Accepted Manuscript

A novel organic dye-based approach to increase photon flux density for enhanced microalgal pigment production

L. Ramanna, I. Rawat, Djamal Zerrouki, F. Bux

PII: S0959-6526(18)31983-8

DOI: 10.1016/j.jclepro.2018.07.016

Reference: JCLP 13470

To appear in: Journal of Cleaner Production

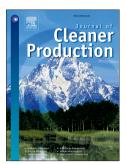
Received Date: 7 February 2018

Revised Date: 8 June 2018

Accepted Date: 3 July 2018

Please cite this article as: Ramanna L, Rawat I, Zerrouki D, Bux F, A novel organic dye-based approach to increase photon flux density for enhanced microalgal pigment production, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.07.016.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Word count 6892

A novel organic dye-based approach to increase photon flux density for enhanced microalgal pigment production

L. Ramanna^a, I. Rawat^a, Djamal Zerrouki^b and F. Bux^{a,*}

^a Institute for Water and Wastewater Technology, Durban University of Technology, P.O. Box 1334, Durban 4000, South Africa

^b Univ. Ouargla, Fac. des sciences appliquées, Lab. dynamique interaction et réactivités des systèmes, BP 511, Route de Ghardaïa, Ouargla 30000, Algeria.

* Corresponding author: E-mail: faizalb@dut.ac.za; Tel.: +27 31 373 2346; Fax: +27 31 373 2777.

Abstract

Numerous research efforts have channeled toward microalgal cultivation systems due to their potential benefit in several applications. Microalgae utilize specific wavelengths of light for photosynthesis. Manipulation of incident irradiance could increase light availability to algae which could enhance pigment production. This study sought to enhance light availability to *Chlamydomonas reinhardtii* using organic dyes as light converters, thereby improving microalgal pigment production. Diphenylanthracene, Diphenyloxazole, Rhodamine 8G and Lumogen yellow were evaluated at varying concentrations in methanol, ethanol, and acetone. Spectrophotometric analyses revealed that most of the dyes had higher fluorescent intensities in methanol at 10 mgL⁻¹. Lumogen yellow exhibited the highest areal intensity but did not increase biomass production. Rhodamine 8G grown algae increased chlorophyll and carotenoid concentrations by 45 wt.% and 36 wt.%, respectively. Light stress was observed by increased non-photochemical quenching from approximately 0.05 to above 0.5 and decreased quantum efficiencies of photosystem 2. This novel light manipulation strategy will potentially enable more economical production of high-value microalgal bioproducts using natural sunlight as opposed to artificial light.

Download English Version:

https://daneshyari.com/en/article/8093440

Download Persian Version:

https://daneshyari.com/article/8093440

Daneshyari.com