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Microalgae cultivation as tertiary unit operation for treatment of pharmaceutical wastewater associated with lipid production

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Abstract

Microalgae based treatment was studied to polish SBR treated pharmaceutical wastewater with mixotrophic mode of operation with simultaneous biomass/lipid production. At the end of biomass growth phase (BGP), carbon removal efficiency was observed to be 73% along with good removal of nitrates (62%). Since microalgae assimilate nutrients from wastewater for growth, an increment in total biomass productivity (2.8 g/l) was observed. Subjecting to nutrient stress phase (NSP), total lipid content of 17.2% with neutral lipids of 6.2% was observed under light condition. Contrarily, dark condition depicted total lipid content of 15.8% with neutral lipids constituting 6.5%. The nutrient stress in combination with light showed marked influence on the profile of saturated and unsaturated fatty acid methyl esters. Integration of microalgae cultivation improves environmental sustainability and enables greener routes of biofuels and value added products production in a biorefinery approach.

Keywords: Sequential batch reactor (SBR); Pharmaceutical wastewater; Reactive oxygen species; Fatty acid phytyl esters; Unsaturated fatty acids

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