

Esbjerg, November 2023

AQUACOMBINE finale conference

How to deal with one of the important challenges of the 21st century to meet the world's demand for sustainably produced biomass for both food and the growing bio-products sector? The AQUACOMBINE project aimed to find answers to this question. Now it is time to share the promising results.

The AQUACOMBINE project was funded by the European Union's Horizon 2020 research and innovation programme. During the funding period AQUACOMBINE aimed to create a new circular industry with co-production of food, feed and bioproducts from salt-tolerant plant species such as *Salicornia* or *Crithmum*. The goal was to prove if this sustainable type of plants can be used in a circular approach that combines aquaculture, farming and bioprocessing to help rural area farmers of salt-affected areas in Europe.

The outcome of this study should enable *Salicornia* farmers and aquaponic farms to utilize all fractions of the produced biomass and produce value added HCAs, functional fish feed and bioenergy. Thus to make the utilization of all fractions of the produced biomass economical, it was necessary to find methods that not only fulfil their purpose but are also easily scalable methods.

In November, at our final conference in Esbjerg, the consortium was pleased to present the results to a broad audience. It was also possible to visit the demonstrator of biomass processing at Aalborg University and the demonstrator of combined aquaculture and *Salicornia* cultivation at Alpha Aqua. The final conference offered also the opportunity to discuss with the speakers or to visit the poster session.

After a warm welcome from [Lasse Rosendahl, head of department, Aalborg University](#) and [Michael Wolf, Policy Officer, DG AGRI](#) and presentation of the [AQUACOMBINE circular approach](#) with co-production of food, feed, bio-compounds, and bioenergy from halophytes with very little or no production of waste streams by Mette Hedegaard Thomsen the panel sessions started to highlight the AQUACOMBINE results.

Panel session I dealt with the topic of **Halophyte cultivation**. Plants can be cultivated in many ways: in a nutrient solution, in several substrates and in soil. Each cultivation technique has pros and cons, also dependent on the climatic conditions, the plant species and the purpose of the crop plants. During the project it turned out that Halophyte cultivation provides additional challenges.



Prof. Dr. Jutta Papenbrock and her panel consisting of Rui Miranda Rocha, RIASEARCH LDA and Flávia Duarte representant of European Saline Farmer's discussed the topic of halophyte cultivation.



Knowledge of how to cultivate halophytes indoor and outdoor was shared - Pros and cons, challenges and differentiation of options were discussed.

Presentation [LINK](#)

Within this panel Flávia Duarte representant of European Saline Farmer's presented the concept of the [European Saline Farmer's association](#).

The next session was on the topic of the **Halophyte Biorefinery**. In this session Prof. Mette Hedegaard Thomsen, who is also the coordinator of the AQUACOMBINE project, gave a short introduction to the approach and achievements in the biorefining of the three halophyte biomasses carried out during the four years of the project. In a dialog with the expert biorefinery partners the different conversion technologies developed in the project were presented and challenges and opportunities in the halophyte biorefining will be discussed.



On stage with Prof. Mette Hedegaard Thomsen, Aalborg University were: Prof. Paul Christakopoulos, Luleå University of Technology University, Prof. Hinrich Uellendahl, Hochschule Flensburg University of Applied Sciences, Dr. Job Tchoumtchoua, Celabor scrl, Malthe Fredsgaard, Aalborg University Prof. Iwona Cybulska, UCLouvain - Université catholique de Louvain de Louvain and Dr. Laura Hulkko, Aalborg University.

Presentation [LINK](#)

The theme for the next session was **Aquaculture**. Aquaculture is the fastest-growing sector in animal production. However, to ensure sustainability, the industry must explore new ingredients and functional additives that enhance animal welfare, disease prevention, and production efficiency. Rui Miranda Rocha, Riasearch, LDA , introduced in his session the project's key findings and engaged in a comprehensive discussion these aspects with the diverse panel of experts.



On stage with Rui Miranda Rocha, Riasearch, LDA were Jiwan Chettri, Alpha Aqua A/S, Mário Pacheco, Universidade de Aveiro, Lourenço Pinto, A2S – CIIMAR and Renata Serradeiro, Farmer, flatlantic portugal s.a..

Presentation [LINK](#)



The last session gave an insight into the future potential of AQUACOMBINE. Each person on the panel represented a product or service that benefits from the results of the AQUACOMBINE project.



On stage with the moderator Sabine Höfel, Food-Processing Initiative e. V.-Processing Initiative e.V. were: Prof. Dr.-Ing. Axel Gottschalk, University of Applied Science Bremerhaven, Christoffer Møller Kristensen, CEO Alpha Aqua A/S, Evelyne Kabemba Kaniki, CEO Haloderma and Henrik Tribler, CEO Halorefine.

Christoffer Møller Kristensen, CEO of Alpha Aqua A/S, reflected on the results of Alpha Aqua. Alpha Aqua has successfully implemented three demonstration systems for combined fish and *Salicornia europaea* farming. These systems are known as nanoRAS, Steelhead and flexrack systems. The modular concept makes it possible to respond to the needs of small or medium-sized fish farms as well as large fish farms. The vertical flexrack raceways are specially designed to maximise the biomass of flatfish per square metre of surface area. AQUACOMBINE gave the possibility to design, implement, and proof these concepts. All systems are market ready. This means that the AQUACOMBINE project makes it possible to cultivate fish in aquacultures in a more sustainable way.

Henrik Tribler, CEO of Halorefine, pointed out that the AQUACOMBINE project enabled the development of a modular biorefinery concept that can be used on farms and can economically utilize all fractions of the biomass produced in a simple and common way. As part of the AQUACOMBINE project, the use of the fractionated extracts in food, animal feed and cosmetics was tested. These test indicated that the extracts are suitable for food, feed and especially for use in cosmetics.

Evelyne Kabemba Kaniki, Managing Director of Haloderma, said that without the project, she would not have been able to utilize all fractions of *Salicornia* to expand Haloderma's ingredient inventory and product line. Another plus was the proof of the cream's positive effect on skin irritations. This gives her the opportunity to further expand her business in the future.



Salicornia biomass was also tested in dairy products. Even though the cream cheese test was still ongoing, Sylvia Fasse from Bremerhaven University of Applied Sciences was able to give initial positive feedback on the results. The taste and also the functionality were tested positively.

Besides this first business cases Prof. Dr.-Ing. Axel Gottschalk, University of Applied Science Bremerhaven, who worked with his team on the technical-economic analysis and the business plan, provided insights into their findings. First numbers are very promising. His tip on what to consider before going on the AQUACOMBINE journey is on one hand the area that have a huge influence on the economic efficiency of the system, and on the other hand, that ecological, economic and social aspects should be taken into account to create a sustainable system that benefits everyone, human and nature.

The presentations during the panel sessions showed how good the AQUACOMBINE project meets the brief of the main topic of the European Union's Horizon 2020 research and innovation programme AI: INNOVATION TO ACTION.

Furthermore, the results and the associated possibility of using all parts of the plant in food, animal feed or cosmetics can help to increase the demand for extracts and thus secure the sales market for farmers. This will create added value and jobs in rural, remote and salt-affected areas and can also contribute to the desalination of salt-affected areas.

All participants had the possibility to be part of the question-and-answer sessions after the panel sessions. This strengthen the exchange between the stakeholder and consortium members and makes the exchange on the results easier.

All results can be found in the AQUACOMBINE Handbook and on the website www.aquacombine.de.

Next step will be the design and the expansion of the farmer association to make the results achievable in the future as well.



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