High Tech Recycling Center in MEWLIFE PROJECT: demonstrating new strategies enhancing feasibility of microalgal cultivations

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MICROALGAE

Microalgae are a renewable source able to grow using CO_2 and solar light as terrestrial plants

$$12\ H_2O + light \rightarrow 24\ H^+ + 24\ e^- + 6\ O_2$$

$$6\ CO_2 + 24\ H^+ + 24\ e^- \rightarrow C_6H_{12}O_6 + 6\ H_2O$$

$$6\ H_2O + 6\ CO_2 + light \rightarrow C_6H_{12}O_6 + 6\ O_2$$

higher photosynthetic efficiency
(10 % versus 5%)
higher biomass productivity
(50-70 vs. 10-20 t/ha per year)

Products currently on the market are still limited

due to the high costs associated to microalgae biomass production

HETEROTROPHIC GROWTH OF MICROALGAE

In heterotrophic conditions microalgae grow without light in conventional fermenters (100 m^3)

- Higher biomass concentration (40-100 g/L versus 3-4 g/L)
- Higher biomass productivity (20 g/L/d versus 0.5-1 g/L/d)

BUT

- Need for organic matter sources
- Axenic conditions

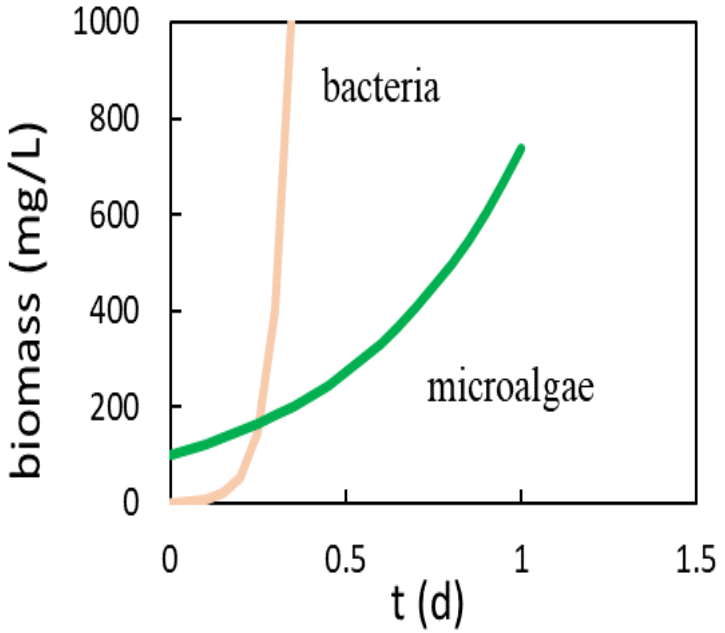
- Using waste waters as carbon source
- Using innovating feeding strategies

HETEROTROPHIC GROWTH USING WASTEWATERS

But how to manage contamination?

Microalgae
t_d=800–2000 min

Bacteria
t_d =20–500 min



Conventional feeding

all nutrients are available

large part of substrates are consumed by bacteria

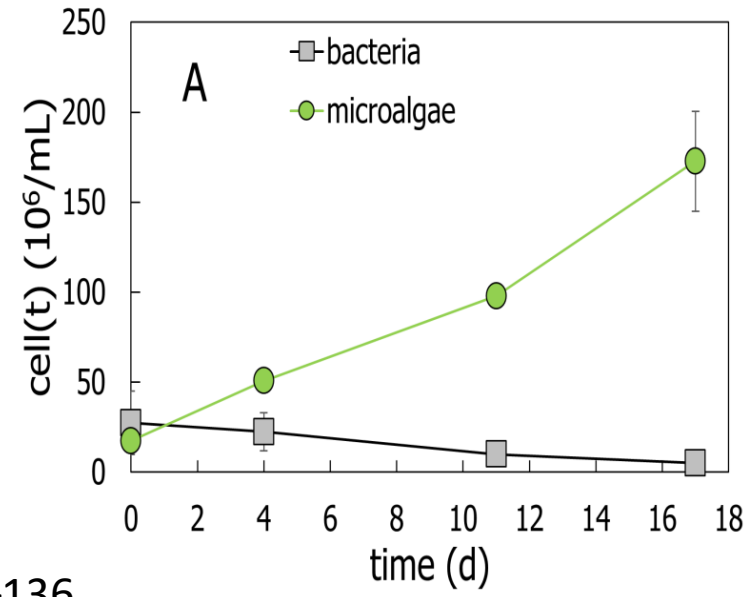
Survival of the fastest

Uncoupled feeding

Only one nutrient at time is available

Nutrients storage ability of microalgae is a competitive advantage

Survival of the fattest



In MEWLIFE project uncoupled feeding will be demonstrated at pilot scale using membrane concentrates from olive oil wastewaters as organic source for heterotrophic growth of microalgae

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Thank you for your attention!

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