

不同外源氮对石灰性土壤硝化作用的影响及其动力学分析

张国桢¹, 黄占斌^{2,3}, 李世清³, 邓震义¹, 张清杉¹

1杨凌职业技术学院, 陕西杨陵 712100; 2中国矿业大学(北京)化学与环境工程学院, 北京 100083; 3中国科学院水利部水土保持研究所黄土高原土壤侵蚀与旱地农业国家重点实验室, 陕西杨陵 712100

Effects of different exogenous nitrogen sources on nitrification in limy soil and its kinetic analysis

ZHANG Guo zhen¹, HUANG Zhan bin^{2,3}, LI Shi qing³, DENG Zhen yi¹, ZHANG Qing shan^{1*}

1 Yangling Vocational & Technology College, Yangling, Shaanxi 712100, China; 2 School of Chemical and Environmental Engineering, China University of Mining and Technology Beijing, Beijing 100083, China; 3 State Key Laboratory of Soil Erosion and Dryland Farming on Loess Plateau, Institute of Soil and Water Conservation, CAS and Ministry of Water Resources, Yangling, Shaanxi 712100, China

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摘要 为了揭示外源氮源对石灰性土壤硝化作用的影响机理,以钙积半干润均腐土(Cal-Ustic Isohumasols)为材料,采用室内培养方法研究了不同添加量和不同氮源对土壤硝化作用的影响,并建立了对应的硝化模型。结果表明, NH_4^+-N 消耗速率和 NO_3^--N 增加速率呈“S”曲线变化, NH_4^+-N 消耗速率高于 NO_3^--N 增加速率。氮素添加量与 NH_4^+-N 消耗速率和 NO_3^--N 增加速率呈正相关,硝化菌外的因子对 NH_4^+-N 和 NO_3^--N 的吸收与 NH_4^+-N 添加量呈正相关;不同氮素添加量对硝化作用影响程度不同,当氮素添加量为 75 mg/kg ,干土时,硝化作用较彻底。SO42-可加快硝化作用速率,同时也可改变其他因子对 NH_4^+-N 和 NO_3^--N 的利用。

关键词: 石灰性土壤 外源氮源 硝化作用 Michaelis-menten动力学方程

Abstract: In order to understand the mechanism of nitrification in limy soil for different exogenous nitrogen sources, the study was conducted to investigate the effects of different additive amounts and nitrogen sources on the nitrification in fresh Cal-Ustic Isohumasols by using the plot experiment, and the corresponding model was obtained. The results show that the curve between the ammonium nitrate consumption rate and nitrogen nitrate increasing rate can be described as an S shape, and the ammonium nitrate consumption rate is higher than the nitrogen nitrate increasing rate. The ammonium nitrate consumption rate and nitrogen nitrate increasing rate are positively correlated with the nitrogen addition. Except the nitrifying bacteria, other organisms' absorptions of ammonium nitrate and nitrogen nitrate are positively related to the addition of nitrogen nitrate. Applications of different nitrogen amounts have great influences on the nitrification in soils. When the nitrogen addition is 75 mg N/kg soil, the nitrification is more completely. SO42- can hasten the nitrification rate and can also improve the bio-availabilities of ammonium nitrate and nitrogen nitrate for other organisms.

Keywords: limy soil exogenous nitrogen sources nitrification Michaelis-menten kinetics

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Corresponding Authors: 张国桢 Email: gzhzhang2005@126.com

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