Belgium

Farm's performance, restructuring & modernisation

Location
Temse

Programming period
2014 – 2020

Priority
P2 - Competitiveness

Measure
M16 - Cooperation

Funding
Total budget 83 280 (EUR)
EAFRD 37 476 (EUR)
National/Regional 37 476 (EUR)
Private 8 328 (EUR)

Project duration
2021 – 2021

Project promoter
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CAP funds in Belgium help convert waste grass into superfood algae.

Summary

The superfood chlorella can be produced using nutrients from grass cuttings, which are of very low feed value for cattle. An EIP AGRI Operational Group in East Flanders trialled and tested a unique way to locally produce alternative proteins from grass cuttings in a water-saving, vertical agriculture system.

© EIP Operational Group Grass2Algae

Project Results

This Operational Group is the first in the world to be able to use grass extract for production scale algae cultivation using a bioreactor.

Conventional algae growing in 10 000 litre water/medium vertical farming requires mineral fertilisers with 0.9 kg N and 0.2 kg P every week and some micronutrients. The Operational Group replaced this with 9.800 litre of water and 200 litre grass extract (no fertilisers).

After one week they could harvest 800 to 1200 grams of chlorella, recycle the water and add 200 litre of grass extract to start the process again.

Lessons & Recommendations

- ❑ The technology has not been replicated yet. However, this could be done in every country where there are grasslands.
- ❑ Freshwater algae growers all over Europe might find benefits in this new strategy, meaning that consumers could find their superfoods grown more naturally and locally than before.

* The Project promoter/beneficiary is an EIP-AGRI Operational Group (https://ec.europa.eu/eip/agriculture/en)

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Context

Since 2018, the practice of using chemical weed control on the edges between farmers' fields is prohibited. Many farmers are now mowing the field edges rather than weeding them, but as they often leave the cuttings on the ground (as they are perceived to be of little feed value), unused nutrients are able to run off into the watercourses.

Grass fibres are of particular importance in the bioeconomy, however, using them can be expensive, depending on their application. An EIP AGRI Operational Group was set up to find out how to use nitrogen and phosphorus from unused grass and weed cuttings as a mineral supplement in algae cultivation, to improve the process in line with the principles of circular agriculture.

Objectives

An Operational Group tested whether added value – and a new revenue model for farms - could be created by producing algae protein from grass extracts.

Activities

The EIP Operational Group consisted of one cattle farm and two nearby arable farms in Temse, East Flanders. The research was supported by policy and industry representatives, an algae grower and a group of scientists. They measured: *how much grass could be cut throughout the season; how the quality of the grass extract differed on different farms*; and *how this affected the cultivation of the algae*. The Operational Group also hired a start-up business, 'Releaf' nv, who had invested in a grass press/screw conveyor.

In April 2021, the mowed grass was measured to check its extract yield and quality. Once the grass was pressed, seven algae strains were tested to see whether they would grow on the diluted extract.

In June, they mowed other verges on two of the farms to see what the quality of grass extract yield would be, and again, how the algae growth would grow in the diluted extract.

In August, they mowed the first-mown verges again, to check the grass extract yield and quality. They assessed the best pre-treatment for the grass extract to make sure the algae would start growing as fast as possible after adding the grass extract. The quality of algae harvest was tested, both for its microbial and nutritional values.

In October, they mowed the fields of the third farmer. The potential grass extract yield and quality were once again assessed, and - as there was a huge quantity of grass available in October - they looked for a way to store some of the extract for the following year to further increase the profitability of the operation. Finally, they tested several cultivation methods for chlorella: batch, fed batch and semi-continuous.

The Operational Group organised an information event in the third week of October to inform super foods and alternative proteins stakeholders, as well as local farmers, about their findings.

Main Results

This Operational Group is the first in the world to be able to use grass extract for production scale algae cultivation using a bioreactor.

Three algae strains survived: chlorella, spirulina and scenedesmus, and although, of the three, chlorella and spirulina are generally regarded as safe to use as food, it proved difficult to cultivate spirulina with nothing but diluted grass extract because spirulina typically needs a lot of nutrients and a basic pH.

The overall result was that chlorella grew best, with 10 % grass extract and 90 % water. Spirulina, on the other hand, needed a mixture of 15 % grass extract and 85% water.

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Conventional algae growing in 10 000 litre water/medium vertical farming requires mineral fertilisers with 0.9 kg N and 0.2 kg P every week and some micronutrients. The Operational Group replaced this with 9 800 litre of water and 200 litre grass extract (no fertilisers), and produced a side product of 200 kg of grass fibre per week. After one week they could harvest 800 to 1200 grams of chlorella, recycle the water and add 200 litre of grass extract to start the process again, and this only required three farms to provide the 'low quality' grass that they would otherwise cast aside.

In this context, a farmer could produce the same revenues with one less cow, saving almost 3 kg of methane emissions every week and some 80 kg of CO^2 emissions for a standard farm.

Key lessons

The technology has not been replicated yet. However, this could be done in every country where there are grasslands. Moreover, in some areas (for example, in the Netherlands and Belgium), farmers may be forced to breed fewer animals for ecological and environmental reasons, in which case the cultivation of algae could make an interesting alternative revenue model for farm diversification.

Freshwater algae growers all over Europe might find benefits in this new strategy, meaning that consumers could find their superfoods grown more naturally and locally than before..

Additional sources of information

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

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