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Assessment of stress conditions cultivation on the chemical composition of saponifiable lipid fraction from microalgae *Chlamydomonas sp.* biomass

Luciene S de Carvalho, Anderson F Gomes, Tatiana C Bicudo and Marta Costa

Federal University of Rio Grande do Norte, Brazil

Microalgae subject to cultivation conditions of nutrient restriction become prone to greater total lipids accumulation and changes in the fatty acids profile. In this study, *Chlamydomonas sp.* microalgae were cultured in photosynthetic ponds for five days in normal conditions (control group, CTG) and under nutritional stress (nutrient restriction, BS) for three days. Higher heating values (HHV) of BS and CTG as a function of the elemental chemical composition were estimated. The total lipid fraction (TLF) of each biomass was obtained by hexane (CHF) and later chloroform (CCF) extractions by means of mechanical stirring associated with ultrasound technique. Chloroform fractions from CTG (CCF) and BS (CCF*) were hydroesterified with methanol and then characterized by thermogravimetry (TG), FTIR and GC/MS. The content of TLF from BS (approximately 29%) was 60% higher than that of CTG. Nutritional stress induced an increase in carbon and hydrogen percentage compared to CTG, causing a distinguished difference in HHV of BS (20.16 MJ kg⁻¹) and CTG (17.98 MJ kg⁻¹). TG and FTIR data of CCF and CCF* extracts revealed a predominant composition of saponifiable compounds. The hydroesterified fractions showed a fatty acids profile mainly composed by C16:0 and C18:3. In addition, stress conditions have induced an increment in C18:3 (from 33.47 to 45.68%), restricting the use of biomass for biodiesel production, nevertheless suggesting a pharmacological potential application.