



Avecom

OPTIMIZING MICROBIAL PROCESSES

Sustainable Alternatives for Proteins from Agro-Industrial Residues and Byproducts

22/11/2023

Our history

- Started in 1995 as spin-out of UGent
- Founder: Professor Willy Verstraete (Highly Cited Researcher since 2014)
- Management Buyout in 2021
- Staff: 12 FTE



The challenge

- Climate change & global warming are **environmental super challenges**
- **R&D** turns complex and multi-faceted challenges into economic and environmental opportunities
- The **bioeconomy** will become a catalyst for systemic change
- Need for developing and scaling-up innovative **bio-based and biodegradable solutions** that are economically competitive
- A successful industrial deployment needs **collaboration** across the value chain



Our mission: Experts in Microbial Resource Management 2 business units



Environmental Remediation

Water
Soil and groundwater
Microbial corrosion

- R&D&I
- Feasibility studies and biodegradability testing
- Microbial cultures
- Nutrients (micro/macro)

Biomass Fermentation

PROMIC: SCP from residual side streams
Power To Protein: SCP by gas fermentation

- R&D&I
- Microbial fermentation platforms



Biomass Fermentation

An eco-friendly avenue to produce biobased ingredients



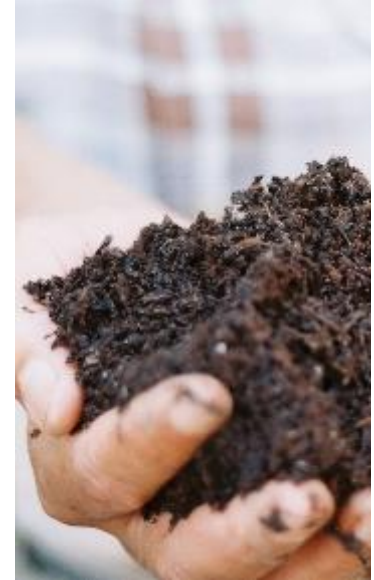
Edible microbial proteins



Animal feed ingredients



Biobased and biodegradable polymers



Circular biofertilizers

Biomass fermentation

PROMIC | Single Cell Protein for animal feed



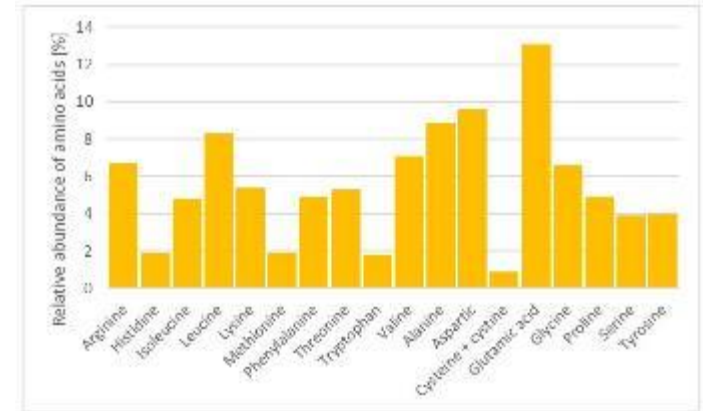
- Upgrading undervalued industrial side streams and coproducts from the food processing industries
- Conversion via Avecom's heterotrophic fermentation process into protein rich product (SCP)





Biomass fermentation PROMIC | Single Cell Protein for animal feed

- Non GMO protein source
- 70% protein content
- Amino acid composition better than soy, approaches that of high-quality fishmeal
- Excellent digestibility, feed uptake and conversion (piglets, shrimps)
- Shrimps challenge test with pathogenic Vibrio:
 - Survival factor 2 better → Immunostimulating effect
 - Weight gain factor 1,5 better when PROMIC is fed



Biomass Fermentation Power To Protein



Microbial gas fermentation platform



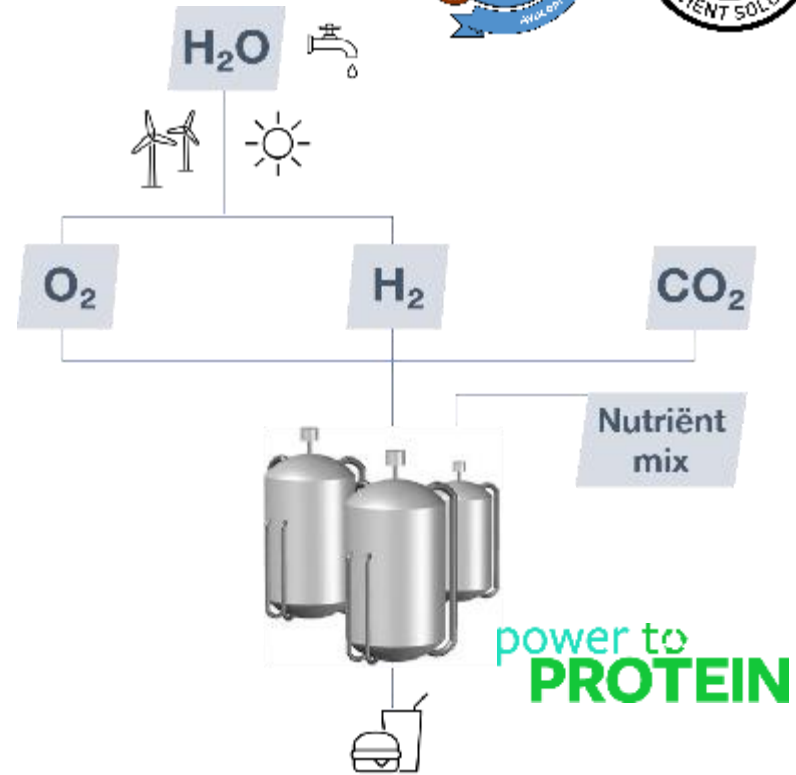
By means of hydrogen gas oxidation,
produced out of clean water



Carbon capture using carbon dioxide



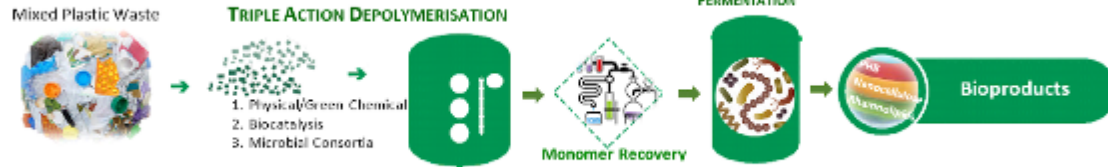
Food ingredients rich in protein (70%),
and presence of vitamin B12



Biomass Fermentation Biopolymers: EcoPlastiC & BioICEP



BioICEP Diagram:



Eco conversion of lower grade PET and mixed recalcitrant PET plastic waste into high performing biopolymers.



European
Commission

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This project has received funding from the The European Innovation Council (EIC) Horizon EU programme under grant agreement number 101046758

Biomass Fermentation

Sustainable fertilizers

- Gradually release of its nutrients (slow-release organic fertilizer)
- Increases soil water retention
- Buffers the soil against acidity, alkalinity, salinity, pesticides and toxic heavy metals
- Cost-competitive alternative for other organic fertilizers
- Improves soil biodiversity and crop growth



Biomass Fermentation

Sustainable fertilizers

- Case study: RUSTICA Project

Rationale RUSTICA

Main relevant environmental problems identified in crop productions:

- **Nutrient pollution in soils due to surplus application of N/ha and P/ha.**
- **Soil degradation.**
- **Food waste:** 70 million tonnes of dry matter of field crop residues.

We need to:

Invest in recovery of nutrients from food waste.

Replace mineral fertilizer with bio-based alternative.

RUSTICA locations and consortium



Get Involved!



Demonstration of circular bio-based fertilisers and implementation of optimized fertiliser strategies and value chains in rural communities

A technical solution to converting organic residues from the fruit and vegetable sector into novel bio-based fertiliser products.

What is RUSTICA project?

RUSTICA will:

- Foster the **technical validation, demonstration** and **implementation** of bio-based fertiliser and soil improvement production techniques.
- Focus on waste from the fruit and vegetable agro-food system.
- **Close nutrient cycles** on a regional level.
- Develop of **economically viable and environmentally sustainable alternatives** to mineral fertilisers with the same or improved agronomic value.



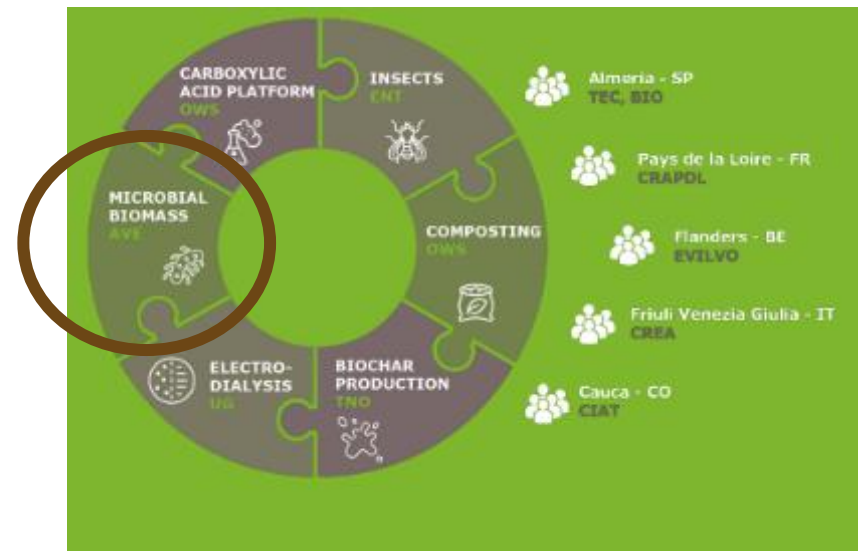
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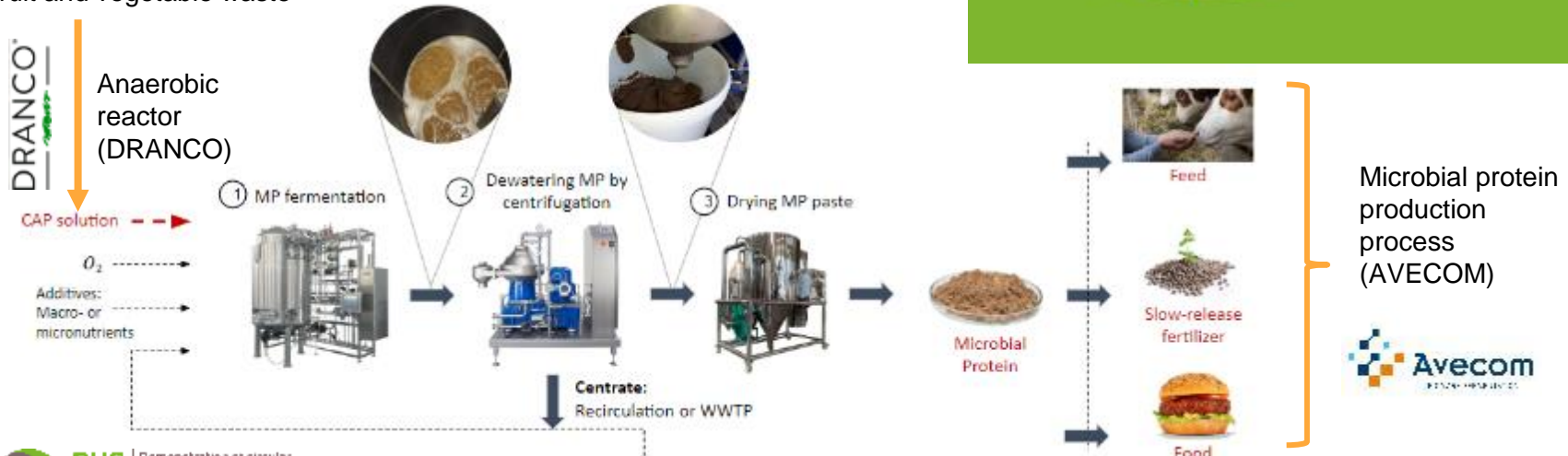
Biomass Fermentation

Sustainable fertilizers

- Case study: RUSTICA Project
 - Bio based fertilizer: blend of different building blocks
 - Scale: 1000-2000 L reactor, continuous
 - Production of 115 kg microbial protein powder



Fruit and vegetable waste



Demonstration of circular bio-based fertilizers and improved soil and animal nutrition via stable and solid chains in rural communities

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Biomass Fermentation

Sustainable fertilizers

- Case study: RUSTICA Project: Future perspective
 - **Field trials** in RUSTICA with RUSTICA blend (including Avecom's microbial protein)
 - Currently ongoing in Flanders
 - 2024: France and Italy
 - **Scaling up**
 - Collaboration with DRANCO and Belgian vegetable and fruit processing company
 - Currently: designing **full-scale** installation: converting **all** their waste into microbial protein: wet (DM = 10%) or dried (DM = 95%)
 - 50.000-liter reactors, continuous operation
 - Looking for interested companies/institutes for further research and utilization as sustainable organic fertilizer/biostimulant
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Preparing the field trial of Flanders

Our competences

- Innovative R&D driven SME company
- Steering and optimizing microbial processes
- Proven track record in successfully developing and commercializing microbial solutions
- 9 patents (1 recently sold to industrial partner)
- 16 EU funded projects (~ 5 million €)
- Own labs and industrial pilot facilities
- Highly-skilled and diverse team





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