Valorization of waste streams is a sustainable strategy

Nature, refined

Est. 1929 in Tienen

Nature, refined

The only, genuine circular producer of citric acid, mycelium and other high-quality products through surface fermentation on sugar molasses

Products

Citric Acid

Mycelium

Citrates

Low K Vinasse

Potassium calcium salt

Gypsum

Citric Acid

unique nutrition and pharma ingredient

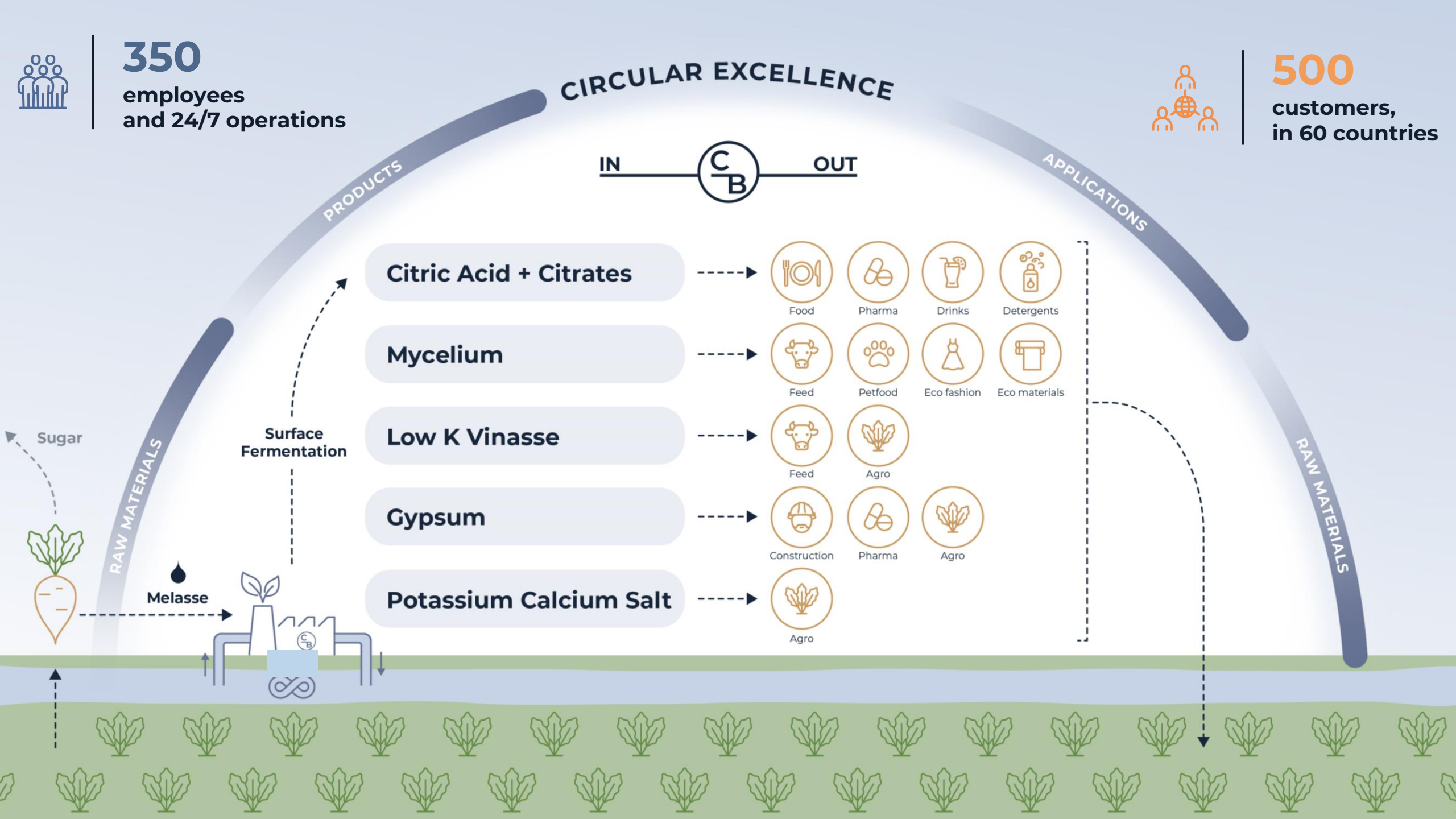
- **2 COOH groups**
- **Flavouring agent**
- **PH regulator**
- **Colorless**
- **Preservative**
- **Effervescent**
- **Chelating agent**










350
employees
and 24/7 operations
CIRCULAR EXCELLENCE
IN
C
B
OUT
500
customers,
in 60 countries
PRODUCTS
APPLICATIONS
RAW MATERIALS
RAW MATERIALS
Citric Acid + Citrates
Mycelium
Low K Vinasse
Gypsum
Potassium Calcium Salt
Food
Pharma
Drinks
Detergents
Feed
Petfood
Eco fashion
Eco materials
Feed
Agro
Construction
Pharma
Agro
Agro
Surface
Fermentation
Sugar
Melasse

Fermentation processes

CITRIBEL

SURFACE FERMENTATION

Fermentation room

Fermentation plate

Open air, static process

- Fermentation on co-products and foods syrops
- Multiple, valuable co-products
- Low energy requirement
- High volumes of mycelium production

OTHER CITRIC ACID PRODUCERS

SUBMERGED FERMENTATION

Closed, dynamic proces

- Fermentation on food syrops
- Fewer valuable co-products
- High energy requirements
- Low volumes of mycelium production

2. Innovate to differentiate supported by VLAIO

Introduction: process & product development

Focus on creation of added value through product diversification on the organic co-products of the citric acid fermentation

Valorisation vinasse side-stream

HBC2018.0331: Val_Cit_NS End date: 31/08/2021

Renovating through knowledge: new succesful product since 2023 with lower carbon footprint

Valorisation mycelium: dry and pure fibre and protein products

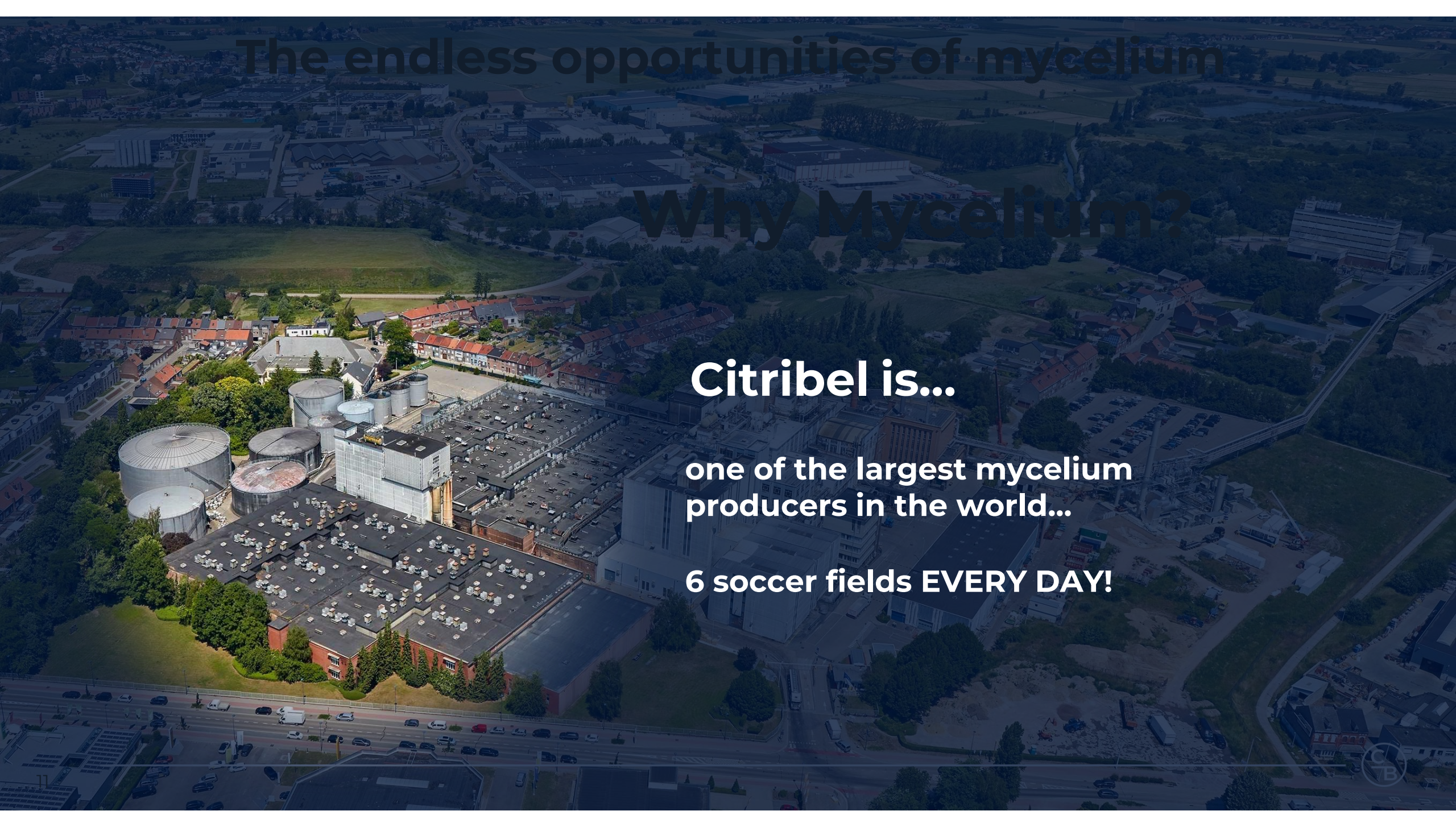
HBC2018.0431: Fun4Bio End date: 31/12/2021

HBC2019.0128: Prometheus End date: 28/05/2022

The revolutionary discovery of mycelium: focus of the presentation

The endless opportunities of mycelium

Why Mycelium?



Citribel is...

one of the largest mycelium producers in the world...

6 soccer fields EVERY DAY!


CITRI
BEL

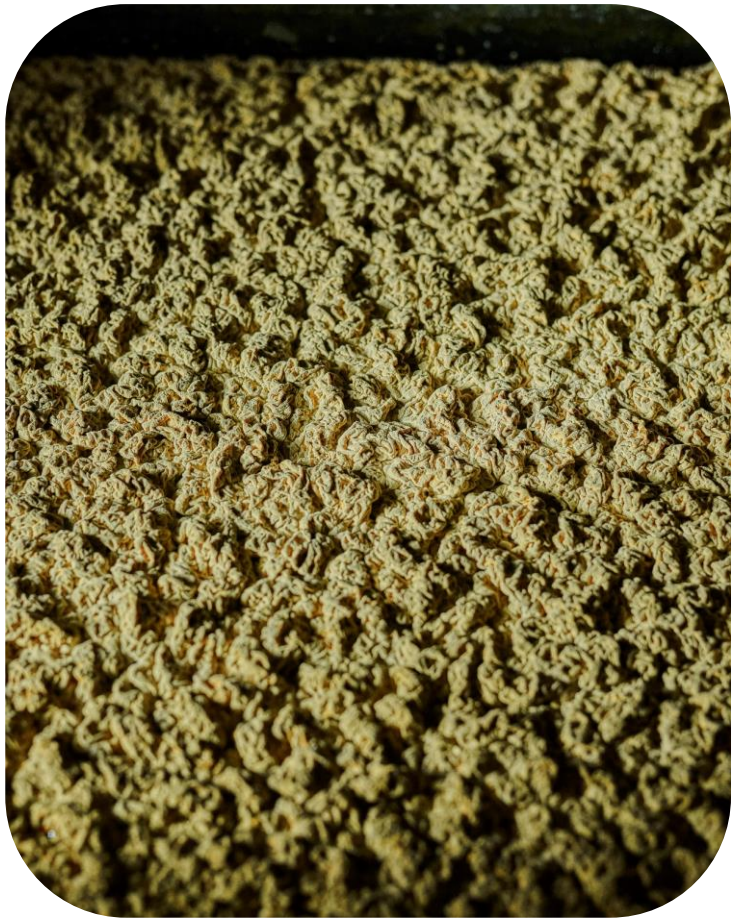

CITRI
BEL

Citribel as knowledge hub in Flanders

- Unique **surface fermentation** on sugar molasses
- **Quality** and **test lab** for fermentation
- **Exclusive, extensive know-how** for:
    - Scaling up
    - Fermenting on co-products
    - Circular processes
- **Endless applications**

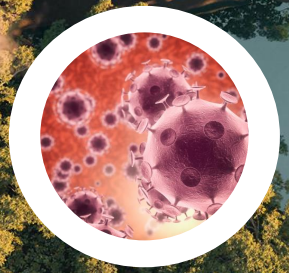
Citribel: knowledge hub in Flanders

The only, genuine circular producer of citric acid, mycelium and other high-quality products through unique surface fermentation on sugar molasses



Beta-glucans from mycelium

- Immunity stimulating properties
- Promising natural alternative to antibiotics



CITRIBEL

Beta-glucans from mycelium

Purified beta-glucan (1,3-1,6) source from **mycelium**

MycoFence®

Proven functionality as **immunity stimulant**:

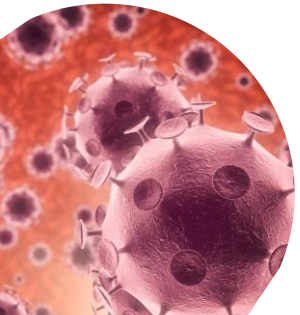
- Lowering mortality (aqua culture)
- Improving overall health
- Anti-inflammatory

PetFood

Aquaculture

Distinguishing feature:

- High purity
- Unique sourcing
- Hypo-allergenic



Roadmap:

2024 – 2025: Pilot facility

2027 – 2028: Full scale plant

TRL 5-6

Mycofence: β-glucan 60% as immunity booster

Aqua culture → Immunoboost, Ant-inflammatory → Scampi's, Salmon / Tilapia

Companion animals → Immunoboost → (Obese) pets, (Race) horses ~ stress

50% less mortality when using MycoFence in a viral challenge test in scampi

What with bacterial challenge bij salmon/tilapia/scampi?

Go to market for companion animals?

Fib4immunity (HBC.2023.0574)

Mycofence: β-glucan 60% as immunity booster

wet mycelium

High pH

Liquid protein extract (LPE)

LPE (>15%DM)

Fertiliser
Soil improver
Biostimulant

Proteïn free mycelium (PFM)

Drying

Dry fibre fraction

Mycofence

β-glucan 60%

aquacultuur
pet food
food
cosmetica

<u>Zero waste production process for PFM</u>:

LPE internal re-use
+
LPE as end product

Mycelium bio textile

- Reducing CO_2 emissions as PU-replacer in bio textile
- Lowering carbon footprint in overall life cycle

CITRI BEL

Mycelium bio textile

Dry mycelium can replace up to 40 mass% plastic in the leather process without loss of quality!

MYCA NOVA

TRL 7-8

https://www.mycanova.com/

100% plastic-free mycelium biotextile

Roadmap:

2024 – 2025: Development

2027 – 2028: Pilot plant

TRL 3-4

Summary

Mycelium: unlimited applications

of a former waste / by product

The unique surface fermentation production process allows for product diversification