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研究报告

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驯化矿化垃圾CH_4氧化速率和N_2O释放研究

Landfill CH_4 oxidation and N_2O emissions from incubated mineralized refuse

关键词：填埋场甲烷释放 甲烷氧化能力 矿化垃圾 铵氧化菌 N_2O释放

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摘要：利用畜禽废水驯化矿化垃圾,并将其与原生矿化垃圾和粘土对比,分析了土壤理化性质、含水率、温度等对CH_4氧化能力和N_2O释放的影响.研究表明:驯化矿化垃圾对CH_4的氧化能力(15.48 μmol·g^{-1}·h^{-1})明显高于原生矿化垃圾和所选粘土土样;材料的粒径尺寸、有机质、氨氮硝化率及硝态氮生成率均与CH_4氧化能力有着显著的正相关性;驯化矿化垃圾在加入蒸馏水后释放大量的N_2O,产生N_2O的量是原生矿化垃圾的2倍,并且比粘土高一个数量级.由于驯化矿化垃圾对环境的适应能力强,CH_4氧化能力高,进而能够减少温室气体排放,可作为一种较为理想的填埋场覆土材料.

Abstract: In this study, livestock wastewater was used to incubate mineralised refuse (IMR). The effects of physicochemical properties, soil water content and soil temperature on CH_4 oxidation and N_2O emissions from IMR were reported and compared with original mineralised refuse (OMR) and soil. The maximum CH_4 oxidation potential (MOP) of IMR was 15.48 μmol·g^{-1}·h^{-1}, which is substantially higher than those of OMR without incubation and soil. Correlation analysis (p>0.05) showed that the D_{50} value, organic matter content, NH_4^+-N nitrification and NO_3^--N generation rates (p<0.05) were highly positively correlated with the MOP for each of the three types of materials. Following the addition of distilled water, N_2O emissions from the IMR were almost two times and one order of magnitude greater than those of the OMR (p>0.05) and soil (p>0.05). IMR was a low-energy practice for the production of a MSW landfill bio-cover material that could help to mitigate CH_4 emissions without a secondary pollution risk because of its tolerance for environmental changes.

Key words: landfill CH_4 emissions methane oxidation potential mineralised refuse ammonia-oxidising bacteria N_2O emissions