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Enhanced nitrogen and phosphorus removal from domestic wastewater via algae-assisted sequencing batch biofilm reactor

Cong-Cong Tang, Wei Zuo, Yu Tian*, Zhen-Wei Wang, Jun Zhang, Zhang-Wei He

State Key Laboratory of Urban Water Resource and Environment, School of Environment, Harbin Institute of Technology, Harbin 150090, China.

*Corresponding author:

Yu Tian

Tel: +86 451 8628 3077; Fax: +86 451 8628 3077; E-mail: hit_tianyu@163.com.

Abstract

This study proposed a potential strategy for enhancement of nutrients removal from domestic wastewater by adding algae to sequencing batch biofilm reactor (SBBR) to form a novel algal-bacterial symbiosis (ABS) system. Results indicated that the algae-assisted SBBR increased the total nitrogen and phosphorus removal efficiencies from 38.5% to 65.8%, and from 31.9% to 89.3%, respectively. The carriers fixed at the top of the reactor was favorable for both formation of ABS system and algae enrichment. The chlorophyll-a increased to 3.59 mg/g at stable stage, which was 4.07 times higher than that in suspension. Moreover, the bio-carrier replacement and sludge discharge were independent, indicating that the sludge and algae retention time could be separated. The mechanisms analysis suggested that the enhanced nitrogen and phosphorus mainly attributed to the enrichment of both algae biomass and total biomass in biofilm. This study highlights the significance of developing ABS system for wastewater treatment.

Keywords: Nutrients removal; Domestic wastewater; Sequencing batch biofilm

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