

植物功能群多样性对人工湿地微生物生物量和营养滞留的影响

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Effects of plant functional group diversity on microbial biomass and nutrient retention in a constructed wetland

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摘要 为了检验植物功能群多样性是否影响人工湿地植物生物量、微生物生物量和填料营养滞留, 本研究在垂直流人工湿地中设置了5个植物功能群丰富度处理(未栽培处理以及分别栽培1、2、3和4个功能群处理), 分别分析了不同处理下的植物生物量、微生物生物量碳和氮、填料中有机碳、NH₄-N、NO₃-N和有效磷含量。单因素方差分析表明: 植物生物量、微生物生物量碳和氮均随着植物功能群丰富度显著提高(P < 0.05), 而填料中的NH₄-N和NO₃-N含量仅依赖于植物栽培与否。相关分析揭示出植物功能群丰富度与植物生物量、微生物生物量碳和氮以及填料中的NO₃-N含量均呈正相关关系, 而微生物生物量碳分别与填料中的NH₄-N和NO₃-N含量呈正相关。本研究突出了植物功能群多样性在改善人工湿地中的植物生物量、微生物生物量碳和氮方面的重要性。

关键词: 人工湿地 植物功能群丰富度 植物生物量 微生物生物量 营养滞留

Abstract: In order to test whether plant functional group diversity affects plant biomass, microbial biomass and nutrient retention in constructed wetlands, five plant functional group richness treatments (including unplanted treatment, treatments planted with one, two, three and four functional groups, respectively) were established. The plant biomass, microbial biomass carbon and nitrogen, as well as organic carbon, NH₄-N, NO₃-N and available phosphorus contents in the filled material were analyzed, respectively. The results of the one-way analysis of variance (ANOVA) indicate that plant biomass, microbial biomass carbon and nitrogen are significantly increased with the plant functional group richness (P < 0.05), while the contents of NH₄-N of NO₃-N are depended on whether the treatments are planted or unplanted. Correlation analysis reveals that the plant functional group richness is positively related to plant biomass and microbial biomass carbon and nitrogen, and as well as the NO₃-N content, and the microbial biomass carbon is positively related to the contents of NH₄-N of NO₃-N. The present study highlights the importance of plant functional group diversity in improving plant biomass, microbial biomass carbon and nitrogen in a constructed wetland.

Keywords: constructed wetland plant functional group richness plant biomass microbial biomass nutrient retention

Received 2011-03-18; published 2011-10-24

Fund:

细菌多样性对废水处理效率的影响及机理研究

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引用本文:

李红梅 陶高峰 徐凌 倪露佳 蒋小娜 周超群 杨月 张崇邦. 植物功能群多样性对人工湿地微生物生物量和营养滞留的影响[J] 植物营养与肥料学报, 2011, V17(6): 1365-1371

LI Hong-mei TAO Gao-feng XU Ling NI Lu-jia JIANG Xiao-na ZHOU Chao-qun YANG Yue ZHANG Chong-bang. Effects of plant functional group diversity on microbial biomass and nutrient retention in a constructed wetland[J] Acta Metallurgica Sinica, 2011, V17(6): 1365-1371

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