

# Biomass characterisation and valorisation

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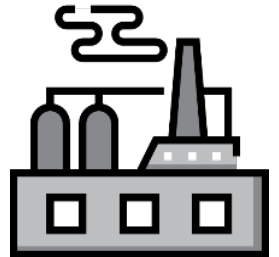


What can we do with our (side-)stream?

# Biomass valorisation

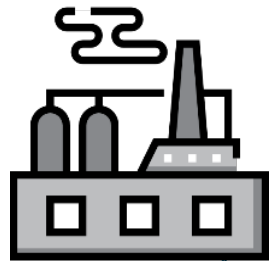
## Biomass: Organic side and waste streams

- Tomato stems and leaves,
- Brewers spent grain,
- Rice husk,
- Potato peels,
- Fruit pomace
- Roadside grass,
- Seaweed,
- Water treatment sludge
- Sugar beet leaves



# Biomass valorisation

- Biomass: Organic side and waste streams
- These natural resources often provide specific components which can be used as ingredients for new product applications. E.g.
  - Proteins, starch, fibres
  - Lignin
  - Micro-components (biostimulants, flavours)
- Approach:
  - Analyze the composition and characteristics of the side-stream
  - Identify valorization opportunities
  - Design an effective process towards a total use of biomass



# Examples



# Fungal residues

- Cuttings from mushroom such as stems from fruiting bodies
- Mycelium from industrial fermentations such as citric acid production
- Contain 5-40% chitin
- Possible sources of chitosan from side streams

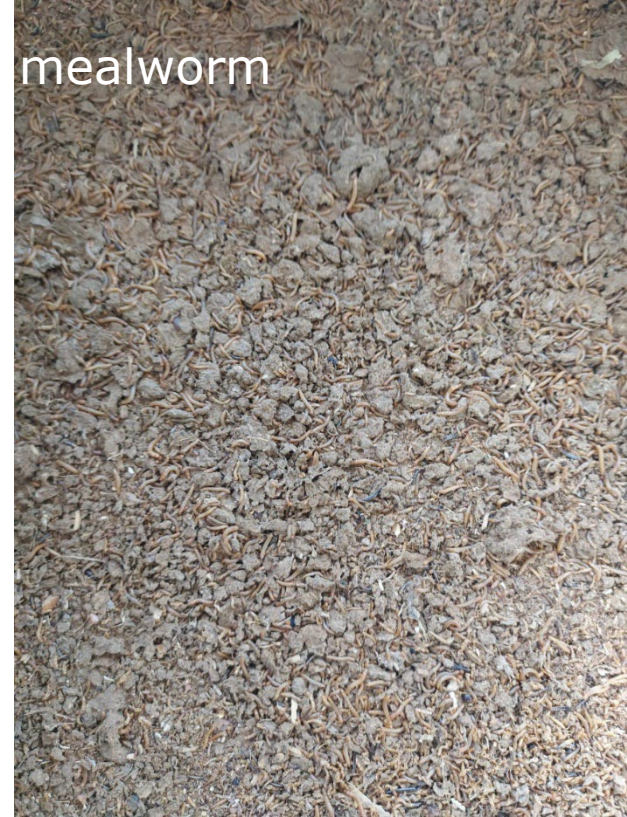


# Other side-streams containing chitin/chitosan

Crustaceans:  
shrimp, crab, lobster



Insects: mealworm



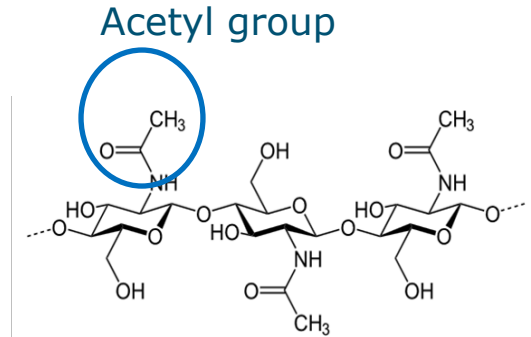
# Chitin – Chitosan introduction

- Chitin – Chitosan



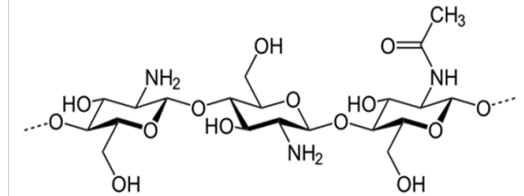
Chiton

- Discovered in 1811 by Henri Braconnot
- Chitin is garment worn by Greek men and women from the Archaic period (750–500 bc)



insoluble

Chitin



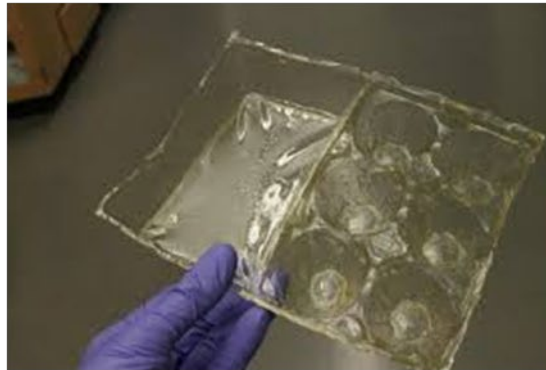
soluble < pH 6.5

Chitosan



# Chitin – Chitosan applications

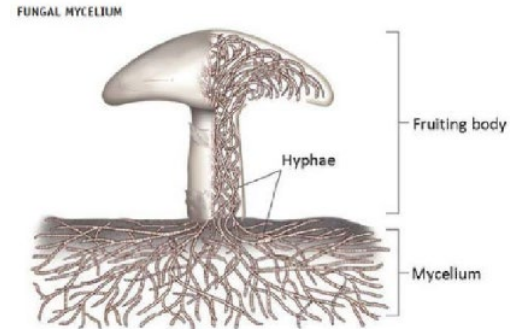
- Cosmetics, wound dressing, packaging, food supplement, fertilizer, flocculant, wastewater treatment, coatings for seeds, biosensors, toothpaste etc.



# Chitin – chitosan from fungi/mushroom

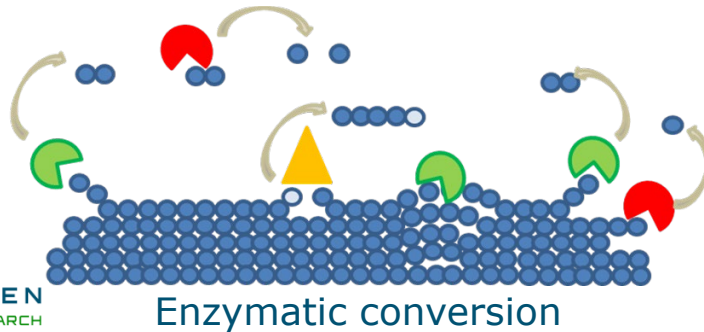
## Advantages chitin/chitosan from fungi/mushroom

- Less minerals compared to crustaceans
- Non-animal source
- In some cases already chitosan present e.g. mycelium from fungi



# Chitin – Chitosan projects

- Consultancy
- Characterization
- Biorefinery and purification
  - Lab and pilot scale
- Applications



# Asparagus cut-offs

Primarily bottom parts of the asparagus

Also peels and asparagus that are not straight (discards)

# Asparagus cut-offs

- Composition: Fibre part is mostly cellulose, very little soluble fibre
- Not a very logical component to extract at a first glance
- Can you use this as a food ingredient?
- In which products?



# Product search

- Innova database
  - Identifies new products on the market
  - Searchable on ingredient
- Search terms:
  - “extract”
  - “powder”
  - “fibre”



# Technology approach

- Lower quality, not to be used directly in a product like a risotto
- Flavor is key, use mild processing (low temperature)
- Finding a (non-)volatile flavor component as a marker



# Mild processing to obtain a concentrate

- Teboza asparagus cut-offs
- Pressing, centrifugation, reverse osmosis
- Concentrate with 22% dry matter content
- Most difficult was to do the drying step, as a dry powder was the requested product



# Pilot scale

- Realistic mass balances for techno-economic evaluation
- Sample preparation for spray-drying experiments
- Tasting sessions
  - Production “fit for tasting”



# Side-stream valorisation

- Can be based on a major component, micro components or a functionality
- Include specifics from the provider such as variety, storage and pre-treatment
- Start small, looking at opportunities, include techno-economics
- Application testing possible in-house
- Aqueous extraction and purification of functional protein from oilseed meal to be used as a food ingredient -->



# Thank you for your attention

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