“Biogas production from halophytes and their residues”

Continuous biogas reactor in lab-scale with Prof. Dr Hinrich Uellendahl

“Hinrich and Aadila AQUACOMBINE, aim to create a new circular industry with co-production of food, feed, bio compounds, and bioenergy from salt-tolerant plants (halophytes) such as Salicornia or Crithmum with very little or no production of waste streams. What is your main project task within the four-year project time?”

“In the AQUACOMBINE project, FUAS core objective is to establish an efficient and robust biogas process on halophytes and their residues from the AQUACOMBINE processes. First, we determine the biogas potential and any inhibition effects of halophyte biomass and associated fibre and juice fractions before and after different upstream pre-treatment and extraction processes in batch tests. Then we run continuous biogas reactor tests to identify the optimal operation conditions of the biogas process of the respective halophyte material in co-digestion with other residual fractions from the AQAUCOMBINE processes or with agricultural residues like manure. When we have found the optimal process conditions in lab-scale, we will test the biogas process in pilot-scale to find a biogas process that is ready for upscaling in full-scale.”

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“What added value do you both expect from the project?”

“We expect that the outcome of the AQUACOMBINE project will be a biorefinery concept for full valorisation of halophyte plants that can be implemented in full-scale. This means that the AQUACOMBINE project will provide a solution for the utilization of saline soils by halophyte cultivation and the economically feasible conversion into multiple value-added products, bioenergy, and nutrient recovery. The utilization of halophytes and their residues for biogas production will, furthermore, support biogas plants in increasing their share of residual biomass resources for sustainable biogas production.”

Automated *biomethane* potential (BMP) test with Aadila Cayenne

“Aadila what is your most surprising result during the last 2 years?”

“I am most surprised of the potential human health promoting benefits of the phytochemical compounds found in the extracts of halophyte biomass.”

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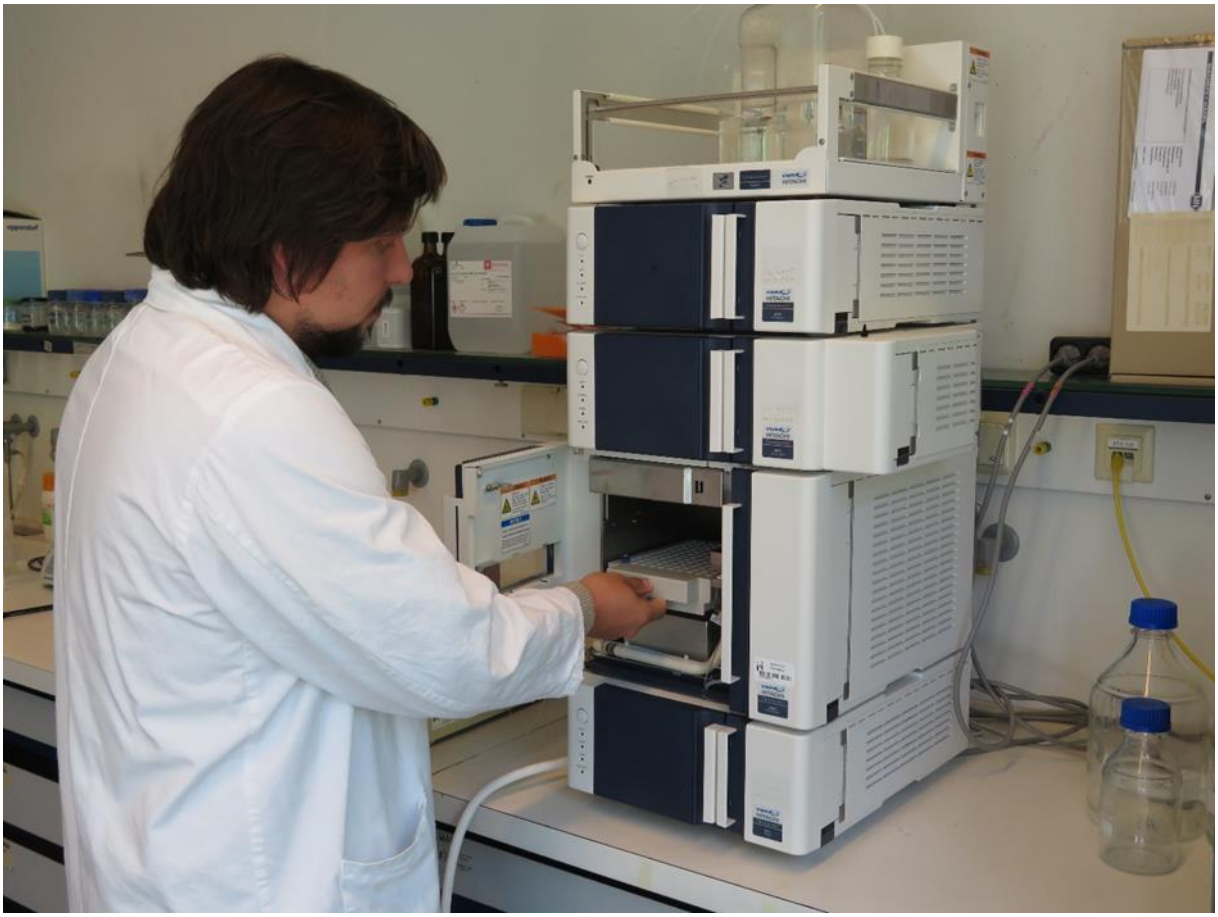
“And Hinrich what result has surprised you the most?”

“I was most surprised to encounter fewer inhibiting effects in the biogas process by the salt-containing halophyte plants than we had originally assumed.”

“Can you describe why the AQUACOMBINE topic is so important?”

“It remains a major global challenge to supply the rapidly increasing demand for food, water, soil, and energy. At the same time, arable lands are severely impacted by limited freshwater resources and soil salinization. Thus, this project allows for the exploration of new cultivation practices to salt affected lands for cultivating biomass that can thrive under these saline conditions as well as broadening the range of feedstocks for bioenergy production. By developing the different processes for the production of valuable compounds and biogas we pave the way for an economically feasible utilization of saline soils.”



HPLC analysis with Marius Martens

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“If you both could wish for something for the project, what would it be?”

“We wish to see that, based on the outcomes within the project, the innovative biorefinery approach of the AQUACOMBINE project will be realized in full-scale in combination with existing and new biogas plants, to achieve the goal of full valorisation of halophyte plants in a zero-waste concept.”

Dr Hinrich Uellendahl is Professor at FUAS within biomass conversion and biogas technology, WP leader of WP9 of the AQUACOMBINE project (Develop and scale up of processes for conversion of residual fractions from extraction processes into biogas (from carbohydrates) and biochar (from lignin)). Prof. Uellendahl has been working on biomass conversion into fuels and chemicals for more than 20 years with focus on biogas production from organic wastes and agricultural residuals as stand-alone technology or in combination with biorefinery concepts.

MSc Aadila Cayenne is PhD student, working in the AQUACOMBINE project since January 1, 2020, on tasks 9.6-9.8 (Determining the biogas potential of halophytes and their residuals of the different fractionation and extraction processes, optimization of the biogas process of halophyte material).

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