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Wastewater treatment by microalgae-bacteria co-culture system
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Abstract
Aim: Microalgae is one of the bioremediation agents in wastewater treatment due to its ability to degrade nutrients and organic compounds. Several studies reported that co-cultivation of microalgae and bacteria, i.e. Microalgae Growth Promoting Bacteria (MGPB) could improve the nutrients removal process. This MGPB helps to degrade complex nutrient compounds into smaller components before being taken up by microalgae. The objective of this study is to investigate the effectiveness of co-cultured (microalgae and bacteria) system compared to axenic microalgae system in the removal of major nutrients (ammonium and phosphorus) and chemical oxygen demand (COD) in synthetic wastewater. Methodology and result: In this study, two different strains of microalgae (Chlorella vulgaris and Scenedesmus quadricauda) were each co-cultured with a MGPB (Azospirillum brasilense) and their effectiveness in the removal of major nutrients and COD were compared. The results show that, the nutrients and COD removal were higher in cocultured system compared to the axenic microalgae under similar cultivation conditions for both microalgae strains. Higher percentage removal was obtained from co-cultured C. vulgaris compared to that from co-cultured S. quadricauda which were 86% and 48%, 44% and 31%, 62% and 35% for ammonium, phosphorus and COD removal respectively. Conclusion, significance and impact of study: The findings of this study demonstrate the potential of the co-culture of C. vulgaris and A. brasilense to be applied in wastewater treatment, specifically replacing the aerobic digestion process in secondary stage of conventional wastewater treatment. This study provides an important insight into developing an efficient and environmental friendly method to treat wastewater by incorporating the green technology in the treatment system. © 2018.

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Bioremediation; Co-culture; Microalgae; Synthetic wastewater

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