NUTRI•KNOW

Farmer's Encyclopedia on innovative Nutrient Management Solutions

EIP-AGRI Operational Group Grass2Algae

Grass2Algae

Valorisation of low-value grass for microalgal cultivation as novel protein source

https://nutricycle.vlaanderen/onderzoek/grass2algae/

Activities

- Assessing the growth of microalgae in grass juice. The growth performance of various microalgae species, including Arthrospira, are tested.
- Development of the economic model to assess the economic feasibility of microalgae cultivation based on data collected within this OG.
- Assessing the impact of the cutting season on the volume and nutrient content of grass juice.
- Exchange of information between the partners and communication of the results to the agricultural sector.

Objectives

Flemish Farmers have access to an abundance of roadside grass or low- quality grass that cannot be used as animal feed.
The aim of the OG is to valorise these grass residues by using grass juices for microalgae cultivation and valorising the fibre fraction. The grass juice was separated from the fibre fractions by a sequence of sedimentation, coarse filtration and pH adjustments. Then it was used by farmers as an alternative fertiliser to cultivate microalgae that can be produced locally on the farm and sold as animal feed. In this way, the OG aims to generate a wider income on Flemish farms.

Pilot-scale microalgae cultivation installation at Kris Heirbaut's company. By using grass juices from low-quality grass clippings, Heirbaut can obtain an alternative source of income while increasing circularity at his company

Further details

Total budget: € 83.280,00
Total financed: € 75.000,00
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Results

The obtained grass juice has an intense green color and a high concentration of suspended solids, which means that light cannot penetrate efficiently. This suggests a pre-treatment to improve the properties of the grass juice, as microalgae needs light for their growth. A sequence of dilution to 10% and overnight sedimentation was performed and resulted in a nutrient-rich clear supernatant with good light penetration properties. Further pH adjustment from the initial acidic pH of 4 to 8 was necessary to inhibit contaminants and ensure good algae growth.

After proper treatment of the grass juice, green microalgae (*chlorella sorokiniana*) and cyanobacteria (*arthorspira platensis*) were successfully grown in this organic medium. The produced biomass had a 41% protein content, and most microorganisms complied with safety norms for feed production These findings offer new perspectives to sustainably manage plant waste and convert it to a protein source in a Green Biorefinery.

Context

Grasslands represent a substantial part of the agricultural area and often periodic mechanical cutting is vital. Currently, grass clippings from farm-edge or roadside are often left to rot, used to make compost, mulch or used to produce bioenergy.

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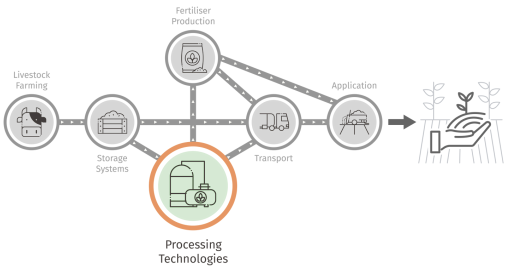
Location in the
Nutri-Know value chain



The liquid fraction derived from preliminary separation, i.e. the grass juice, is often used for the production of proteins and lactic acid. Microalgae cultivation is one of the promising valorisation of grass juice, given high productivity of biomass, not limited to arable land, and the capacity to be harvested throughout the year. Moreover, microalgae has a biomass composition (proteins, lipids, carbohydrates) that is attractive for several applications.
With the use of grass juice as a growing medium, a more sustainable approach to microalgae cultivation could be achieved. However, the acidity of the juice may warrant the need to artificially increase the pH of the culture medium for optimal growth of the microalgae and reduce the microbial load during cultivation. Besides the types of grass, also the storage of the grass juice and potential seasonal effects should be taken into account.
Furthermore, pilot-scale studies will be needed to validate and better refine the existing techno-economic assessment with more relevant data.

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