%, 最大缓冲容量($Q_m \cdot K$)下降13.58%, 而磷素的吸附饱和度(DPS)、零净吸附浓度磷(EPC_0)则呈不同程度的增加, 幅度依次为98.52%、7.13%。试验结果显示, 通过堆肥生产富磷垃圾肥可为解决中国磷素资源缺乏、化学磷肥利用率低等问题提供一条生物学途径。

英文摘要:

There are a lot of organic acid substances during municipal solid waste(MSW) composting that can transform insoluble phosphate. Ground phosphate rock was mixed into MSW composting; the effects of composting on ability of insoluble phosphate solubilization and the effects of composting production (P-enriched MSW composting) on soil phosphorus sorption characteristics after being amended for two years were studied. The authors observed that by mixing ground phosphate rock into composting, the active organic phosphate, middling active organic phosphate, middling stable organic phosphate and high stable organic phosphate were increased by 212.83%, 80.36%, 61.21%, 62.74%, 157.89%, respectively. At the final stage of composting, scanning electron microscopy revealed cavities of phosphate rock powder surface. After composting productions have amended soil for two years, the results showed, in comparison with the treatment of chemical fertilizer, amending with P-enriched MSW composting could influence phosphorus sorption characteristics of the soil. Maximum phosphorus sorption capacity(Q_m), maximum buffer capacity($Q_m \cdot K$) decreased by 8.76%, 13.58%, and the degree of phosphorus saturation(DPS) and equilibrium phosphorus concentration at zero sorption(EPC_0) increased by 98.52%, 7.13%, respectively. This study suggests that P-enriched MSW composting could provide a biological approach to the problem of phosphate resources shortage and limited availability rate of phosphorus fertilizer in China.

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