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Integrated microalgae biomass production and olive mill wastewater biodegradation: optimization of the wastewater supply strategy

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Abstract

Olive mill wastewater (OMW) was supplied to *Scenedesmus sp.* cultures to simultaneously achieve biomass production and wastewater biodegradation. Two OMW supply strategies were implemented to prevent the reduced growth performances that are attained, compared to photoautotrophic cultivation, when OMW is supplied at the beginning of cultivation (batch strategy). A fed-batch strategy including the gradual OMW supply yielded a biomass production equal to 0.86 g/L, while 1.4 g/L was attained by a two-stage strategy including OMW addition during nitrogen-starvation. OMW enhanced the carbohydrate accumulation (up to 44%) through the removal of OMW sugars (60-70%). About 55% OMW phenol removal was achieved by the fed-batch strategy when the phenol concentration was lower than 100 mg/L, and by the two-stage strategy when the heterotrophic stage lasted longer than 8-10 days. The illustrated results indicate that the OMW supply strategy can be purposefully tailored to regulate biomass production and OMW biodegradation.

Keywords

Scenedesmus sp., olive mill wastewater, microalgae, biofuels, phenols, heterotrophic

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