Optimization and acclimatisation of *Chlorella vulgaris* grown on cow manure based digestate

SEMPRE-BIO

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SEMPRE-BIO Project

SEMPRE-BIO aims to demonstrate **novel and cost-effective biomethane production solutions** and pathways, deemed essential to achieve the European Green Deal and climate and energy targets for 2030 and the net zero greenhouse gas emissions by 2050, and to increase the market up-take of biomethane related technologies.

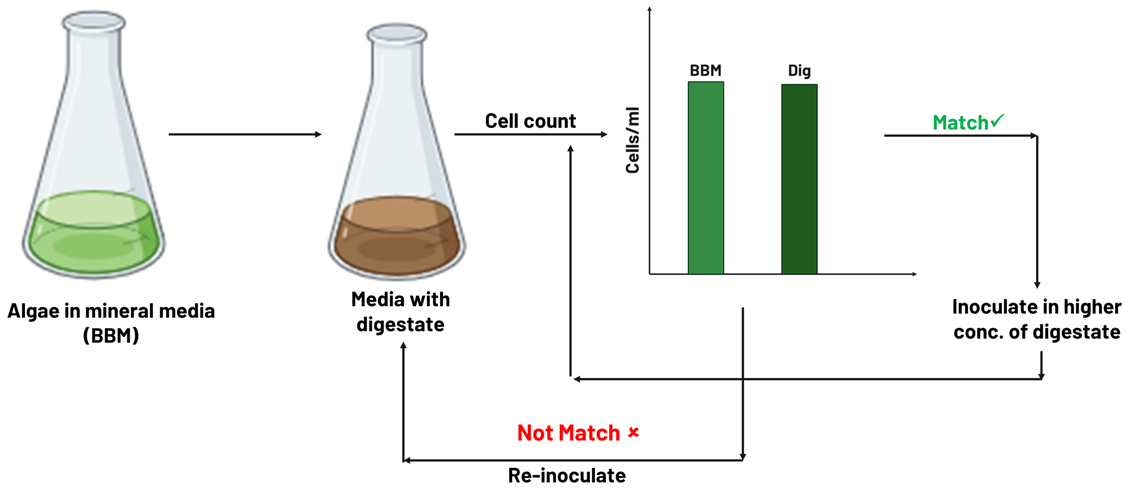
Introduction

SEMPRE-BIO utilises anaerobic digestion to generate biogas, which is subsequently upgraded to biomethane, with CO_2 and digestate produced as a by-product. A core focus of the project is the efficient valorisation of digestate and CO_2 from anaerobic digestion and biogas upgrading to generate additional revenue. This work specifically focuses on acclimatising microalgae to higher concentrations of digestate, using it as a nutrient source to enhance the sustainability of microalgae as alternative protein sources.

Results

Preliminary results demonstrated that cow manure-based digestate serves as a favourable growth medium for *Chlorella vulgaris*. While the tested pre-treatment methods had minimal effect on microalgae growth, they may impact the solid fraction of the final product, warranting further study before scaling up production. *Chlorella vulgaris* showed minimal stress during initial acclimatisation, but concentrations above 5% required longer periods, especially at 10%, likely due to elevated ammonia and reduced light. The goal is to achieve concentrations up to 20%.

Methodology



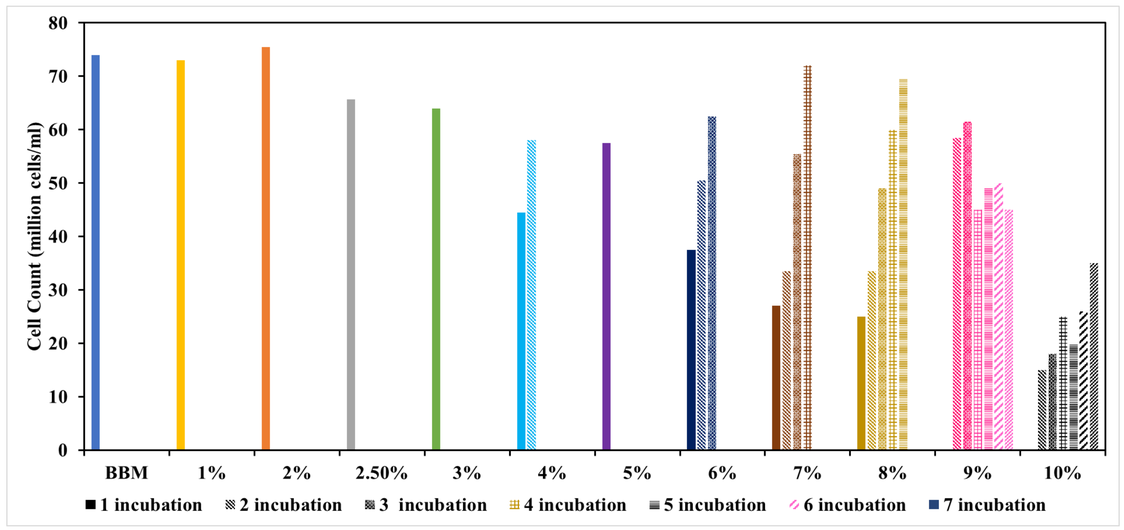


Figure 2. Micro-algae acclimatisation, number of incubations mean the number of times the micro-algae had to be re-incubated until they reached a stable growth curve. BBM: mineral medium, Dig: Digestate.

Future Perspective

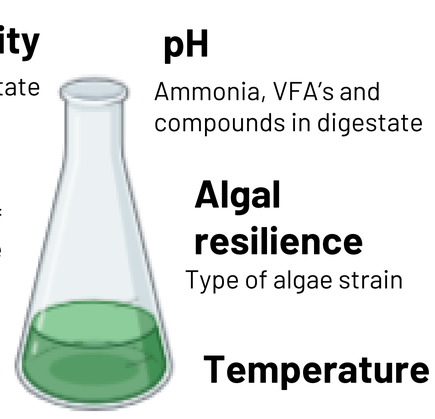
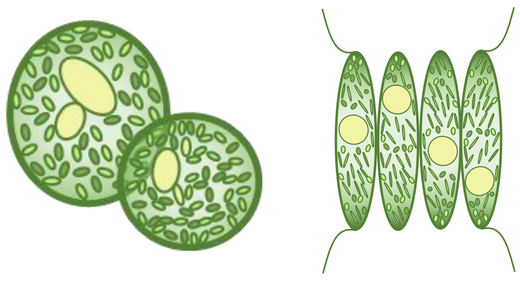
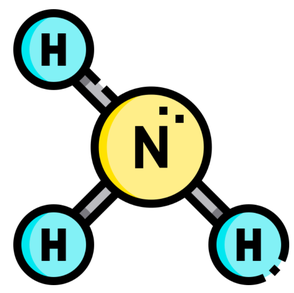


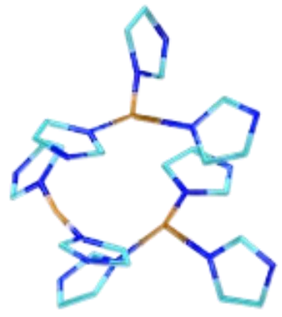
Figure 1: Factors influencing the growth of microalgae.



To evaluate the effect of different microalgae strains (*Chlorella vulgaris* vs. *Desmodesmus*) on microalgae acclimatisation.



To check effect of ammonia stripping from digestate on microalgae acclimatisation



To evaluate the impact of enzymatic colour removal from digestate on microalgae acclimatisation.

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