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Nutrient Removal and Microalgal Biomass Growth of Chlorella Vulgaris in Response to Centrate Wastewater Loadings

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Abstract : The effects of wastewater, with four different nutrient loadings, from synthetic centrate on biomass production of Chlorella vulgaris, nutrient removal, microalgal settling, and lipid production were investigated in photobioreactors under both batches and, subsequently, semi-continuous operations. At higher centrate concentration factors (17.2% and 36.2%), hydraulic retention time and pH adjustments could be employed to sustain acceptable microalgal growth rates and wastewater treatment. Similar nutrient removals efficiencies (>95%) and biomass production (0.42-0.51 g/L) were observed for the four centrate concentrations. Both the lipid productivity and lipid content decreased with increasing nutrient loading in the wastewater. The results also demonstrated that the mass ratio of carbohydrate to protein could provide a good indication of microalgal settling performance, rather than sole component composition or total extracellular polymeric substances.

Keywords : lipid production, microalgae, nutrient removal, wastewater
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