Production of lipids by *Chaetoceros affinis* in media based on palm oil mill effluent

*Karthick Murugan Palanisamy a, Primilla Paramasivam a, Gaanty Pragas Maniam a,b, Mohd Hasbi Ab. Rahim a,b, Natanamurugaraj Govindan a,b, Yusuf Chisti c,**

aAlgae Culture Collection Center & Laboratory, Faculty of Industrial Sciences & Technology, Universiti Malaysia Pahang, Lebuhraya Tun, Razak, 26300 Gambang, Kuantan, Pahang, Malaysia

bEarth Resources & Sustainability Centre, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300

cSchool of Engineering, Massey University, Private Bag 11 222, Palmerston North, New Zealand

ABSTRACT

Biomass and lipid production by the marine diatom *Chaetoceros affinis* were characterized under continuous light with aeration. Media based on palm oil mill effluent (POME; 10, 20 and 30 % v/v in distilled water) were used together with a standard control medium. The maximum biomass concentration on day 12 of batch cultures in control medium was 821 ± 71 mg L^{-1}. Under identical conditions, in the best POME medium (20 % POME v/v in distilled water with other inorganic components), the biomass concentration was reduced by ~11 % to 734 ± 66 mg L^{-1}. The lipid content of the biomass grown in the control medium was 50.8 ± 4.5 % by dry weight, but was a little lower (48.9 ± 4.1 % by dry wt) in the above specified best POME medium. In the best POME medium, oleic acid was the major fatty acid (72.3 ± 5.2 % by weight) in the total lipids extracted from the biomass and monounsaturated fatty acids were the main type of fatty acids (74.6 ± 5.2 %). POME levels of >20 % in the medium suppressed both biomass and lipid production relative to the medium with 20 % POME.

KEYWORDS: Chaetoceros affinis; Palm oil mill effluent; Lipid production; Algal lipids; Diatom lipids

DOI: https://doi.org/10.1016/j.jbiotec.2020.12.021

ACKNOWLEDGEMENTS

The authors gratefully acknowledge Universiti Malaysia Pahang (UMP) for financial support through a Flagship Grant (RDU182205) and Internal Research Grants (RDU1903125 and RDU190337).