



TITLE

Biogeneration of phytobiotics from agro-industrial waste

LAB & PEOPLE

Name of the Research Centre: CIMA-UAlg

General activities of the Research Centre: CIMA promotes and develops scientific knowledge and innovation in the sea and environment, contributing to sustainable, innovative, integrated, and intelligent development. The overall activities respond to EU Societal Challenges and UN Sustainable Development Goals, through a multidisciplinary approach applied to marine and environmental research. The internship will be developed between two labs at CIMA-UAlg:

LEBA: Laboratory of Engineering and Environmental Biotechnology

LEMM: Microbial Molecular Ecology Laboratory

Website: <https://www.cima.ualg.pt/en/>

Number of staff / PhD: 3 senior scientists; 2 PhD students; 1 MSc student
1 PhD technician

Supervisor name and contact: LEBA: Sara Raposo (sraposo@ualg.pt); LEMM: Filomena Fonseca (ffonseca@ualg.pt)

TOPIC OF THE INTERNSHIP

Scientific context of the internship

1 A large amount of waste is produced by the agro-food industries in the form of
2 discardable by-products (seeds, peels, bagasse, trimmings).
3 Sustainable exploitation of this type of material is key to a circular economy, as it
4 searches to use the resources for as long as possible and to extract the maximum
5 value from them. One side to this endeavour is the development of biotechnological
6 processes that allow to identify and extract phytobiotics to be used as
7 additives (fresh and dried, fermented, or freeze-dried) to animal feeds. Phytobiotics
8 can be expected to regulate digestive processes, increase appetite, improve the
9 absorption of nutrients, inhibit the growth of pathogenic microorganisms, stimulate
10 the immune, reproductive and endocrine systems, and have antioxidant and
11 antiallergic properties.

12 The proposed internship (suitable for an MSc thesis) is integrated within the activity
13 of the LEBA and LEMM, in evaluating the application of biotechnological processes
14 to re-purpose residues from Mediterranean agro-food wastes as valuable substrates
15 for extraction of bioactive substances, such as natural antibiotics, oils, phenolic
16 acids, flavonoids and the production of useful microorganisms. Currently, both
17 suitable biomass pre-treatment/fractionation technologies are being tested as
18 viable alternatives to develop scalable processes. The internship will have a
19 workflow devised to follow the different steps of the whole bioprocessing design.

Keywords: agro-food wastes; nutraceutical products; fractionation technologies

Bibliography



2023 Master internship at University of Algarve

Constantino, A., Rodrigues, B., Leon, R., Barros, R., Raposo, S. (2021) Alternative chemo-enzymatic hydrolysis strategy applied to different microalgae species for bioethanol production. *Algal Research*, 56, Article number 102329. DOI <https://doi.org/10.1016/j.algal.2021.102329>

Derabli, B., Nancib, A., Nancib, N., Anibal, J., Raposo, S., Rodrigues, B., Boudrant, J. (2022) *Opuntia ficus indica* waste as a cost-effective carbon source for lactic acid production by *Lactobacillus plantarum*. *Food Chemistry*, 370, Article number 131005. DOI <https://doi.org/10.1016/j.foodchem.2021.131005>

Fonseca, F., Cerqueira, R., Fuentes, J. (2019) Impact of Ocean Acidification on the Intestinal Microbiota of the Marine Sea Bream (*Sparus aurata* L.). *Frontiers in Physiology*, 10, Article number 1446. DOI <https://doi.org/10.3389/fphys.2019.01446>

Fonseca, F., Fuentes, J., Vizcaíno, A.J., Alarcón, F.J., manceara, J.M., Martínez-Rodríguez, G., Martos-Sitcha, J.A. (2023) From invasion to fish fodder: Inclusion of the brown algae *Rugulopteryx okamuraa* in aquafeeds for European sea bass *Dicentrarchus labrax* (L., 1758). *Aquaculture*, 568, Article number 739318. DOI [10.1016/j.aquaculture.2023.739318](https://doi.org/10.1016/j.aquaculture.2023.739318)

Tasks and duties entrusted to the student:

- Biomass pre-treatment / fractionation technologies; - Product analyses;
- Extraction of bacterial DNA (bDNA) during the bioprocessing timescale; - PCR targeting 16S variable regions for microbiota profiling through RFLP; - Process scale-up

Skills to be acquired or developed:

- Pre-treatment / fractionation methodologies; - Analytical methodologies;
- Microbiome analysis through sequencing and RFLPs profiling protocol already developed in LEMM; - Data treatment and Multivariate Analysis; - Report writing and communication of scientific results.

PROFILE OF THE DESIRED STUDENT

- Minimum level of study required:

University Degree (1st cycle)

- **Field(s) of study:** Biology; Marine Biology; Biotechnology, Biochemistry

- **Scientific skills:** Basic Laboratory experience; Analytical equipment and techniques; Basic molecular techniques: DNA extraction, PCR, gel electrophoresis

- Language skills required:

Good level of English (spoken and written)

THE INTERNSHIP ASSIGNMENT:

Desired duration of the internship (in months): 3 - 12 months (work plan adjusted to the duration of the internship)

Desired Starting date of the mission: January 2024

Indicative weekly schedule: 35h / week

Remuneration: *NOT AVAILABLE*

Erasmus grant APPLICATION SHOULD BE MADE

Internship agreement: *an internship agreement will be signed.*

To SEA-EU students:

If you're interested, please send your CV and letter of motivation to the scientist in charge, sraposo@ualg.pt; ffonseca@ualg.pt.