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BOOK OF ABSTRACTS

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P56. Performance of microalgae-bacteria granular sludge for nutrient removal of freshwater aquaculture wastewater

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Aerobic granular sludge (AGS) has been receiving increasing attention as one of the promising biotechnologies in wastewater treatment. Compared to conventional processes, AGS offers as main advantages its excellent nutrient removal capability, good settling properties, and the simplicity of operation [1]. At the same time, microalgae research in wastewaters has been blooming in the past few decades, largely owing to their capacity concerning the removal of nitrogen, phosphorus, and other elements from these effluents [2]. The combination of microalgae and bacteria within the same structure could improve wastewater treatment as the resulting metabolic diversity could make the process more efficient [3]. In a consortium, microalgae may provide oxygen for the aerobic bacteria which could biodegrade pollutants from wastewater and release carbon dioxide to be used by the microalgae in photosynthesis [4]. This study aims to investigate the effectiveness of microalgae- bacteria granular sludge in removing nutrients from aquaculture wastewater. A photobioreactor was operated in sequencing batch reactor (SBR) mode, which comprised the following successive phases: anaerobic feeding, aeration, settling and decanting. AGS from a full scale wastewater treatment plant was used as the seed for bacterial granules. Several microalgae were isolated from sludge collected at a freshwater aquaculture facility. A suspended microalgae consortia was added to the AGS granules during the aeration phase. Reactor performance concerning nitrogen and phosphorus removal was assessed throughout its operation. At startup, synthetic domestic wastewater was used as the feed, and its composition was gradually lowered to mimic the aquaculture facility's wastewater. Cycle times were adjusted to optimize nutrients removal. The aggregation of microalgae to bacterial granules was evaluated in the reactor throughout reactor operation by optical microscopy and BG-11 agar plating. Most of the ammonium present in the feeding wastewater was removed and converted into nitrate, without nitrite accumulation. Phosphate removal was instable throughout operation. This study is ongoing to better understand how the interaction of both microorganisms affects the removal processes.

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