

Accepted Manuscript

Short Communication

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PII: S0960-8524(18)31217-3

DOI: <https://doi.org/10.1016/j.biortech.2018.08.113>

Reference: BITE 20396

To appear in: *Bioresource Technology*

Received Date: 9 July 2018

Revised Date: 25 August 2018

Accepted Date: 27 August 2018



Please cite this article as: Gupta, S., Pawar, S.B., An integrated approach for microalgae cultivation using raw and anaerobic digested wastewaters from food processing industry, *Bioresource Technology* (2018), doi: <https://doi.org/10.1016/j.biortech.2018.08.113>

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An integrated approach for microalgae cultivation using raw and anaerobic digested wastewaters from food processing industry

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Abstract An integrated approach has been proposed to produce microalgal biodiesel using both raw wastewater (RW) and anaerobically digested wastewater (ADW) of food processing industry without addition of extra nutrients or carbon source for cultivation besides obtaining effluent discharge permissible limits of TN, TP, and COD. Three microalgae species cultivated with following different combinations: RW, ADW, RW + ADW, and glucose + ADW. Results indicated that the addition of RW as a carbon source in ADW significantly enhanced BP, LP, and TN removal as compared to the ADW alone. The runs with RW + ADW removed COD, TN, and TP by 89%, 84%, and 70%, respectively. *Sc. obliquus* showed highest biomass and lipid productivities (211 and 27.5 mg L⁻¹d⁻¹) for RW + ADW. The addition of RW or glucose in ADW significantly lowered PUFA contents to 5–15% CDW (as against 35–50% with ADW) for *Chl. sorokiniana* and *Sc. obliquus*.

Keywords: waste to bioenergy; biodiesel; anaerobically digested wastewater; cost-effective cultivation; food industry effluent

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