

LEVARBIO - Utilization of algal components and biomass as food, feed, and fuel

<http://levarbio-ymparistotieteet.com/>

LEVARBIO project utilizes micro algae in waste water treatment, renewable energy production as well as in sustainable production of high value substances for food and feed. Aim of the project is development of the cost-effective and zero-waste concept utilizing industrial or agricultural side streams for combined production of energy, and algae based high value products, such as omega-3 fatty acids, pigments and vitamins. During the project, environmental friendly methods and processes suitable for large scale extraction of valuable substances and harvesting the biomass will be tested and usability of extracted compounds for food and feed products will be evaluated. The coordinator of the project is the University of Helsinki, and additional partners are the Häme University of Applied Science (HAMK) and the Finnish Environmental Institute (SYKE).

The LEVARBIO project builds on and utilizes the rapid growth of microalgae in a maximally completely and versatile manner. The project reflects the need to develop renewable energy production that can be applied locally in small units, to promote nutrient circulation, to improve feed self-sufficiency, and to refine biomass to valuable products. In order to make the production of algae based biofuel production economically feasible, the production has to be integrated with a maximum of other processes that improves the economic outcome: nutrient circulation, exploitation of high-value products etc. keeping in mind the market price of each potential product. Economic feasibility comes from utilizing waste fractions as the cultivation substrate, from extraction of high-value products such as lipids, and from biogas production of the residual biomass.

In the LEVARBIO project we will chart and test under-exploited side streams from the food industry, seepage waters from biowaste treatment as well as agricultural side-streams as growth substrates for the microalgae. The cultivation is optimized to generate maximal yield of high-value products but also of components suitable as energy sources. High value metabolites produced by microalgae include lipids, vitamins, pigments, and proteins, and these can be utilized in various industrial fields. Poly-unsaturated omega-3 fatty acids are used as nutritional ingredients and in proactive health foods, while pigments are used as antioxidants and coloring in food, feed, cosmetics and medicines. Additionally, microalgae are suitable as such as nutritional supplements and as feed because of their high protein and carbohydrate contents.

An important part of the LEVARBIO project is the development of cost efficient harvesting and dewatering of the algal biomass, and these methods should be easily applicable also when up-scaling to pilot- and production scale. Environmental friendly extraction procedures suitable for extraction of high-value products (omega fatty acids, vitamins, pigments) in large scale production will be developed and tested during the project. Also usability of such components for various food and feed purposes will be evaluated, while the bulk of the biomass is tested for biogas production, keeping in mind that economic feasibility comes only from optimal exploitation of the possibilities. To this end efforts will be made to integrate LEVARBIO into existing industrial and agricultural setting, such as the food/feed industry, animal husbandry, and waste water treatment. A number of companies representing all part-taking regions are involved as potential end users and commercializers of the technology, and as advisors during the project.

