

研究论文

虾池中具有降解硝酸盐或亚硝酸盐能力的细菌多样性

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摘要 水产养殖过程中, 氮素积累日益严重, 而其中亚硝酸盐由于转化速度低, 毒性强, 对养殖的危害更加突出。对从对虾养殖池中通过反硝化条件选择性富集培养得到的具有去除硝酸盐及亚硝酸盐能力的细菌进行筛选, 结果分离到27株能够还原硝酸盐的异养细菌, 其中24株在7d内能有效地降低硝酸盐和亚硝酸盐浓度; 特别是LZX22、LZX27、LZX23、LZX21等4株使硝酸盐氮由起始的422.25mg/L降至4.00mg/L以下, 亚硝酸盐浓度也降至0.40mg/L以下。对这些菌株进行16S rDNA系统发育分析, 结果显示: 27株菌分属于5个不同的类群, α -Proteobacteria(1), γ -Proteobacteria(10), Actinobacteria(12), Firmicutes(3), 和Bacteroides(1); 它们在系统发育上分别与11个属相近, 分别是*Pseudomonas*, *Halomonas*, *Acinetobacter*, *Paracoccus*, *Arthrobacter*, *Microbacterium*, *Cellulosimicrobium*, *Bacillus*, *Stenotrophom*, 和*Sphingobacterium*。表明所分析的虾池中具有去除硝酸盐和亚硝酸盐能力的细菌具有较高的多样性, 特别是多株细菌为首次报道具有去除硝酸盐和亚硝酸盐的能力, 为下一步筛选亚硝酸盐高效去除细菌提供了丰富的菌种资源。

关键词 [细菌多样性](#); [亚硝酸盐](#); [硝酸盐](#); [16S rDNA](#); [系统发育](#)

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Diversity analysis of bacteria capable of removing nitrate/nitrite in a shrimp pond

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Abstract Nitrogen accumulation is a serious concern in aquaculture. Among other forms of nitrogen nitrite is more harmful because of its low transformation rate and high toxicity. In this study, 27 strains, which can reduce nitrate to nitrite, were isolated from a shrimp pond by using selective enrichment cultures under alternating oxic-anoxic denitrifying conditions. Among these strains, 24 strains effectively decreased nitrate and nitrite concentrations during a 7-day test. The strains LZX21, LZX22, LZX23, LZX27 decreased nitrate concentrations from 422.25mg/L to lower than 4.00 mg/L, and decreased nitrite concentrations to lower than 0.40mg/L. Sequence analysis of 16S rDNA indicated that the 27 strains belonged to five separate groups of α -proteobacteria (1), γ -proteobacteria (10), Actinobacteria (12), Firmicutes (3), and bacteroides (1). Moreover, these strains were classified into or showed close relationship to 11 genera including *Pseudomonas*, *Halomonas*, *Acinetobacter*, *Paracoccus*, *Arthrobacter*, *Microbacterium*, *Cellulosimicrobium*, *Bacillus*, *Stenotrophom*, and *Sphingobacterium*. These data suggest that a high diversity of bacteria capable of removing nitrate/nitrite was present in the shrimp pond. Several species were reported for the first time to have capability of nitrate/nitrite removal. These strains provide a plentiful resource for further selecting nitrite cleaners.

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