

GROWTH AND FATTY ACID PRODUCTION OF THREE NATIVE CANARIAN STRAINS OF *Nitzschia palea* IN BATCH CULTURES

Francesco Pisapia*¹, Ana-Luisa Merse^{1,2}, Antera Martel Quintana¹ and
Juan Luis Gómez Pinchetti¹

¹ Spanish Bank of Algae (BEA), Canarian Science and Technology Park Foundation (FCPCT),
University of Las Palmas de Gran Canaria (ULPGC), Muelle de Taliarte s/n, 35214 Telde, Spain.

francesco.pisapia@fpct.ulpgc.es, ana.merse@live.com, antera.martel@ulpgc.es,
juan.gomez@ulpgc.es

² Internationales Hochschulinstitut (IHI) Zittau, Germany.
ana.merse@live.com

Abstract: Assessment of growth and production of metabolites of interest from a given microalgae on a laboratory scale is crucial to evaluate its potential applicability on larger scales into the biotechnology sector. Our work within the H2020 NewTechAqua project focuses on fatty acid production for use of microalgae as aquafeed in the aquaculture industry.

Growth studies of microalgae comprise the estimation of cell density over time, for which several methods have been described in the literature. While indirect methods are undoubtedly less time-consuming, their relevance needs to be evaluated case by case for the species and the experimental conditions used.

Our study focused on the benthic diatom *Nitzschia palea*, a species of interest for biotechnology (Abdel-Hamid et al., 2013). Three native strains of *N. palea* from the Canaries were cultured for 26 days in triplicate flasks under the same culture conditions. Growth was monitored using cell counting as direct method, and optical density (OD) and basal fluorescence (F_0) as indirect methods. The three strains showed their maximum growth rates between days 4 and 7 ($0.21 - 0.29 \text{ day}^{-1}$), and entered the stationary phase at day 17. The relevance of OD and F_0 was demonstrated during the exponential phase only (days 4 – 17), as they both positively correlated with cell density in a linear regression model ($R^2 > 0.89$, $n = 45$).

Preliminary results on the fatty acid (FA) composition indicated that the major FAs produced by *N. palea* were palmitic acid (18 – 41 %) and palmitoleic acid (12 – 25 %), in accordance with a previous study (Touliabah et al., 2020). As for the ω -3 FAs, DHA was poorly produced ($\leq 3\%$), while EPA constituted a major FA for two of the strains (21% and 13%).

This study showed that OD and F_0 were suitable alternatives to cell counting for cell density estimation, at least during the exponential phase of growth, allowing faster execution of the daily laboratory work.

More accurate studies on the fatty acid production should be developed in the future to have a more comprehensive view of the biotechnological value of these strains.

Key words: *Nitzschia palea*, fatty acids, growth, basal fluorescence, optical density, aquaculture.

Acknowledgments: The authors acknowledge funding from the Horizon 2020 “NewTechAqua” project (PID: 862658).

References:

- Abdel-Hamid et al. (2013): “Studies on biomass and lipid production of seven diatom species with special emphasis on lipid composition of *Nitzschia palea* (Bacillariophyceae) as reliable biodiesel feedstock”. *Algol. Stud.* 143, 65–68.
- Touliabah, H. E., Abdel-Hamid, M.I. and Almutairi, A. W. (2020). Long-term monitoring of the biomass and production of lipids by *Nitzschia palea* for biodiesel production. *Saudi Journal of Biological Sciences*, Volume 27, Issue 8, pp. 2038-2046. DOI: 10.1016/j.sjbs.2020.04.014