SBBf 2023 47th Annual Meeting of the Brazilian Biophysical Society

SBBf Brazilian Biophysical Society

RELATIONSHIP BETWEEN PIGMENT AND NEUTRAL LIPID KINETICS IN THE DIATOM *HALAMPHORA COFFEAEFORMIS* AT DIFFERENT LIGHT INTENSITIES: FLUORESCENCE-BASED SCREENING

Ana V. Bauchi[1,2]; M. Alejandra Sequeira[3]; M. Belén Faraoni[3]; M. Cecilia Damiani[1,2]; Cecilia A. Popovich[1,2,4]

[1]Centro de Recursos Naturales Renovables de la Zona Semiárida (CERZOS) (CONICET-UNS), Camino de La Carrindanga Km 7, B8000, Bahía Blanca, Argentina. (email: avbauchi@cerzos-conicet.gob.ar)

[2]Departamento de Biología, Bioquímica y Farmacia (UNS) San Juan 670, B8000, Bahía Blanca. Argentina.

[3]INQUISUR-CONICET, Departamento de Química. Universidad Nacional del Sur (UNS), (B8000) Bahía Blanca, Argentina. Miembro de la CIC.

[4]Centro de Emprendedorismo y Desarrollo Territorial Sostenible (CEDETS) (CIC-UPSO), B8000, Bahía Blanca. Argentina.

Some species of marine diatoms can produce high-added value products such as neutral lipids (NL), rich in palmitoleic acid (C16:1) and eicosapentaenoic acid (C20:5; EPA), and fucoxanthin (Fx) under certain environmental conditions (nutrient and light availability, salinity, among other). These natural compounds are well known for their wide range of bioactive properties in human health (anti-oxidant, anti-carcinogen, hypoglycemic, anti-inflammatory, anti-obesity), being very interesting as alternative feedstocks for nutraceutical and cosmetic industries. A great challenge is to produce these compounds simultaneously in order to avoid different cultivation strategies. Thus, the objectives of this work were: a) to determinate the light intensity effect on the growth rate and the pigment and neutral lipid kinetics of the native marine diatom *Halamphora coffeaeformis*; b) to evaluate its trends at different growth-phases; and c) to analyze the correlation between these compounds in order to assess their simultaneous production. The cultures were carried out in duplicate in Erlenmeyers with f/2 medium at 33‰, and with a 12 h:12 h light:dark photoperiod. Under these conditions, the effect of low, middle and high photosynthetically active radiation was analysed (20, 100 and 200 µE m^{-2} s^{-1}, respectively). The kinetics of Fx, chlorophyll *a* (Ch-*a*) and NL were measured using a spectrofluorometer (Jasco FP-8250) and the growth rate (k) was calculated by counting duplicate samples in a Sedgwick-Rafter chamber. Neutral lipids were previously detected by Nile Red (NR) staining. Average fluorescence intensity of Fx, Ch-*a* and NR were correlated by the Pearson Correlation Coefficient (r). The growth rate presented its maximum value (k=1.37div d^{-1}) at 100 µE m^{-2} s^{-1}. Fx and Ch-*a* fluorescence intensities showed high correlation (r>0.90) during the exponential growth-phase, independently of light intensities, and during the stationary growth-phase (r=0.92 and 0.81) at 20 and 200 µEm^{-2} s^{-1}, respectively. Fx and NR fluorescence intensities presented high correlation (r=0.74 to 0.98) only during the stationary growth-phase. In conclusion, the obtained results indicate that: 1) the tested spectrofluorimetric method allows to have a rapid estimation of pigment and neutral lipid accumulation period; and 2) an intensity of 100 µE m^{-2} s^{-1} is adequate for developing *H. coffeaeformis* biorefineries tending to the simultaneous production of biomass rich in fucoxanthin and neutral lipids.

This study was funded by grants from Agencia Nacional de Promoción Científica y Tecnológica (PICT 2019-00348), Universidad Nacional del Sur (PGI 24/B314) and Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) de la República Argentina (PIP 11220200100696CO). We are also grateful to the Iberoamerican network 320RT0005-Renuwal-Cyted.