Screening and comparative metabolic profiling of high lipid content microalgae strains for application in wastewater treatment

A.V. Piligaev, K.N.Sorokina, M.V. Shashkov, V.N. Parmon

PII: S0960-8524(17)32067-9
DOI: https://doi.org/10.1016/j.biortech.2017.11.063
Reference: BITE 19213

To appear in: *Bioresource Technology*

Received Date: 3 October 2017
Revised Date: 17 November 2017
Accepted Date: 22 November 2017

Please cite this article as: Piligaev, A.V., K.N.Sorokina, Shashkov, M.V., Parmon, V.N., Screening and comparative metabolic profiling of high lipid content microalgae strains for application in wastewater treatment, *Bioresource Technology* (2017), doi: https://doi.org/10.1016/j.biortech.2017.11.063

Screening and comparative metabolic profiling of high lipid content microalgae strains for application in wastewater treatment

A.V. Piligaev [a], K.N.Sorokina [a,b,*], M.V. Shashkov [a,b], V.N. Parmon [a,b]

[a] Boreskov Institute of Catalysis, pr. Lavrentieva 5, Novosibirsk, Russia, 630090.

[b] Novosibirsk State University, Pirogova str. 2, Novosibirsk, Russia, 630090.

*Corresponding author: Tel.: +7 (383) 326-95-86, E-mail: sorokina@catalysis.ru

Abstract

New strains of green microalgae were isolated and screened for growth and the production of lipids from municipal wastewater. It was shown that the strain *Micractinium* sp. IC-76 has a biomass productivity of 37.18 ± 4.12 mg L^{-1} d^{-1} and a lipid content of 36.29 ± 0.11%, with a total content of saturated and monounsaturated fatty acids of 71.9%. The efficiency of nitrogen ($N\text{-}NH_4$) and phosphorus ($P\text{-}PO_4$) removal was 96.4±0.7 and 77.8±5.6%, respectively. The metabolic differences at the exponential and stationary phases of growth between the closely related strains with different patterns of lipid accumulation were revealed via gas chromatography mass spectrometry metabolic profiling. The strain *Micractinium* sp. IC-76 in the stationary phase of growth shows a significant difference in carbohydrate metabolism, especially sucrose concentration. High lipid induction during cultivation in wastewater was also driven by changes in the biosynthesis of amino acids, fatty acids and the tricarboxylic acid cycle.

Keywords: microalgae, wastewater, metabolic profiling, lipid metabolism