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氨化细菌对植物浮岛人工湿地中有机氮强化分解

Ammonifying bacteria in plant floating island of constructed wetland for strengthening decomposition of organic nitrogen

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中文关键词: 分解 细菌 氨 氮 植物浮岛 有机氮

英文关键词:decomposition bacteria ammonia nitrogen plant floating island organic nitrogen

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中文摘要:

鉴于人工植物浮岛生态塘出水氨氮浓度高、去除率较低这一难题，将实验室筛选的一株具有高效氨化能力的工程菌应用于植物浮岛人工湿地中进行强化分解有机氮试验，以提高植物浮岛生态系统中有机氮、氨氮的去除效果。菌株动力学试验研究表明：有机氮分解反应符合零级反应，降解速率为0.76 mg/(L·h)，在48 h时有机氮的分解率为81.80%。采用常绿植物蕙兰构建植物浮岛污水处理模拟生态系统，以未加菌剂做为对照组，以加入氨化细菌菌剂做为试验组，进行对比试验。结果表明，在48 h时未加菌剂的植物浮岛中有机氮的分解率为75.66%，有机氮质量浓度为8.23 mg/L；加入菌剂的植物浮岛中有机氮的分解率为86.50%，有机氮质量浓度为4.40 mg/L，加入菌剂比未加菌剂时有机氮的分解率提高了11.16%，有机氮质量浓度降低3.83 mg/L。在72 h时，加入菌剂的植物浮岛中氨氮质量浓度为6.74 mg/L；而未加菌剂在72 h时氨氮还未开始降解，在144h时氨氮质量浓度为9.86 mg/L-1。加入氨化细菌菌剂后，植物根系能够更多的吸收氨氮，为植物根系周围的微生物群提供了充足的氧气进行硝化作用，提高了植物浮岛对氮素的去除效果。该研究可为人工湿地中提高氮素去除效果提供参考。

英文摘要:

In order to solve the problem of low ammonia nitrogen removal efficiency in traditional constructed wetland of plant floating island, an engineering bacteria strain with high ammonifying ablity was isolated from the laboratory to strengthen organic nitrogen decomposition in the system. The dynamic test of the ammonifying bacteria strain showed that the organic nitrogen decomposition reaction followed zero-level reaction, with degradation rate was 0.76 mg/(L • h) and organic nitrogen decomposition rate was 81.80%. The simulation ecosystem of plant floating island in wastewater treatment was constructed by the Cymbidium faberi Rolfe (Evergreen plant), and control test group was designed without adding the strain agent. The results showed that at 48 h, the organic nitrogen decomposition rate was up to 86.50% by adding the strain agent while it was 75.66% without them in the control test group in plant floating island, being increased by 11.16% after adding agent. Similarly, the organic nitrogen was 4.40 mg/L by adding the strain agent while it was 8.23 mg/L in the control group reduced by 3.83mg/L. At 72 h, the effluent ammonia nitrogen was 6.74 mg/L by adding the strain agent while at 72h it had not been degraded and at 144 h it was 9.86 mg/L in the control group. It was significant to strengthen organic nitrogen decomposition and removal efficiency by adding ammonifying bacteria because it supplies sufficient oxygen for the microorganisms adhering to the plant roots to nitrification, and it was more convenient for plants roots to absorb ammonia nitrogen as well. This study could provide reference for improving nitrogen removal effect in constructed wetland.

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