



Biodiesel from sewage :

*Favorable conditions and
other lessons learned*

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#EUGreenWeek
2021 PARTNER EVENT

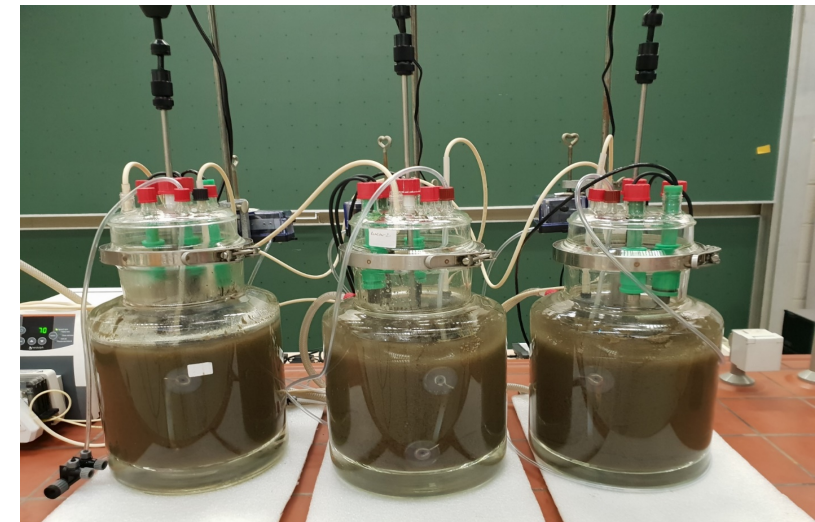
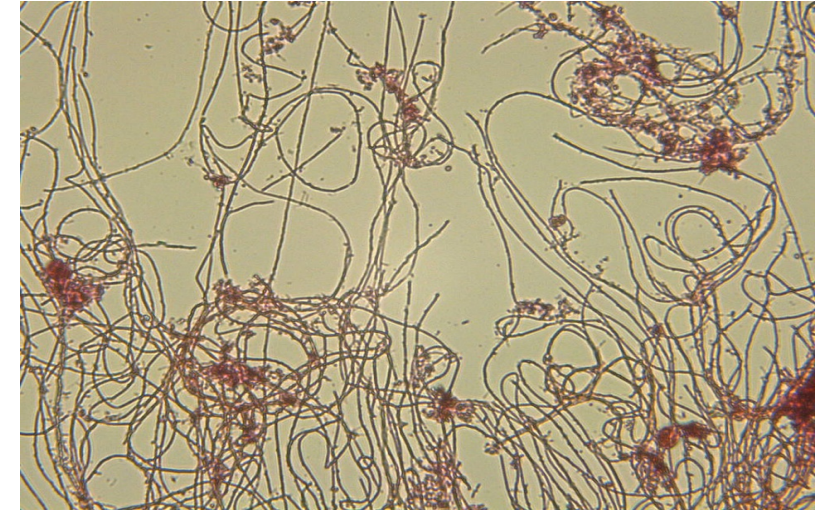
Background: Lab-scale study

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- **Study based on:**
 - ✓ Literature review
 - ✓ Experience with foaming & bulking at 7 WWTPs in Luxembourg
- **5 experimental scenarios:**
 - ✓ Aeration mode
 - ✓ DO concentration
 - ✓ Sludge loading
 - ✓ Feeding regime
 - ✓ Temperature
- **Achievements:**
 - ✓ Determination of main factors of *Microthrix parvicella* growth and its lipids accumulation ability
 - ✓ Development of *M. parvicella* selection technology
 - ✓ Characterization of accumulated Lipids by *M. parvicella*



Lesson learned from the lab-scale experimental study

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- **Preliminary results (from about >20 samples after 4 weeks of incubation):**
 - ✓ ~63 mg FAME/g of dry solid was produced (6.3% biodiesel yield)
 - ✓ Transesterification efficiency: 98%
- **Best scenario for *M. parvicella* growth:**
 - ✓ Continuous feeding with real wastewater (low sludge loadings)
 - ✓ Intermittent aeration (low DO)
 - ✓ Low temperature: < 12°C
 - ✓ Long sludge age: > 30 days



Objectives of the lipid-pilot installation

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- Operate at “**real conditions**” using **favourable operational parameters** for *Microthrix parvicella* **growth** and **lipid accumulation** (University of Luxembourg – SIVOM)
- **Test settleability** of the sludge and **recirculation**
- Characterize **long-chain fatty acids (LCFAs) in the influent** (GC-MS, LIST)
- Characterize **specific LCFAs** being accumulated in the **set of bioreactors**
- Calculate **mass balance** and evaluate **performance of the pilot** (Remondis Aqua)
 - Dispatch sludge samples to Animox (Germany) for development of the **lipid extraction protocol**
 - Dispatch samples of the extracted lipids to the IRSA (Italy) for the **transesterification to biodiesel** and **assessment of biodiesel quality**
- Evaluate **development of microbial community** within the experimental time and in changing seasons at the sewage treatment plant (genomics, LCSB)



A microscopic view of a biological sample, likely a tissue section or a culture. The image shows a complex network of thin, light-colored fibers or cells, possibly collagen or a similar extracellular matrix component. There are numerous small, dark, granular structures scattered throughout the field, which could be nuclei, debris, or specific cellular components. The overall appearance is dense and intricate. The text "Questions?" is overlaid in the center in a bold, black font.

Questions?

Virtual tour at the lipid-pilot plant

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... if there are no more questions,
let's go to see the pilot!