

Towards Versatility of Aquatic Production Platforms: Unlocking the Value of Nordic Bioresources (NordAqua)



Aims and objectives

NordAqua is a Nordic Centre of Excellence (NCoE) funded by NordForsk (2017-2022) through the Nordic Bioeconomy Programme. NordAqua brings together 10 Nordic research organizations along with 10 industrial and societal partners from Finland, Norway and Sweden. The University of Turku is a coordinator of the consortium. NordAqua aims at improvement and strengthening the algae-based blue bioeconomy, which in Nordic countries is still in its infancy. NordAqua focuses on the use of aquatic photosynthetic organisms to convert solar energy and CO₂ into value-added products with concomitant recycling of nutrients and removal of water pollutants. Main objectives of NordAqua are (i) to develop a value chain of activities for sustainable production of algal based chemicals, food and feed additives; (ii) to improve photosynthesis and develop synthetic biology tools for creating cell factories producing a diverse range of biofuels, commodity and fine chemicals; (iii) to create fruitful interactions with company partners to achieve efficient knowledge transfer to industry; (iv) interact with key players in society, including decision makers and the public, to foster science- based decision making towards conceptual and solid frameworks for a blue bioeconomy.

Progress towards the objectives

The NordAqua consortium has established 5 interlinked clusters: waste-water treatment, algal biorefinery, bioactive compounds, synthetic biology, and photosynthesis. The consortium develops integrative database for a large Nordic algae culture collection. The algae collection has been screened for the best performing species in efficient removal of nitrogen, phosphate or pharmaceuticals from different wastewaters. A new analytical chemistry platform has been established for improved exploitation of algae biomass. This platform allows to evaluate the impact of cultivation conditions on biomass composition.

Seaweed samples were evaluated for possible food and feed applications. Dozens of strains were tested for anticancer and antimicrobial activities. Combining the chemical analyses with molecular networking allowed the identification of several novel bioactive molecules from cyanobacteria.

NordAqua has applied an alternative technology, by developing solid-state production platform through immobilization of the algal and cyanobacterial cells on different solid carriers, to overcome the bottlenecks of suspension cultures. Moreover, the consortium has focused on developing cyanobacterial strains with increased production of butanol, terpenoids, ethylene and jet fuel. NordAqua is also setting up genetic engineering tools for non-model eukaryotic microalgae of Nordic origin.

NordAqua organizes symposiums, workshops, courses and open multi-disciplinary discussions on entrepreneurship and commercialization among the NordAqua researchers.

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