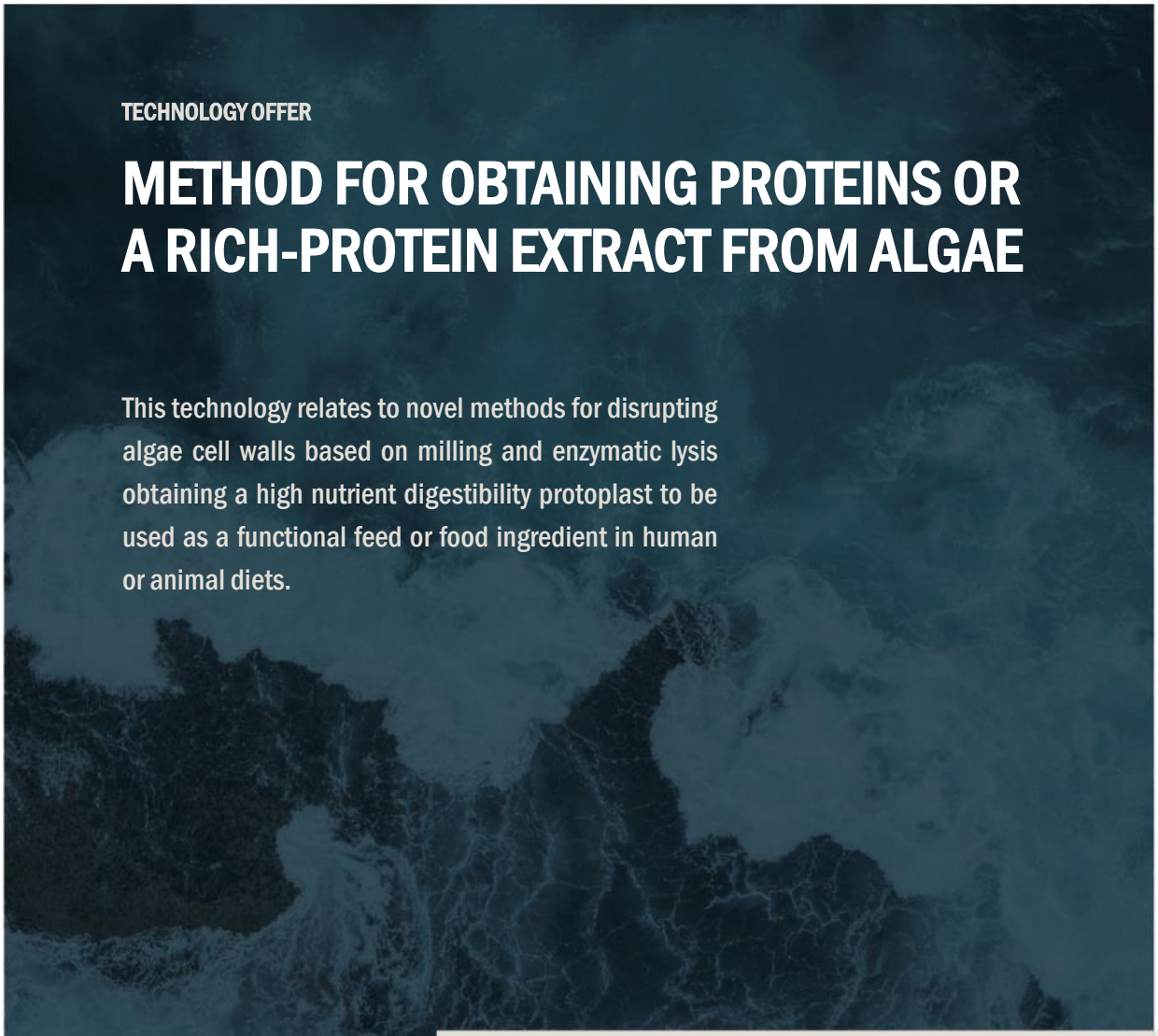
TECHNOLOGY OFFER

METHOD FOR OBTAINING PROTEINS OR A RICH-PROTEIN EXTRACT FROM ALGAE

This technology relates to novel methods for disrupting algae cell walls based on milling and enzymatic lysis obtaining a high nutrient digestibility protoplast to be used as a functional feed or food ingredient in human or animal diets.



KEYWORDS

- Algae nutrient bioavailability
- Aquafeeds
- Novel ingredients
- Cell wall disruption
- Digestive enzymes

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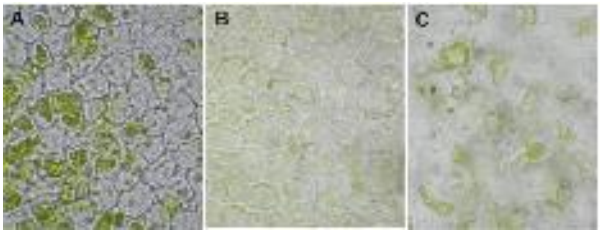
DESCRIPTION

Global population growth and increased living standards will push up the demand for fish-derived protein in the future. However, resource scarcity (feed, water and energy), environmental impacts, and changes in climate and growing conditions can seriously hamper aquaculture that supplies a significant proportion of human food.

New sustainable protein and lipid sources and improved technologies to increase bioavailability of existing sources are needed, ensuring adequate supply of aquafeeds and sustained growth of aquaculture.

The cellulosic cell wall, which represents about 10% of the algal dry matter, poses a serious problem in the use of the algal biomass as feed/food ingredients, since it is not digestible by humans and other non-ruminants like fish.

This technology provides therefore an effective solution to improve the algal nutrient bioavailability, being relevant for the algae biomass sector, especially for aquaculture, food/feed ingredients, nutraceuticals, cosmeceuticals and fertilizers industries.



Microscopy images (100x) of Hydrated Ulva sp. cell wall disruption:
A – after 5 minutes of ultra-turrax action; B – after 10 minutes of gravitational ball mill action; C –after 5 minutes of vibratory rings mill action.

ADVANTAGES & INNOVATIONS

The novel disrupted algal suspension contains a high level of “free” protein, peptides and amino acids and other valuable soluble nutrients and bioactive compounds entrapped in cell membranes (minerals, vitamins, lipids, antioxidants, etc.) that can be dried and efficiently used as feed/food ingredient for animals or humans.

Improved algal biomass digestibility capacity and nutrient metabolism in aquaculture systems, leading to higher fish growth performance and better end product quality. The use disrupted micro- and macro-algal biomass as feed ingredients contributes to increased farming efficiency, sustainability and reduced environmental impact, providing a safe and healthy food item with wide consumer acceptance.

INTELLECTUAL PROPERTY RIGHTS

Patent(s) applied for but not yeat granted

International Patent Application via PCT WO2019171293, 06.03.2019: https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2019171293

Entry in India National Phase in 13.08.2020; Entry in China National Phase in 04.09.2020; Entry in USA National phases in 08.09.2020; Entry in Europe Regional phases in 06.10.2020.

DEVELOPMENT STAGE

Technology Development / Laboratory Testing (TRL 4 – 5)

TRL 4 – The technology was validated in the laboratory.
Further development for validation in large scale setups required.

COOPERATION OPPORTUNITY

Research Cooperation Agreement, License Agreement , Commercial Agreement

Intellectual Property Licensing agreement, product development and marketability. Collaboration for further validation in large scale setups, namely regarding the optimization of a large-scale capacity vibratory mill to process larger quantities of biomass. Research, Development and Innovation partners to conduct in vivo experiments with farmed fish for the development of a novel commercial aquafeed.

RELEVANT PUBLICATIONS

Valente, LMP, S, Batista, C, Ribeiro, R, Pereira, B, Oliveira, I, Garrido, LF, Baião, F, Tulli, M, Messina, R, Pierre, H, Abreu, M, Pintado, V, Kiron. 2021. Physical processing or supplementation of feeds with phytogenic compounds, alginate oligosaccharide or nucleotides as methods to improve the utilization of Gracilaria gracilis by juvenile European seabass (Dicentrarchus labrax). Aquaculture 530, 735914. https://doi.org/10.1016/j.aquaculture.2020.735914

Batista, S, M, Pintado, A, Marques, H, Abreu, JL, Silva, F, Jessen, F, Tulli, LMP, Valente. 2020. Use of technological processing of seaweed and microalgae as strategy to improve their apparent digestibility coefficients in European seabass (Dicentrarchus labrax) juveniles. J Appl Phycol 32: 3429–3446 https://doi.org/10.1007/s10811-020-02185-2

Valente, LMP, Custódio, M, Batista, S, Fernandes, H, Kiron, V. 2019. Defatted microalgae (Nannochloropsis sp.) from biorefinery as a potential feed protein source to replace fishmeal in European sea bass diets. Fish Physiology and Biochemistry 45(3): 1067–1081. https://doi.org/10.1007/s10695-019-00621-w

Valente, LMP, M, Pintado, S, Batista, AF, Silva, J, Faria. (2019). Method for Obtaining Proteins or Rich-protein Extract from Algae, Extracts and Uses Therefore, Patent WO2019171293 - Method for obtaining proteins or a rich-protein extract from algae, extracts and uses therefore. https://patentscope.wipo.int/search/en/detail.jsf?docId=WO201917129

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