

NUTRITIONAL PROFILING AND BIO-ACTIVITY SCREENING OF FIVE MICRO-ALGAE STRAINS CULTIVATED IN NORTHWEST EUROPE

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Introduction

Nutritional profiling of algae cultivated in the same region is needed

- to facilitate the incorporation of algae in animal feeds that are precisely balanced on many different levels and
- to optimize fractionation processes where also minor constituents and remaining fractions must be valorized to the maximum.

Aim

The aim of the study was to map the nutrient composition and digestibility of algae cultivated in NW Europe. In addition, the angiotensin-1-converting enzyme (ACE-1; EC3.4.15.1) inhibition activity was tested because of promising results with other algae species. ACE-1 is a key enzyme that helps to regulate salt-water balance and blood pressure.

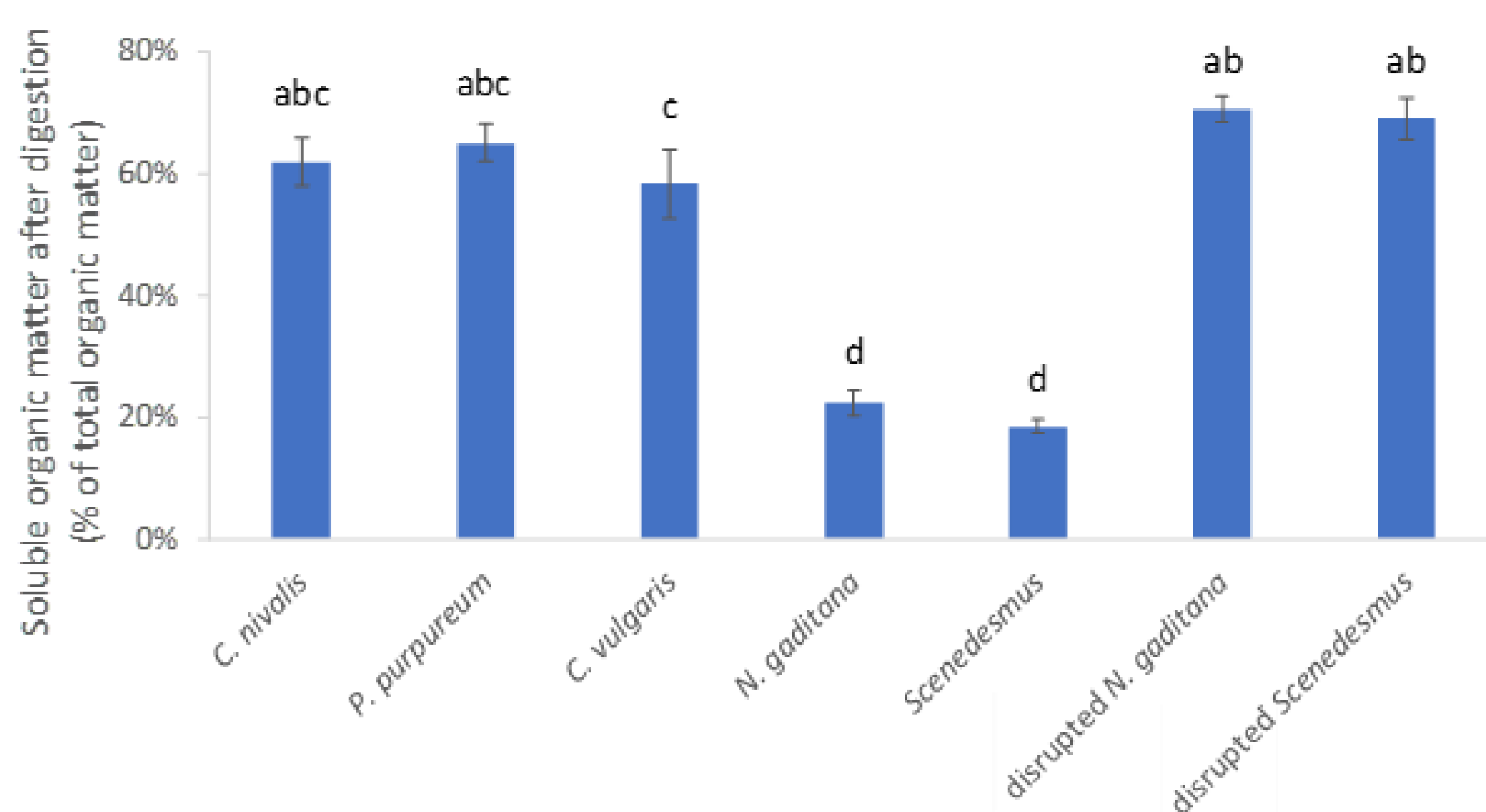
Conclusions

- A cell disruption step is needed to unlock the majority of the nutrients from *N. gaditana* and *Scenedesmus* biomass
- The fatty acid profiles showed major variations, with particularly high Ω -3 fatty acid levels found in *N. gaditana*
- Microalgae inhibited ACE-1 by 73–87% at physiologically relevant concentrations compared to a commercial control.

Results

Organic matter solubility after digestion

A low organic matter solubility after digestion of *N. gaditana* and *Scenedesmus* biomass indicated that for these 2 algae a cell disruption step is needed to unlock its nutrients



Carbohydrate digestion

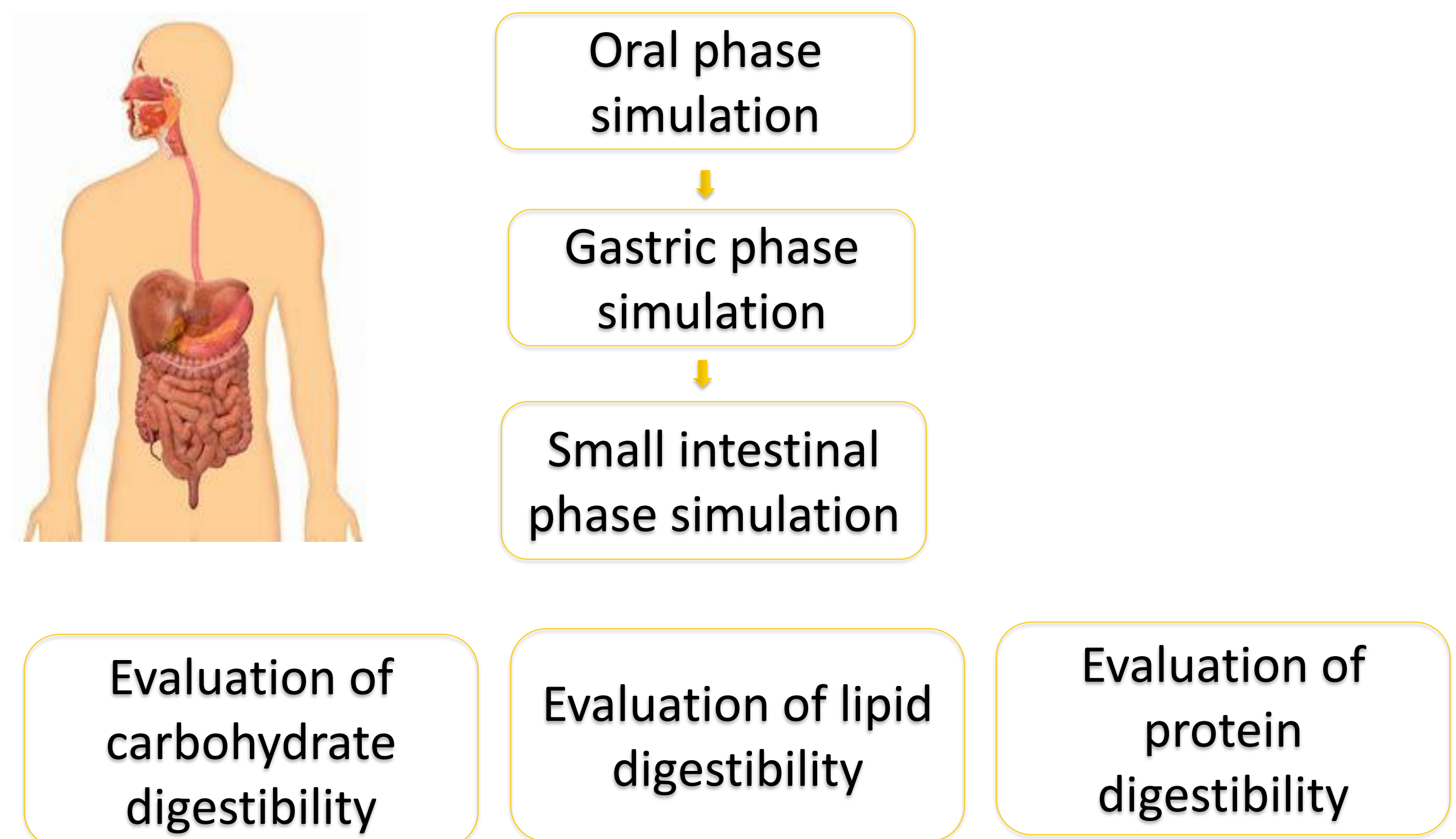
Significant amounts of free glucose (16–26 g glucose/100 g dry algae) were observed after digestion of *C. nivalis*, *P. purpureum*, and disrupted *Scenedesmus*, which will contribute to the energy content of the biomass.

Publication details

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Materials & methods

After compositional analysis, algae digestion was simulated in vitro. The soluble digesta was analyzed to evaluate protein, carbohydrate & lipid digestibility. ACE-1 was also tested in vitro (without digestion, ACE-1 inhibition kit, Dojindo Laboratories)



Lipid composition & digestion

The fatty acid profiles showed major variations with particularly high Ω -3 fatty acid levels found in *N. gaditana* (5.5 ± 0.5 g/100 g dry algae) while lipid digestibility ranged from $33.3 \pm 6.5\%$ (disrupted *N. gaditana*) to $67.1 \pm 11.2\%$ (*P. purpureum*).

Protein composition & digestibility

C. vulgaris and disrupted *N. gaditana* had the highest protein content (45-46% of dry matter), a nitrogen solubility after digestion of 65-71%, and the degree of protein hydrolysis after digestion was 31% and 26%, respectively.

ACE-1 inhibition activity

ACE-1 inhibition was observed for all algae when assayed against the known ACE-1 inhibitor Captopril®.

