

# HOW FRUIT & VEG BIOMASS IS CONVERTED INTO BIOPLASTICS AND FINE CHEMICALS

TRANSBIO is searching for a sustainable way to get value from industrial plant residues

## **The project: Finding cascade concepts for biorefineries**

The fruit and vegetable processing industry produces huge amounts of as yet unused residues and byproducts. The TRANSBIO project therefore aims to implement an innovative cascading concept to convert the residues into green plastic and chemical products. This involves environmentally friendly biotechnological solutions like fermentation and enzyme conversion strategies to obtain valuable bioproducts from the industrial residues.

The concept stems from the necessity of using renewable raw materials in a sustainable and environmentally sound manner, as increasing demand for industrial products and energy from biomass will inevitably lead to an expansion of global arable land at the expense of natural ecosystems. Besides, industrial biowaste, normally sent to landfills, is an important potential feedstock resource for use in biorefineries.

## **The product: Bioplastic packs, nutraceuticals, detergents for household application**

The end products will be biopolymers (PHB) for bioplastic packaging, nutraceuticals/platform chemicals and enzymes for household applications such as detergents.

The products will be produced through different strains of microbiome such as bacteria, proteolytic and lipolytic fungi and yeasts for succinic acid production, using their metabolic systems as 'cell-factories'. Great effort will also be put into scanning and selecting the right hydrolysate-substrates for building the carbon sources for the micro-organisms, substrates such as potato flour, pea pods, apple peels, turnip waste, banana peels, vegetable waste (e.g. grass, chicory).

The project aims to reduce production costs for biopolymer PHB for use in packaging applications, to improve production of biobased succinic acid, and to develop a solid state fermentation process (biocatalysts) for the production of enzymes for detergent applications. Finally, remaining biomass will be evaluated for potential use in biogas production. The partners will scale up the results to technical pilot scale to obtain information for possible implementation. Industrial scale to follow after project finalisation.

## **The end users: Industry, retail, consumer**

Bioplastics industry, fine chemical industry, packaging industry, pharmacy, biomass and recycling industry, retailers and consumers





### The inventors: Academia and SMEs

The TRANSBIO consortium – a mix of SME and academic partners – has been built as a well-balanced and equal partnership between European and Latin American countries. This partnership is based on a number of factors: proven expertise in the exploitation of fruit and vegetable by-products, microbial strain selection (bacteria, yeasts, fungi), fermentation strategy development, downstream processing, end-product stabilisation and utilisation, as well as sustainability and economic feasibility.

Screening methods for strain identification and genetic selection of microbiomes have been developed by project partners before.

The partners will scale up the results to technical pilot scale to obtain information for possible implementation at industrial scale after project finalisation.

### Development stage: Towards pilot scale

The screening of raw materials and characterisation of microbiome, including strain selection, has been done. The first cultivation experiments in TRANSBIO hydrosylates have been conducted.

The obtained biopolymer PHB will be tested for potential application in food packaging. Enzymes will be tested for use in detergents, and succinic acid will be purified for food applications or to be used as a platform chemical. Tests in controlled bioreactors will be conducted.

### Policy impact: Waste policy and key enabling technologies for industrial biotech

The successful implementation of TRANSBIO will also support several other European policies and initiatives. Through its demand driven approach it supports the Lead Market Initiative in the field of biobased products and renewable energy; by providing value-added solutions for fruit and vegetable by-products, it supports the Directive (1999/31/EC) requiring the reduction of biodegradable waste in landfill sites; through the development of cleaner industrial products and processes based on the use of enzymes and fermentative processes

(biocatalysis) it supports the strategy on life sciences and biotechnology. It also contributes to the initiative for developing a coherent European strategy for promoting technology in the area of industrial biotechnology.

### Next steps: Partner search and licencing procedures

The partners will exploit the project results as individual partners but also within the value chain via group exploitation. When protection measures are in place it is also hoped to exploit the project results outside the consortium, via licences. Therefore, during the project's duration several workshops and conferences will be organised to ensure wide contact with possible end users.



#### TRANSBIO

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