USE OF MICROALGAE IN THE DEVELOPMENT OF ENRICHED, BIOACTIVE FOODS AND ASSESSMENT OF THEIR ACCEPTANCE BY CONSUMERS.

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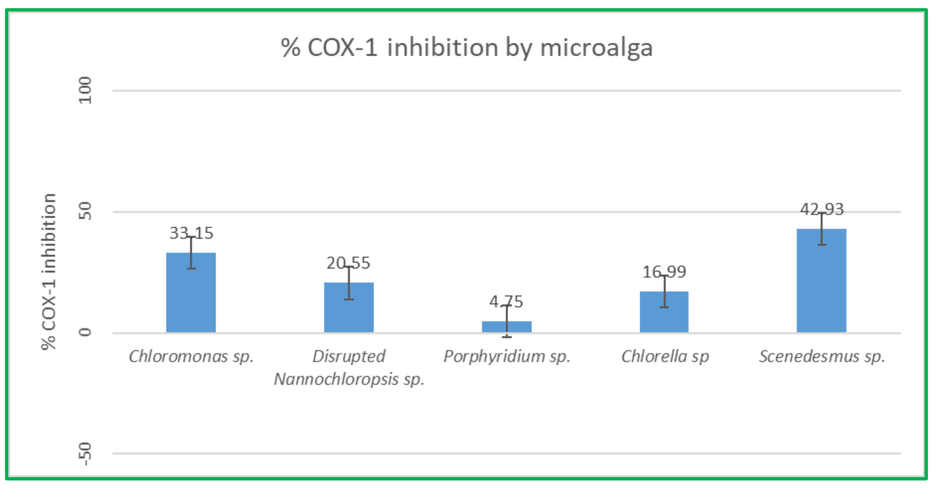
Introduction

As part of the IDEA project, microalgae were incorporated into recipes for jelly sweets and biscuits (Figure 1). Algae supplied whole or processed by project partners (Teagasc, FZ Jülich and VITO) were screened for bioactivities and some were used in this study as a source of protein and for the development of bioactive peptide-rich protein hydrolysates that were subsequently incorporated into biscuits. Cyclooxygenase-1 and -2 inhibition was determined for other microalgae (Figure 2 a & b). A bioactive peptide containing *Spirulina* sp. hydrolysate identified as an Angiotensin-I-converting enzyme (ACE-1) inhibitor (Figure 3) was used in biscuit formulation.

Figure 1: Jelly sweets made with *Spirulina* sp.



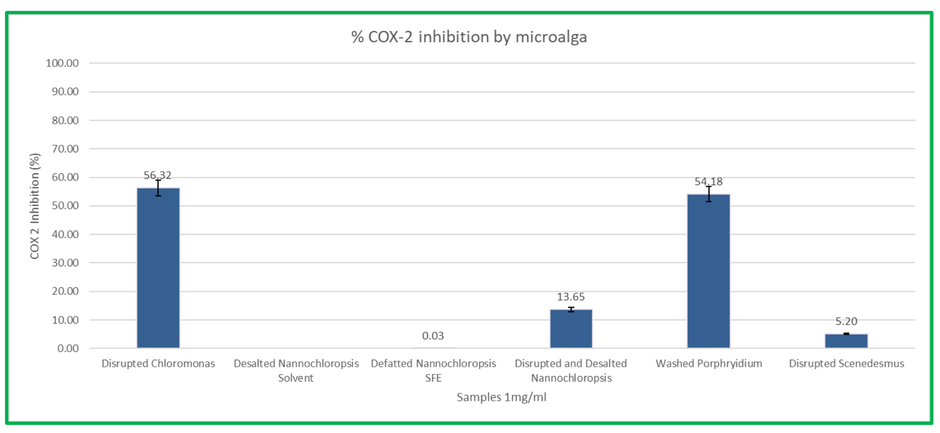


Figure 2 a & b: % COX-1 and COX-2 inhibition by microalgae assayed at a concentration of 1 mg/ml

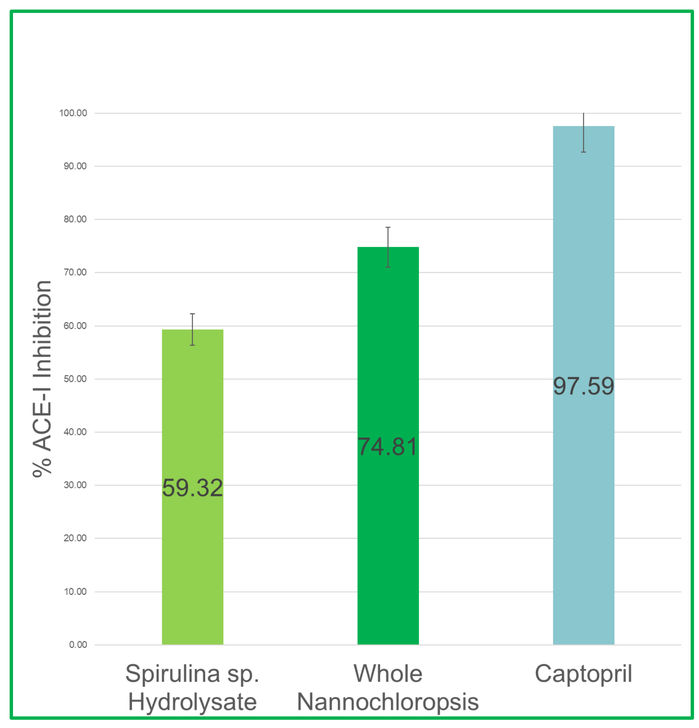
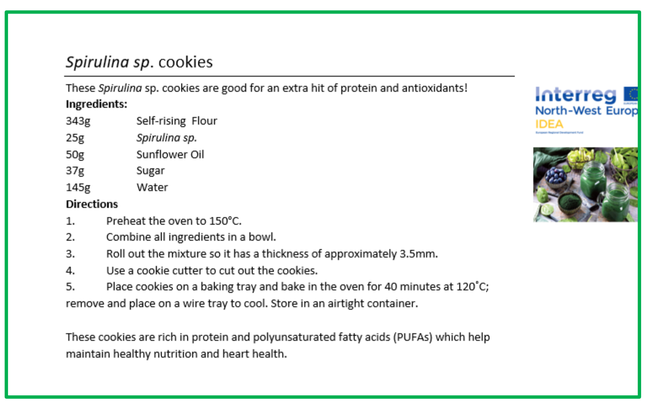


Figure 3: % ACE-1 inhibition by microalgae assayed at a concentration of 1 mg/ml against the control Captopril©

Methods & Results

- *Spirulina* sp. hydrolysate was incorporated in biscuits at 4% of the dry weight. Sensory acceptance tests were carried out to determine the acceptability of the biscuit formulations by potential consumers.
- Sensory panels were carried out on a team of 18 untrained panellists. Parameters analysed included appearance, aroma, flavour, texture and overall impression. A nine-point hedonic scale ranging from 1 (dislike extremely) to 9 (like extremely) was used. Purchase intention was evaluated with a 5-point scale, ranging from 5 (I would certainly buy it) to 1 (I would certainly not buy it).



Spirulina sp. cookies

These *Spirulina* sp. cookies are good for an extra hit of protein and antioxidants!

Ingredients:

343g	Self-rising Flour
25g	*Spirulina sp.*
50g	Sunflower Oil
37g	Sugar
145g	Water

Directions

1. Preheat the oven to 150°C.
2. Combine all ingredients in a bowl.
3. Roll out the mixture so it has a thickness of approximately 3.5mm.
4. Use a cookie cutter to cut out the cookies.
5. Place cookies on a baking tray and bake in the oven for 40 minutes at 120˚C; remove and place on a wire tray to cool. Store in an airtight container.

These cookies are rich in protein and polyunsaturated fatty acids (PUFAs) which help maintain healthy nutrition and heart health.

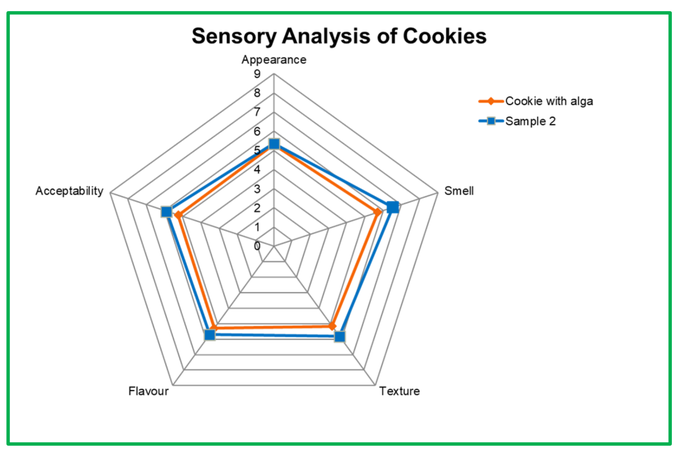


Figure 4: Recipe card, biscuits and graph of sensory analysis results of *Spirulina* sp. and control biscuits.

- Values of between 5 and 2 were obtained for each test respectively. *Spirulina* sp. hydrolysate biscuits presented the highest sensory scores (Figure 4 above) similar to the control biscuit and could provide a potential heart health benefit to the consumer.

Conclusion

- *Spirulina* sp. hydrolysate contains ACE-1 inhibitory peptides that may impact blood pressure positively.
- Biscuits made using the hydrolysate increases protein content and were acceptable to potential consumers.

IDEA - Implementation and development of economic viable algae-based value chains (NWE639)

Duration: 9/2017 – 10/2021, capitalisation till 12/2023

Website: www.nweurope.eu/IDEA

Lead partner: VITO, Belgium

Full IDEA partners: JÜLICH, Innovatiesteunpunt, CentraleSupélec, FEED DESIGN LAB, THOMAS MORE, teagasc, UNIVERSITY OF TWENTE.