



An exciting new project for the sustainable production of cosmetic ingredients in plants

InnCoCells

Innovative high-value cosmetic products from plants and plant cells

H2020-EU.3.2.4.1 – grant agreement 101000373

InnCoCells – Innovative high-value cosmetic products from plants and plant cells

EU Horizon 2020 Research and Innovation Action, 2021–2025

Coordinator

Dr Kirsi-Marja Oksman-Caldentey
VTT Technical Research Centre of Finland Ltd
Tietotie 2
Espoo, Finland
kirsi-marja.oksman@vtt.fi
Tel. +358 40 5522082

Communication

Dr Richard Twyman
TRM Ltd
Scarborough, UK
richard@twymanrm.com



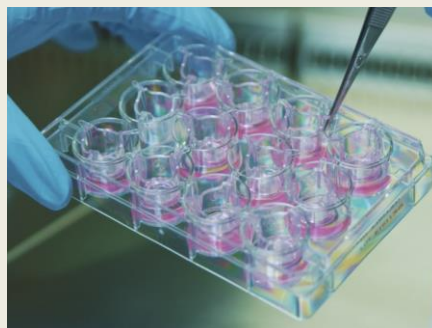
<http://www.innocells.org>



*Left: Plant callus cultures and hairy roots in Petri dishes.
Right: Apple cell suspension culture.*

InnCoCells is a Horizon 2020 project launched in 2021 aiming to develop innovative plant-based production processes for the commercial exploitation of scientifically validated cosmetic ingredients using profitable and sustainable plant cell cultures, aeroponic cultivation, and plants grown in the greenhouse and field.

This is the first of several project brochures – here we describe the project background and goals.



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***InnCoCells* in a nutshell**

InnCoCells is a consortium of 17 partners representing European academic and industrial leaders in the development, sustainable production and rigorous scientific testing of natural cosmetic ingredients derived from renewable plant-based sources.

Cosmetics from plants

Higher plants synthesize a diverse range of bioactive, low-molecular-weight natural products, offering huge potential as cosmetic ingredients. The growing use of cosmetics has increased the demand for scientifically validated bioactive ingredients that are produced in a sustainable manner, reflecting the greater consumer awareness of scientific and environmental issues. This has encouraged companies to seek innovations in sustainable production processes and to demonstrate the evidence-based functionality of their products. Growth in the cosmetics industry has also embraced products containing environmentally beneficial and naturally sourced ingredients to meet the demands of a society increasingly geared towards greener industry and a circular economy based on renewable materials.



The InnCoCells consortium is developing and optimizing efficient extraction methods for cosmetic ingredients.

The *InnCoCells* approach

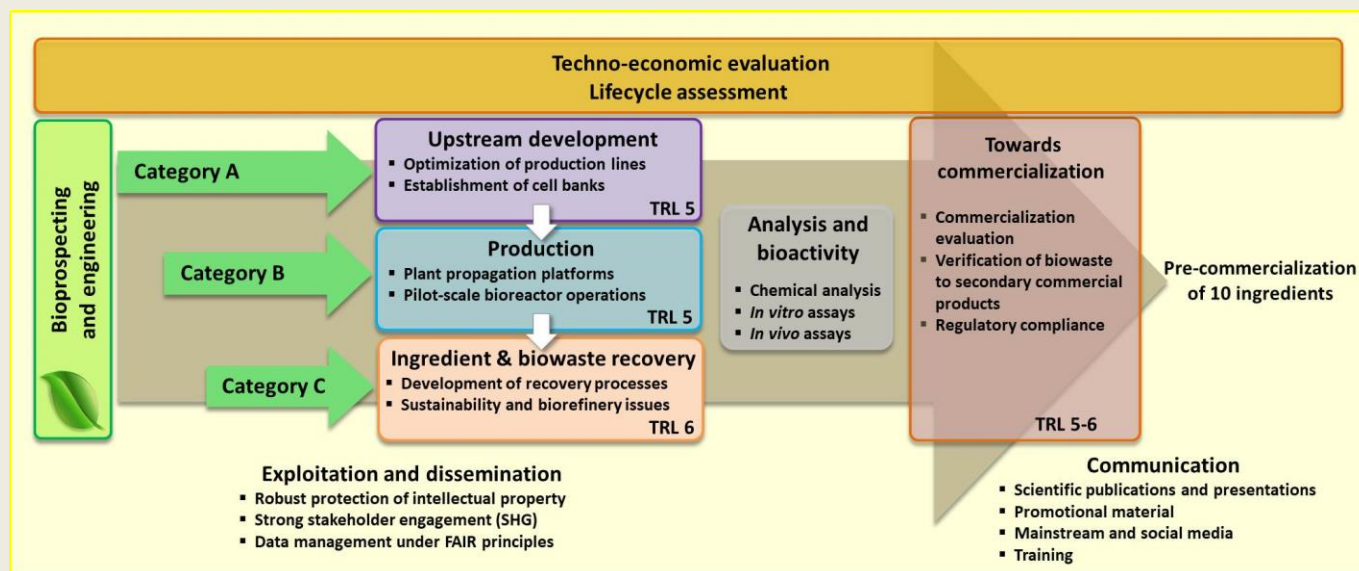
InnCoCells is focusing on underutilized plants that are sourced unsustainably, as well as underutilized byproducts and waste fractions from the agri-food industry. The project is developing sustainable and cost-effective production systems with a small environmental footprint for high-value plant-derived cosmetic ingredients and compounds by integrating biotechnology-based approaches into sustainable production chains featuring cutting-edge innovative technologies. These products are then tested in a broad panel of cell-based assays and ultimately in human clinical trials to prove their efficacy.

Major objectives of the *InnCoCells* project

The *InnCoCells* project will achieve its sustainability goals by focusing on seven key objectives spanning the areas of bioprospecting, upstream production, downstream processing, scientific testing and commercial development (including dissemination, exploitation and communication):

- Mine biological, genetic and chemical resources (following the Nagoya Protocol and local regulations) for biodiscovery, resulting in the sustainable exploitation of at least 10 relevant metabolic pathways in various plant species.
- Develop a multi-step evaluation pipeline for the testing of plant-derived bioactive molecules and extracts, yielding at least 50 scientifically verified active ingredients for cosmetic products.
- Develop, test and optimize production processes and technologies for at least 20 ingredients, using three major production platforms (plant cells, aeroponics, and greenhouse/field cultivation).
- Explore the potential of at least 10 agri-food byproducts or waste fractions by implementing a cascade biorefinery to generate value-added extracts, compounds or ingredients with confirmed activities, using the exhausted biomass as feed, fertilizer or fuel (zero waste).
- Establish environmentally sustainable pilot-scale production and purification technologies for at least 10 active, fully-characterized, cosmetic ingredients by the end of the project, to prepare them for commercialization.
- Ensure product safety, regulatory approval and the sustainability and profitability of the proposed value chains and processes by life cycle assessment and techno-economic analysis, including the development of business models and a mandate for biodiversity preservation.
- Promote knowledge exchange among *InnCoCells* academic and industrial partners, thus supporting product development and ensuring intellectual property (IP) protection. To achieve this, we have established a Stakeholder Group to facilitate the dissemination and exploitation of project results and have developed targeted communication and engagement strategies for the duration of the project and beyond.

Organization of the *InnCoCells* project



Snapshot of the *InnCoCells* project in action

The *InnCoCells* project has nine work packages focusing on the following aspects of the value chain:

Plants, ingredients and production. We will identify candidate plants producing useful target molecules and will develop the upstream production processes (cell/organ cultures, aeroponics and whole plants) to maximize the yields of these molecules in a sustainable manner, including the use of metabolic engineering to boost the production of suitable cosmetic ingredients.

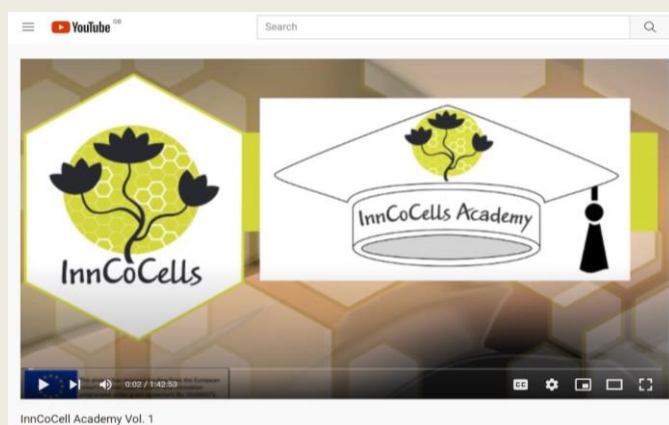
Extraction and purification. We will develop efficient extraction processes for the key molecules based on starting material from the plant cells or whole plants described above, and also from agro-industrial waste streams.

Testing and validation. We will test the ingredients in cell-based assays and ultimately in human clinical trials to confirm their efficacy.

Communication, dissemination and exploitation. We will share our results with industry and consumer stakeholders to ensure that consumer requirements are addressed throughout the project and on the path to commercialization.

Dissemination activities

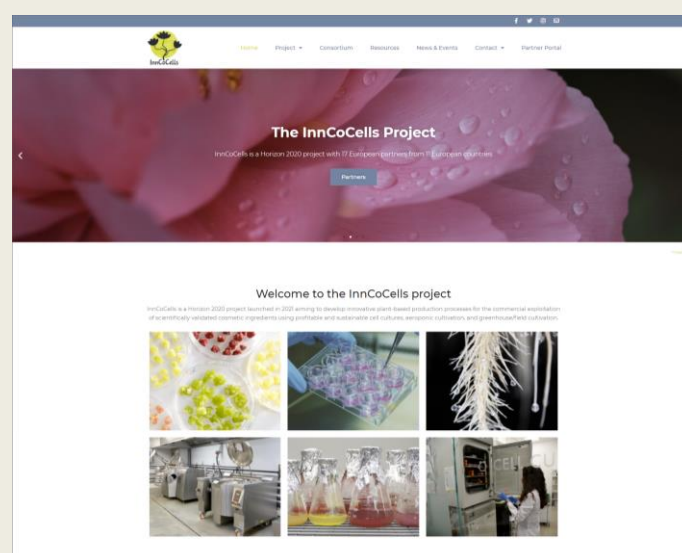
InnCoCells has developed a suite of dissemination activities to ensure that our results are shared widely with stakeholders, creating an efficient path towards commercialization. As well as the Stakeholder Group, scientific publications, presentations at conferences and industry events, and the project website, we have also established an *InnCoCells* Academy to develop a program of seminars and training workshops that showcase our activities and train a new generation of research scientists.



The *InnCoCells* Academy on YouTube.

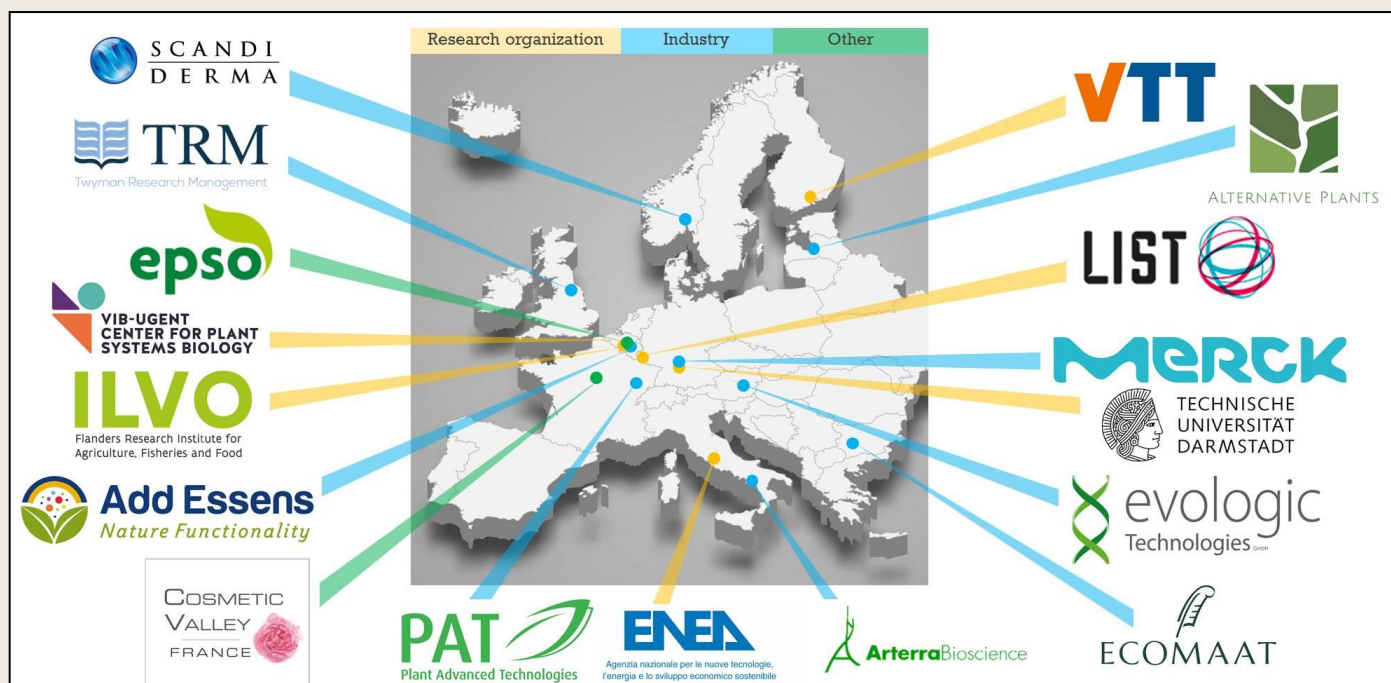
Communication with the public

We are also increasing public awareness of the project's commitment to sustainability and efficacy by developing a suite of communication tools. For example, you can visit the *InnCoCells* website for more information, and follow us for updates on Facebook, LinkedIn, Twitter and Instagram!



The *InnCoCells* public website – <http://www.innocells.org>.

The InnCoCells consortium



VTT Technical Research Centre of Finland Ltd, Finland – Dr Kirsi-Marja Oksman-Caldentey – kirsi-marja.oksman@vtt.fi

Luxembourg Institute of Science and Technology, Luxembourg – Dr Gea Guerriero – gea.guerriero@list.lu

Vlaams Instituut voor Biotechnologie VZW, Belgium – Prof. Alain Goossens – alain.goossens@psb.vib-ugent.be

ILVO, Belgium – Dr Bart Van Droogenbroeck – bart.vandroogenbroeck@ilvo.vlaanderen.be

ENEA, Italy – Dr Eugenio Benvenuto – eugenio.benvenuto@enea.it

Technical University of Darmstadt, Germany – Prof. Heribert Warzecha – warzecha@bio.tu-darmstadt.de

European Plant Science Organisation, Belgium – Dr Karin Metzloff – karin.metzloff@epsomail.org

MERCK KGaA, Germany – Dr Jörg von Hagen – jörg.von.hagen@merckgroup.com

Add Essens BV, Belgium – Ir Kris Schatteman – kris.schatteman@addressens.com

Arterra Bioscience SpA, Italy – Dr Gabriella Colucci – gcolucci@arterrabio.it

Plant Advanced Technologies SA, France – Prof. Frédéric Bourgaud – frederic.bourgaud@plantadvanced.com

Alternative Plants Ltd, Latvia – Dr Martins Boroduskis – martins@alternativeplants.eu

Evologic Technologies GmbH, Austria – Dr Wieland Reichelt – wieland.reichelt@evologic.at

Ecomaat OOD, Bulgaria – Atanas Krachmarov – info@ecomaat.com

ScandiDerma AS, Norway – Dr Geir Håvard Kvalheim – geir@scandiderma.com

Twyman Research Management Ltd, UK – Dr Richard Twyman – richard@twymanrm.com

Cosmetic Valley Association, France – Dr Amandine Goubert – agoubert@cosmetic-valley.com

