In vitro safety assessment of microalgal and cyanobacterial strains of interest as food ingredients

IN VITRO SAFETY ASSESSMENT OF MICROALGAL AND CYANOBACTERIAL STRAINS OF INTEREST AS FOOD INGREDIENTS

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Microalgae (including cyanobacteria) have since long been recognized as potential sources of food, due to their balanced biochemical composition and high nutritional value. The general objective of the present research was to evaluate the toxicity of 13 microalgal strains, selected as potential food ingredients, in two *in vitro* models: human dermal fibroblasts and *Artemia salina*.

Methanolic and aqueous extracts of the biomasses were tested on *A. salina* at concentrations ranging from 0.024 to 25 g L^{-1}. Only aqueous extracts (from 0.5 to 12.5 g L^{-1} of extracted biomass) were tested on fibroblasts. The methanolic extracts of *Arthrospira platensis* M2, *Nostoc commune* var. *sphaeroides* F&M-C117, *Chlorella vulgaris* (Roquette), *Chlorella vulgaris* (Allma), starved *Tetraselmis suecica* F&M-M33, *Nannochloropsis oceanica* F&M-M24 and *Porphyridium cruentum* F&M-M46 were found to have no toxicity on *A. salina*. The methanolic extracts of *Chlorella sorokiniana* F&M-M49, *Phaeodactylum tricornutum* F&M-M40 and *Tetraselmis suecica* F&M-M33 grown in nutrient replete medium showed toxicity only at the highest concentrations (12.5 - 25 g L^{-1} of extracted biomass), while the extracts from Alga Klamath (*Aphanizomenon flos-aquae* bloom), *Isochrysis* aff. *galbana* T-ISO F&M-M36 and *Chlorella sorokiniana* IAM C-212 were toxic even at low concentrations (0.8 g L of extracted biomass). On *A. salina*, the aqueous extracts of *N. commune* var. *sphaeroides* F&M-C117, *N. oceanica* F&M-M24, *P. cruentum* F&M-M46 and all the Chlorophyta showed no toxicity. I. aff. *galbana* T-ISO F&M-M36, *A. platensis* M2 and *P. tricornutum* F&M-M40 were found to be toxic at 12.5 and 25 g L^{-1} of extracted biomass. The extract from *A. flos-aquae* was found to be toxic at concentrations higher than 0.8 g L^{-1} of extracted biomass.

On fibroblasts, *C. vulgaris* (Roquette), *C. vulgaris* (Allma), starved *T. suecica* F&M-M33 and *P. cruentum* F&M-M46 showed no cytotoxicity compared to the control; on the contrary, all the other strains exhibited signs of cytotoxicity, mainly at the highest concentrations. *Artemia* and fibroblasts are valuable models for preliminary screening of toxicity. However, results obtained with these *in vitro* screenings need to be confirmed with in vivo systems.

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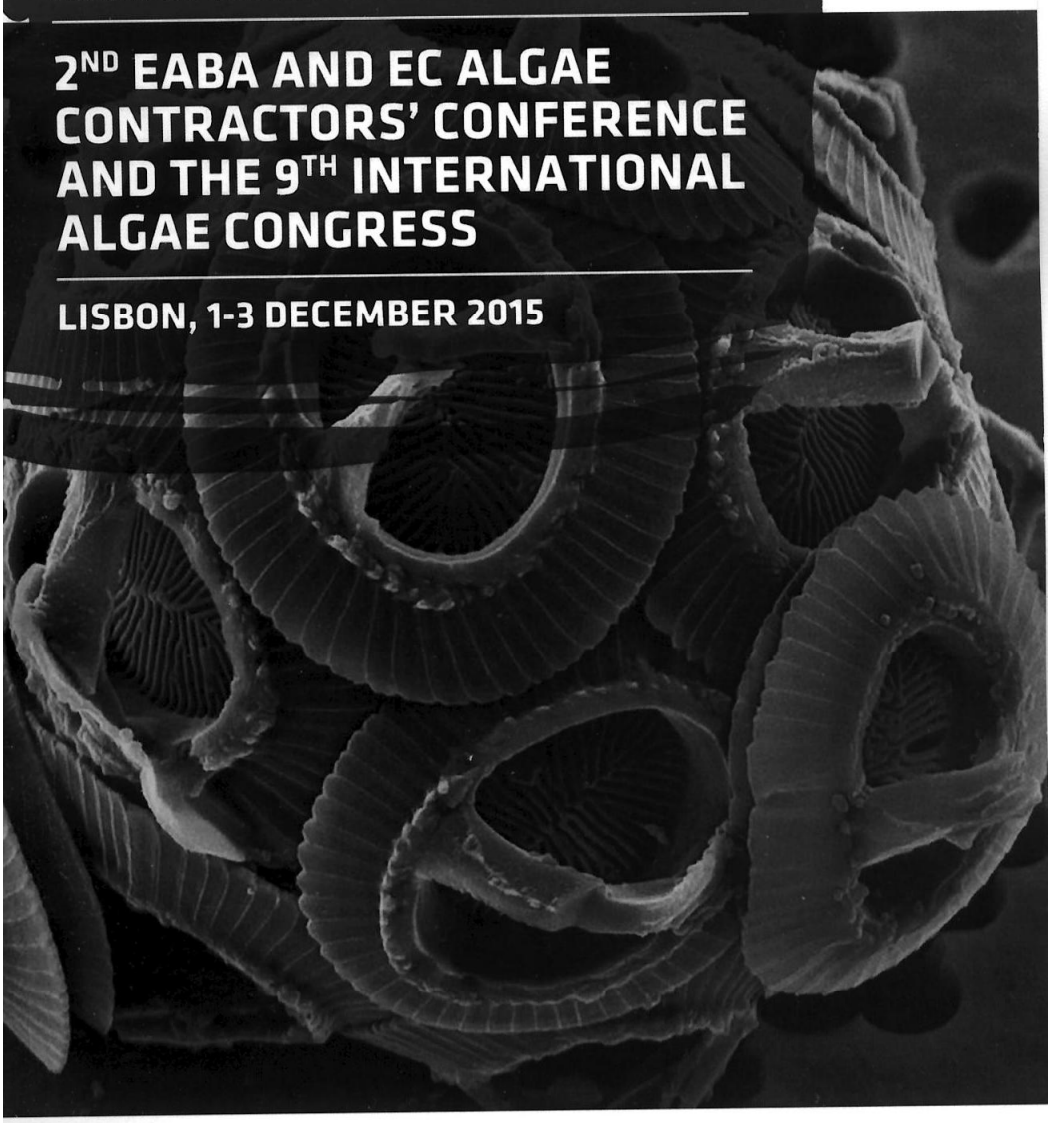

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