



TITLE

Re-purposed biological residues, through biotechnological processes

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). Sustainable
- 3 exploitation of this type of material is key to a circular economy, as it searches to use
- 4 the resources for as long as possible and to extract the maximum value from them.
- 5 The utilization of agro-food wastes has been proposed for animal feed. However, the
- 6 nutritional quality of these wastes needs to be assessed as they may not meet the
- 7 standards that are required for that end, in relation to antinutrients, presence of
- 8 pathogens, allergens, protein and sugar content. Instead, they might be better suited
- 9 as nutritional ingredients for microalgae, which can then be used as components of,
- 10 for instance, fish feeds.
- 11 The proposed internship (suitable for an MSc thesis) is integrated within the activity
- 12 of the LEBA and LEMM, in evaluating the application of biotechnological processes
- 13 to re-purpose residues from Mediterranean agro-food wastes as valuable substrates
- 14 for protein and carbohydrate production, free of pathogens. Currently, both pre-
- 15 treatment/fractionation technologies and efficient processes of enzymatic
- 16 conversion are being developed and combined. Mild and environmentally safe
- 17 processes (such as hydrolysis and anaerobic digestion) are being tested, as viable
- 18 alternatives to develop scalable technologies and increase energy recovery during
- 19 product breakdown. The internship will have a workflow devised to follow the
- 20 different steps of the whole bioprocessing design.

Keywords: agro-food wastes; environmental biotechnology; bioreactor biotechnology



Bibliography

- 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., Aníbal, 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 okamurae* 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:

- Aqueous extraction
- Digestion in bioreactor
- Product analyses
- Extraction of bacterial DNA (bDNA) during the bioprocessing timescale
- PCR targeting 16S variable regions for microbiota profiling through RFLP
- Bioprocess scale-up

Skills to be acquired or developed:

- Biotechnology methodologies; - Enzymatic methodologies; -Microbiota characterization techniques; -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