



Progress in the *InnCoCells* project at the half-way stage

# 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

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*Left: Scaling up plant cell cultures to a 300-L bioreactor.  
Right: Scaling up chrysanthemum to a full-size field plot.*

*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 third in our series of project brochures – describing our progress as we head into the third year.**



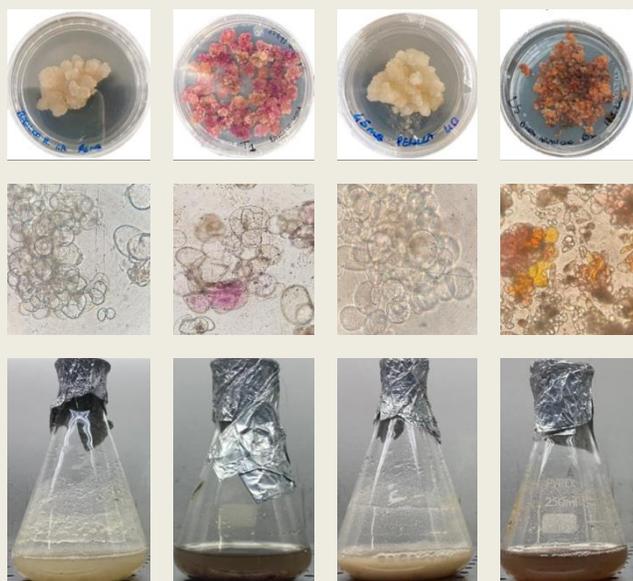
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000373

## The InnCoCells project

*InnCoCells* is a consortium of 16 partners representing European academic and industrial leaders in the discovery, sustainable production and scientific testing of natural cosmetic ingredients sourced from plants. The project is now at the half-way stage and has made remarkable progress towards all its objectives.

### Progress with upstream production

In the technical work packages focusing on upstream production, we are working with four main systems: plant cell suspension cultures, hairy roots, aeroponic units and whole plants grown in the greenhouse and field. We began with 50+ plant species and have progressively narrowed the list down by eliminating the least promising. We now have more than 60 lines in these four systems, representing different varieties and clones of the most promising species that have been tested under a wide range of conditions to optimize growth and the production of bioactive cosmetic ingredients. We are also developing genetic tools to control key metabolic pathways.



Callus tissue and cell suspension cultures (viewed under the microscope and in shake flasks) established from (left to right) two basil varieties, perilla and sugar beet.

We have optimized the growth of more than 20 cell suspension cultures in the light and dark. Six of these have been scaled up to 30–40 L and two others to more than 500 L. We have also eliminated bottlenecks in the cultivation of basil hairy roots, allowing four to be cultivated at a scale of 30 L and another at 300 L. Optimal growth conditions have been established for four plants in aeroponic units, including two species (*Pogostemon cablin* and *Mentha aquatica*) that have been advanced to pilot-scale growth surfaces (100 m<sup>2</sup>). Large-scale field plots of whole plants have also been established for three of our most promising species: chrysanthemum, geranium and lilac.



Pilot-scale (100 m<sup>2</sup>) aeroponic plots of *Pogostemon cablin* (left) and *Mentha aquatica* (right).

### Progress with downstream development

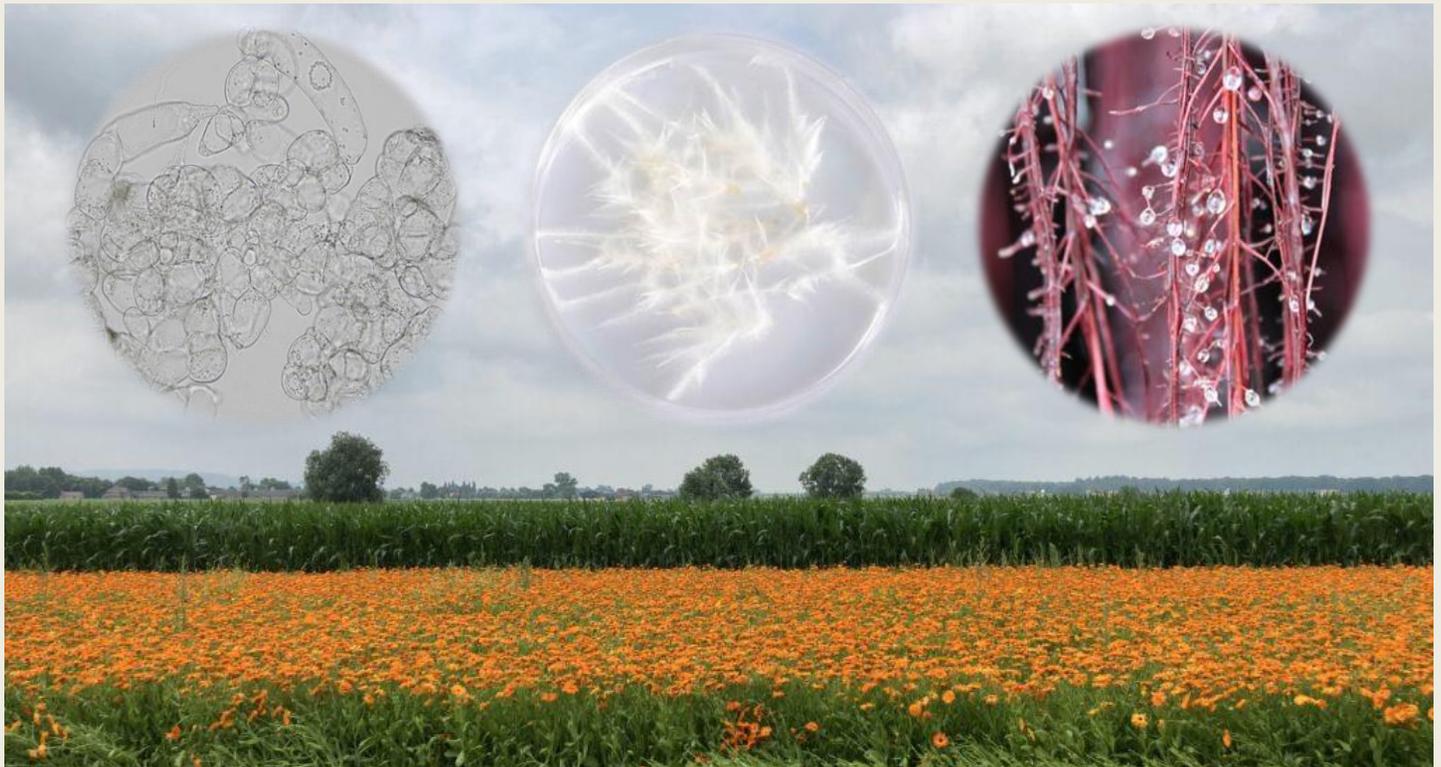
In the technical work packages addressing downstream processing and ingredient testing, we have tested the extraction of active compounds from many different plants on a small scale in order to optimize the processing parameters, including pre-treatment with enzymes or physical methods such as pulsed electric fields. We have confirmed the stability and concentration of the target compounds in these extracts and they are now undergoing detailed chemical and metabolic profiling.



Oil-soluble extracts of chrysanthemum prepared using the supercritical and subcritical CO<sub>2</sub> extraction methods.

More than 15 cell lines have been analysed by highly detailed metabolic profiling, including basil, perilla, multiple pepper varieties and *Carthamus* species. We have also characterized byproducts from ginger, chicory and olive sidestreams, among others, in order to evaluate their potential for the production of bioactive molecules using a cascade biorefinery approach. Our bioactivity profiling studies have detected multiple extracts with promising active components, including some with antimicrobial and anti-inflammatory activities and the ability to promote collagen production, which are all valuable in the cosmetic industry.

We have completed the documentation required for life cycle analysis and techno-economic evaluation, which will help us to provide the necessary technical and regulatory dossiers for product commercialization.



*The InnCoCells project has four main production systems: left inset – plant cell suspension cultures; middle inset – hairy roots; right inset – aeroponic roots; main picture – field plots. Starting with 50+ plant species, the project has spent 2 years testing these production systems to optimize growth, the production of cosmetic ingredients, and efficient extraction protocols, selecting lines with the greatest scalability and productivity. We are also extracting ingredients from plant-based processing sidestreams.*

## Progress with dissemination activities

*InnCoCells* has continued to expand its dissemination activities, including a growing list of peer-reviewed scientific publications, many posters and presentations at scientific conferences, and participation in industry fairs and exhibitions, including a roundtable discussion at Cosmetic 360, Paris, October 2023 (pictured below). We have hosted more *InnCoCells Academy* events, the latest in collaboration with the International Society for Plant Molecular Farming (ISPMF), as well as our first training workshop on plant cell cultures. At the most recent project meeting in Luxembourg, we had the first in-person meeting of our Stakeholder Group, which provides advice and guidance to the project. We have continued to collaborate with the Algae4IBD, MARBLES and SECRETed project as part of the AIMS cluster funded under Horizon 2020 topic FNR-11-2020.



*The InnCoCells roundtable discussion at Cosmetic 360, Paris, 19 October 2023.*

## Progress with public communication

Our communications package provides information for the public about the project and the organizations involved. This includes a content-rich project website, social media, press releases, promotional videos and informal podcasts, a series of informative brochures and articles in newsletters and magazines, and joint activities with the AIMS cluster. We are also planning events to mark Fascination of Plants Day 2024.

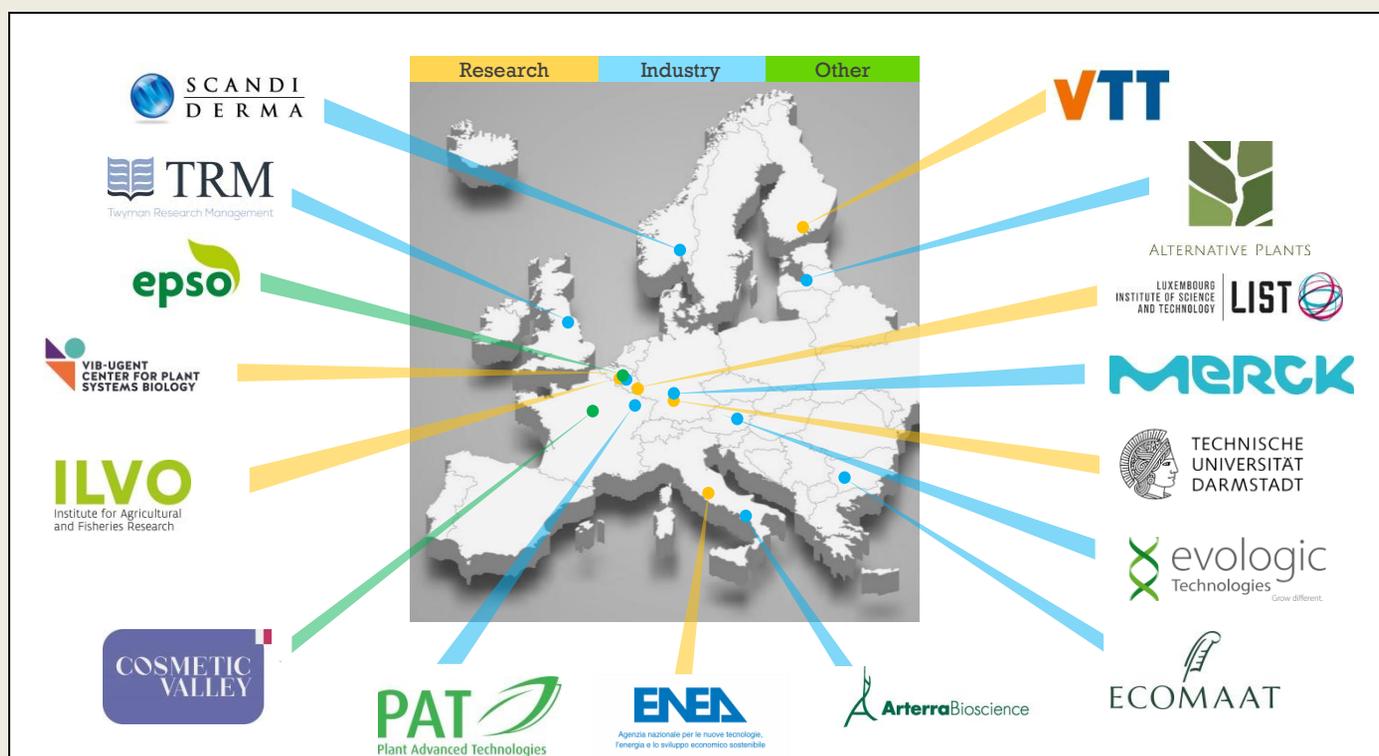


*InnCoCells videos and podcasts – available on YouTube.*

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## The InnCoCells consortium



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