



UNIVERSITÀ  
DEGLI STUDI  
FIRENZE

## FLORE

# Repository istituzionale dell'Università degli Studi di Firenze

### **Preliminary evaluation of a scalable method for TAG extraction from Nannochloropsis sp.**

Questa è la Versione finale referata (Post print/Accepted manuscript) della seguente pubblicazione:

*Original Citation:*

Preliminary evaluation of a scalable method for TAG extraction from Nannochloropsis sp / Bracciali, A.; D'Ottavio, M.; Salvini, A.; Giomi, D.; Brandi, A.; Rodolfi, L.; Bassi, N.; Tredici, M.R. - STAMPA. - (2015), pp. 196-196. ((Intervento presentato al convegno AlgaEurope 2015 tenutosi a Lisbon (Portugal) nel 1-3 December 2015.

*Availability:*

This version is available at: 2158/1052063 since: 2016-09-09T16:07:57Z

*Publisher:*

EABA, EC, DLG

*Terms of use:*

Open Access

La pubblicazione è resa disponibile sotto le norme e i termini della licenza di deposito, secondo quanto stabilito dalla Policy per l'accesso aperto dell'Università degli Studi di Firenze (<https://www.sba.unifi.it/upload/policy-oa-2016-1.pdf>)

*Publisher copyright claim:*

(Article begins on next page)

# PRELIMINARY EVALUATION OF A SCALABLE METHOD FOR TAG EXTRACTION FROM *NANNOCHLOROPSIS* SP.

A. Bracciali<sup>1</sup>, M. D'Ottavio<sup>2</sup>, A. Salvini<sup>1</sup>, D. Giomi<sup>1</sup>, A. Brandi<sup>1</sup>,  
L. Rodolfi<sup>2,3</sup>, N. Bassi<sup>2</sup>, M.R. Tredici<sup>3</sup>

Recently, several studies have been reported for the optimization of large-scale production of biodiesel from microalgae. In particular, drying and extraction of the biomass represent a critical choice for industrial productions.

Aim of this work was the selection of an efficient methodology, suitable for scaled-up production of triacylglycerides (TAG) from microalgal biomass. Extraction tests were performed with *Nannochloropsis* F&M-M24, grown at different nitrogen regimes, in order to produce biomass with different contents of oil. We first compared two cell's disruption methodologies: glass microspheres, commonly used with algae biomass, and microwaves (MW), already used in industrial applications. The two methods resulted comparable in terms of total lipid extracted (% dry weight) regardless the biomass lipid content. A MW/Soxhlet combined protocol was then applied to optimize yield and increase selectivity in TAG extraction. Preliminary MW cell's disruption was performed with biomass blended in distilled water allowing at the same time the separation of water soluble compounds. Petroleum ether, chloroform and diethyl ether were then compared as solvents for the Soxhlet extraction of the biomass. Extraction yields were estimated by weight and by a spectrophotometric measurement (Marsh and Weinstein, 1966). Extract purity was instead evaluated by <sup>1</sup>H-NMR and FT-IR analysis. On the basis of these data, chloroform resulted the solvent with the highest yield in term of total extraction (31% as w/w) with an oil "poor" biomass, but petroleum ether, even with a lower yield (11% w/w), was preferred due to its better selectivity for TAG. Then, petroleum ether was selected for Soxhlet extraction and used with both low and oil rich biomasses, with or without preliminary MW treatment. The best result (29.5% as w/w TAG yield on a 55% total lipid content) was obtained using a lipid-rich biomass and MW/Soxhlet combined protocol. The <sup>1</sup>H-NMR analysis of the extracted oil revealed the presence of TAG with high purity and low amounts of other fatty acids derivatives. The MW/Soxhlet combined system shows potential for the extraction of high purity oil from *Nannochloropsis* biomass at industrial scale. Extraction processes will be further improved in order to recover other high value molecules for commercial exploitation.

<sup>1</sup>Department of Chemistry, University of Florence, Italy

<sup>2</sup>Fotosintetica & Microbiologica S.r.l, Italy

<sup>3</sup>DISPAA, University of Florence, Italy



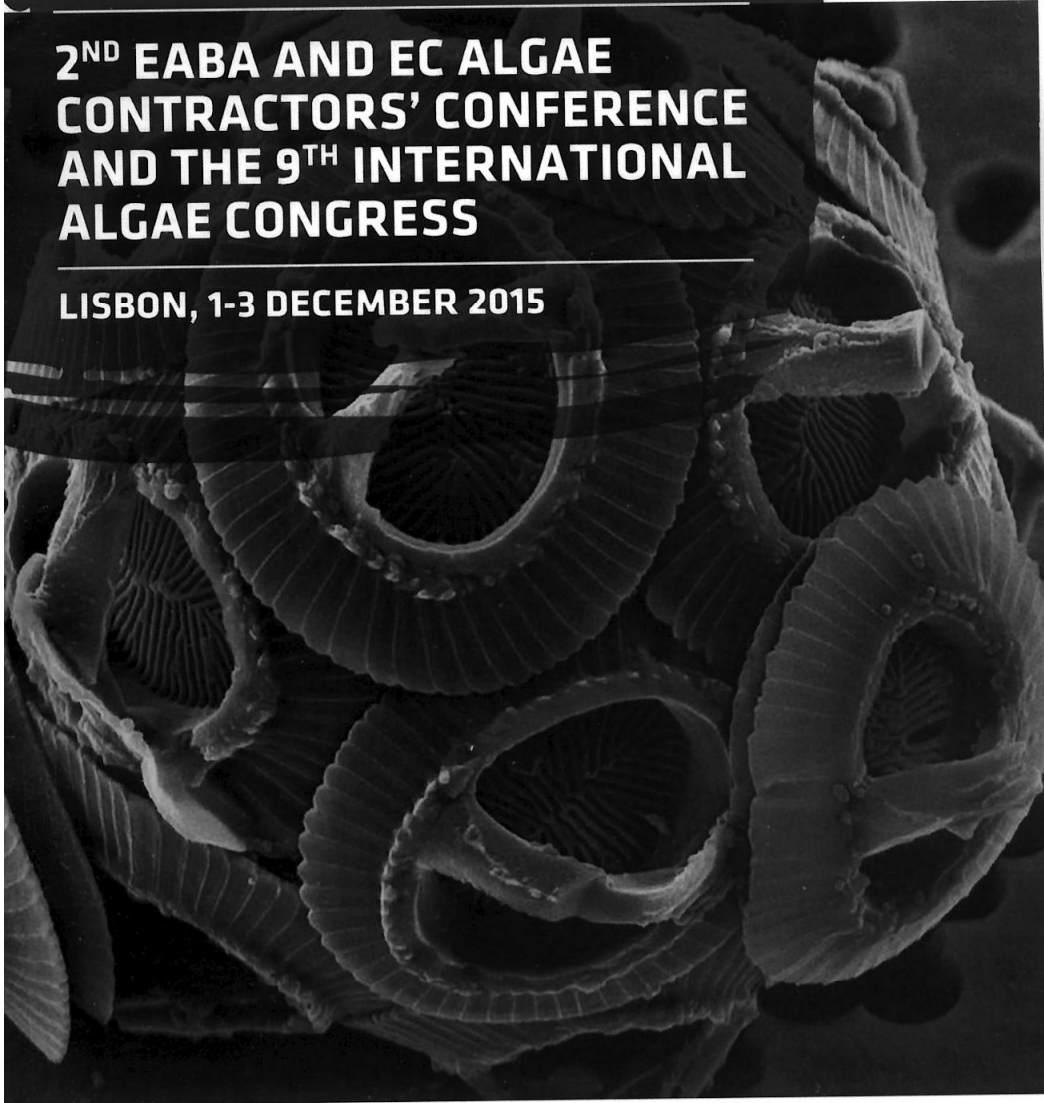
1-3 DECEMBER 2015  
9th International  
**Algae**  
congress

ALGAEUROPE  
CONFERENCE 2015

**BOOK OF ABSTRACTS**

**2<sup>ND</sup> EABA AND EC ALGAE  
CONTRACTORS' CONFERENCE  
AND THE 9<sup>TH</sup> INTERNATIONAL  
ALGAE CONGRESS**

**LISBON, 1-3 DECEMBER 2015**



[algaecongress.com](http://algaecongress.com)

