European Commission

Combining the cultivation of macro-algae with aquaculture

Portugal

A FLAG-supported pilot project, ALGADEPUR, has developed an integrated multi-trophic aquaculture (IMTA) system for small and medium-sized aquaculture businesses. It results in a new product (seaweed) while reducing the impact of fish waste on the area's estuary.

Integrating the production of fish with other value-added species, such as macro-algae, can boost the competitiveness of local aquaculture producers by diversifying their product range and creating new employment opportunities. It can also improve the environmental sustainability of production activities. ALGADEPUR is helping to do just that in the Baixo Mondego region of Portugal.

Led by MAREFOZ Laboratory, the project had four main goals:

- identify the most suitable macro-algae for the IMTA system;
- optimise the production of macro-algae and its impact on fish effluent;
- improve the quality of effluent water from inland fish farms;
- demonstrate and disseminate the technology at regional and national level.

Researchers from MAREFOZ worked closely with a semi-intensive sea bass and sea bream fish farm run by Nasharyba (now FigueiraFish) to develop a practical and efficient IMTA model to cultivate macro-algae alongside the company's fish production activities. Four local species were piloted: *Ulva sp.*, *Chondrus crispus*, *Codium sp.* and *Gracilaria gracilis*, selected for being the most adapted to the area's environmental and meteorological conditions. At the same time, small-scale laboratory tests were carried out to optimise the cultivation process of the algae and their capacity to improve water quality.

Once the pilot system was operational, a series of communication activities were undertaken. These included organising 15 meetings and a project demonstration visit for stakeholders from different sectors (aquaculture producers, investors, companies that process algal biomass, etc.); presenting the project at numerous national and international events; and 13 promotional activities for the general public.

Results:

- The studies carried out indicate that the pilot system implemented is efficient in treating aquaculture production water, reducing the inorganic nutrient load released into the estuary. Its year-round operation requires the combined cultivation of different macro-algae.
- Two papers produced, one published in the scientific journal, Applied Sciences, here.
- The creation of a website to disseminate the project results.
- The production of algae in fish effluent has been maintained by FigueiraFish at its aquaculture site involved in the project.
- An ongoing relationship and exchange with local aquaculture producers have been established and resulted in three other producers trialing the joint production of different species, in their cases fish and shellfish.
- Potential uses for the algae have been identified, including its use as a fertiliser for the local agriculture.

Transferability and Tips:

The IMTA model developed can be transferred to other aquaculture productions but must be adapted to the local production conditions.

Do:

- Use endogenous species, or species that adapt easily to the area's environmental and meteorological conditions. This will maximise production and the algae's capacity to clean the effluent.
- Discuss the design, methodology and implementation of the multi-trophic system with the producers and adapt accordingly. This will ensure their needs are met and performance is maximised.
- Make sure you have a long-term strategy. This is essential to build a more efficient and profitable sector, which is environmentally benign and beneficial to society.

Don't:

- Expect results in the short term! The cultivation of different organisms is influenced by numerous environmental and meteorological factors so time for trial, error and improvement must be allowed.
- implement an IMTA system without first assessing and fully understanding the production specificities of each monoculture that is to be integrated with others. Make sure you have a long-term strategy.
- Force the IMTA concept on producers. Raising their awareness and encouraging them to actively participate in developing solutions for more sustainable practices is more effective.

Quote from project promoter/beneficiary

"The integrated cultivation of species is the future: on one hand, production waters become an asset instead of dischargeable waste; on the other hand, producers can take advantage of existing production facilities to diversify their production and increase their profit."

A. Cristina Rocha, Scientific project coordinator, MARE-University of Coimbra.

Project cost and funding

Total project cost: €208 835

FLAG grant: €177 510 (85%)
University of Coimbra: €31 325 (15%)

Implementation duration

October 2018 – April 2022

Due to the COVID-19 pandemic, the final phase of the project was moved from June 2020 to April 2022.

Beneficiary

Laboratório MAREFOZ (MARE – University of Coimbra)
A. Cristina S. Rocha
Email: marefoz.laboratorio@uc.pt
Telephone: +351 968 768 949
Website: https://www.mare-centre.pt/pt/user/7934

FLAG contact details

Mondego Mar FLAG
Antonio José Cruz Dos Santos
Email: geral@adelo.pt
Telephone: +351 231 419 550
Website: https://www.adelo.pt/