

This is the first newsletter of the MAGNIFICENT project

<https://magnificent-algae.eu/>



Cultivation facilities of partner CMP

## Reliable microalgae products serving market demands for a sustainable future

### Background and aim of project

Microalgae are a promising feedstock for sustainable production of food, feed and non-food products. There is presently a large production capacity for a number of microalgae strains in Europe but the amount of concrete products is limited. Expansion of algae application in consumer products requires reduction of production costs, increase of the production scale and enhancement of economic revenues through development of new products and applications. The MAGNIFICENT project addresses these challenges.

The overall objective of the project is to develop and validate a sustainable and economically feasible new value chain based on cultivation and processing of microalgae, with the aim to transform microalgae biomass into valuable ingredients for food, aquafeed and cosmetics applications. To achieve this, the various steps in the production chain will be optimized. The cultivation of the microalgae will be improved by the selection of new, better performing algae varieties, by adaptation of the cultivation process to reach a higher concentration of valuable target products and by improvement of the extraction and purification processes. In this way the overall aim to maximise the production of compounds of interest can be achieved. In the project the focus is on production of phospholipids rich in omega-3 fatty acids and fucoxanthin. Development and validation of new product formulations based on these compounds are included in the project. The work is supported by chain evaluation, market assessment, socio-economic impact assessment and

Life Cycle Assessment. Specific attention is paid to the requirements of the EU regulatory framework.

This Newsletter addresses the progress in the first 18 months of the project.



Cultivation facilities of partner Necton

### Algae production and harvesting

In WP 1 Algae Production and harvesting partners Necton and CMP/AlgaFarm are responsible for production and supply of algae biomass of the targeted algae species *Nannochloropsis oceanica*, *Phaeodactylum tricornutum* and *Isochrysis galbana* for biorefinery development and bioproduct application. Necton successfully established prototype production protocols and supplied algae biomass. CMP successfully performed pilot scale production. Optimization of the production process (culture medium, energy consumption and thermoregulation) from lab to pilot scale is ongoing. In parallel, partners WU and WFBR address optimization of wild type strains aimed at the production of polyunsaturated fatty acids, phospholipids and fucoxanthin.



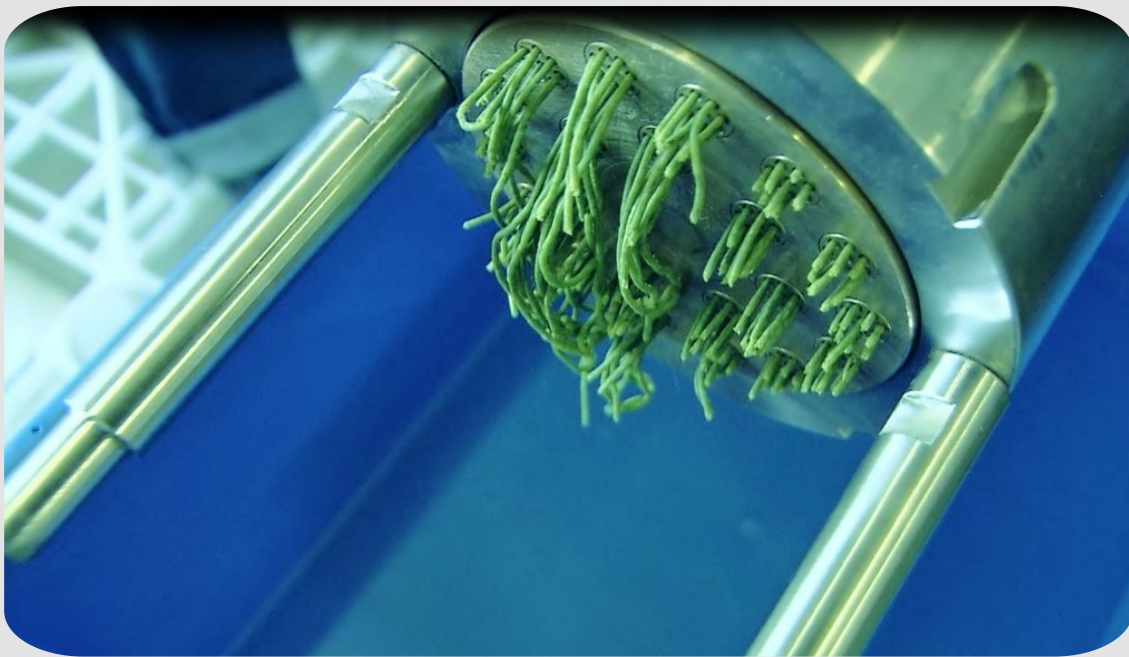
Experimental facilities at partner Natac



Equipment for Pressurized Liquid Extraction at partner Fraunhofer

### Ingredient production

In WP2 Ingredient production new extraction and purification techniques are developed. This will contribute to maximize the production of valuable compounds in the targeted microalgae species. As a first step, cell disruption via bead milling was optimized for energy consumption and recovery yield at lab scale. For the second step, pilot scale disruption and solid/liquid separation using a centrifuge, was performed. The liquid and solids fractions were recovered for the work in WP3 focusing on product development. The hydrophobic fraction was provided to partners for extractions using PLE (pressurized liquid extraction) and SFE (supercritical fluid extraction).



Production of fish feed containing microalgae at partner Sparos

### **Product development and formulation, regulatory framework**

The MAGNIFICENT project has a strong emphasis on the industrial development of innovative algae-rich products targeting the markets of health-promoting beverages, skin care cosmetics and fish feeds. In WP3 Product development and formulation, regulatory framework activities thusfar were focused on the identification of algae fractions with functional properties (nutritional value, bioactivity, technological). An extract of water-soluble carbohydrates from *Phaeodactylum tricornutum*, rich in beta-glucans, is now being tested as an immune boosting supplement in beverages and fish. Also, we found bioactive protein fractions that could naturally control microbial contamination in cosmetic and food products. Efforts are underway to extract fucoxanthin, a natural carotenoid present in *P. tricornutum*, that can act as a natural antioxidant and UV-filter in skin care products.

### **Value chain analysis**

In WP4 Value chain analysis the methodology for the Techno-Economic Analysis, Life Cycle Analysis and Social-Life Cycle Analysis has been agreed with the partners and the project is now firmly in the modelling phase. The preliminary conceptual process design with mass balances for the value chain developed in the project has been established. It will serve as basis for the sustainability models and as a guide for R&D.

### **Dissemination and Exploitation**

In WP5 Dissemination and Exploitation a market analysis was finalized by ERDYN providing complementary information on the selected lead product/market couples and a market assessment/selection of the most promising coproduct/market couples. A competitive watch on key products was done with quarterly updates. The strategy for communication, dissemination and exploitation was validated, actions are ongoing. Management of Intellectual Property Rights (IPR) by ERDYN has identified protectable results and provided consortium members with advice for protection of their results. The results of the market analysis will be used as input for the upcoming business case development and analysis and the techno-economic study.

## Expected results and potential impacts

The MAGNIFICENT project set as target the development of reliable microalgae-based products serving market demands for a sustainable future. By an alliance between large microalgae producers, scientific excellence in bioprocess engineering and industrial end-users, the project has clearly defined market opportunities for novel algae-rich products in the food, (fish) feed and cosmetic sectors. Besides promoting the use of natural and sustainably sourced raw materials, the development of these new algae-based products takes also into account consumers interests by promoting enhanced functionalities on aspects related to healthier foods, naturalness of skin care cosmetics and a higher welfare status of farmed fish. An important aspect -under continuous evaluation- is product safety and strict compliance to the current legal regulatory framework of the various markets.

The project results will contribute to scale-up and growth of the algae sector within the Bio-Economy with a positive impact on the SME sector. The results will strengthen the competitiveness of the European marine biotechnology industry by making this sector more attractive to investments. In this way the project contributes to the EU's long-term Blue Growth strategy to support sustainable growth in the marine and maritime sectors including development of sustainable jobs.



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