

# 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.

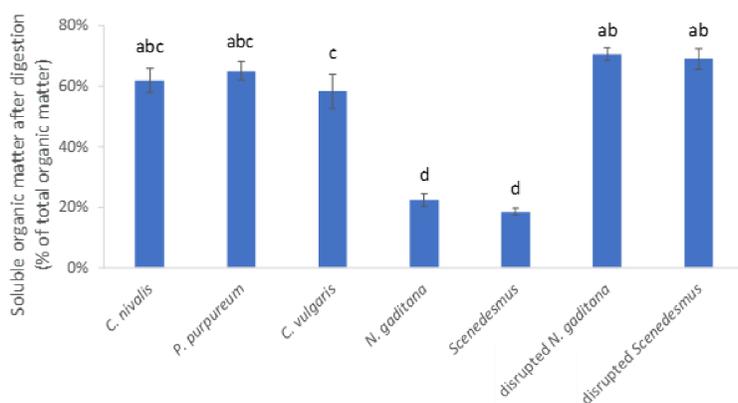
## Conclusions

- 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  $\Omega$ -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

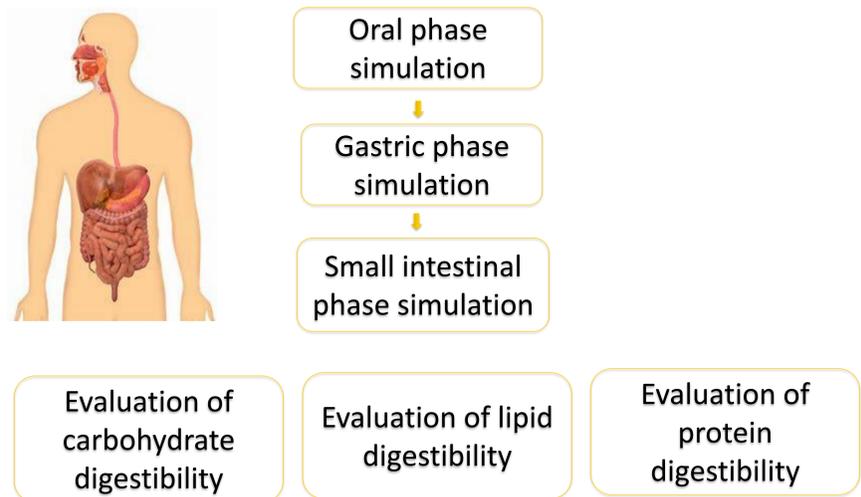
Significant amounts of free glucose (16–26 g glucose/100 g dry algae) were observed after digestion of *C. nivalis*, *P. purpureum*, and disrupted *Scenedesmus*, which will contribute to the energy content of the biomass.

### 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  $\Omega$ -3 fatty acid levels found in *N. gaditana* ( $5.5 \pm 0.5$  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®.

