EXCornsEED

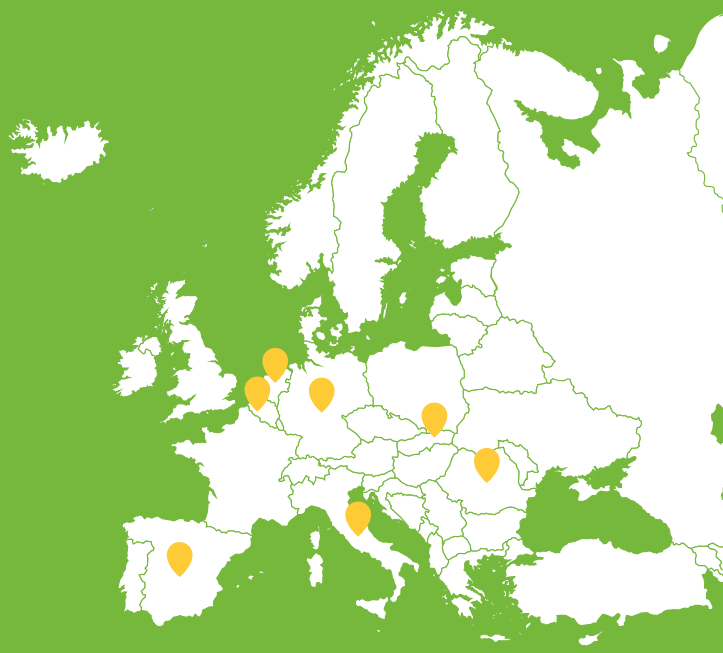
Enjoy reading the EXCornsEED newsletter!

EXCORNSEED CAME TO AN END

On February 13th 2023, the EXCornsEED consortium gathered to present the latest results and overall achievements after almost 5 intense years of hard work.

Since the 1st of June 2018, when the project started, all partners have worked hand-in-hand in order to demonstrate the EXCornsEED technology at pilot scale. For the ¬first time, the valorization potentials of biorefinery side streams has been demonstrated at this level, being able to develop new bio-based and value-added products.

The project has demonstrated the high potential and quality of the separation, fractionation and isolation of biologically active natural substances from corn oil and other side streams.



BIOREFINERIES AND THEIR SIDE STREAMS: THE EXCORNSEED CASE-STUDY

The EXCornsEED Consortium has demonstrated that biofuel biorefineries may be a starting key-point for new sustainable bio-based value chains, putting the basis for new cross-sector interconnections between bioeconomy actors. High-value proteins and bioactive molecules from biorefineries by-products and side streams have been recovered by means of green and sustainable technologies and valorized, opening new perspectives for the creation of integrated biorefineries with the advantage of increasing the competitiveness and sustainability of biofuel biorefineries and maximizing resource efficiency and the total value of biomass.

TECHNOLOGIES AND PROCESSES FOR AN INTEGRATED BIOREFINERY DEVELOPMENT

CELABOR (Belgium) has studied the valorisation potential of corn oil and most particularly rapeseed meal (RSM). An integrated process was developed at laboratory-scale for the extraction and purification of two major proteins found in RSM: Cruciferin and Napin. The process was also optimized for the recovery of a highly interesting polyphenol: Sinapic acid. The process was developed using a multi-step cascade approach and the process operations were optimized to recover the targeted valuable products with high purity, combining extraction and purification techniques. It was then upscaled to an intermediate scale through the production of various batches of 65 L each and 1 trial at 350 L to validate the method and generate data to design the industrial pilot process at ENVIRAL (Slovakia) premises. Protein isolates, sinapic acid and peptides produced were then sent to end-users to study and validate their application potential as food supplements, cosmetic ingredients or surfactants.

ICECHIM has developed methods to improve the sensory qualities of the purified proteins extracted from rapeseed meal and tested alternatives for supporting the extraction process using different mixtures of enzymes. As far as the polyphenols fraction is concerned, the nanoformulation of these ingredients was carried out by grafting on chitosan, in order to increase their bioavailability, and resulting in improved water solubility, as well as enhanced antioxidant and antimicrobial activity.

DEVELOPMENT OF NEW BIO-BASED AND VALUE-ADDED PRODUCTS

Purified protein, peptides and polyphenol fractions of rapeseed meal have been applied as ingredients of innovative and sustainable food and cosmetic formulations.

As regards food, innovative products tailored to the specific needs of special categories of consumers have been formulated and tested. Danone Nutricia Research (The Netherlands) has evaluated the suitability of rapeseed meal protein isolate powder produced within the EXCornsEED project for the formulation of Young Children Formula, plant-based drinks tailored to the special nutritional requirements of children that for any reason (intolerance, cultural, etc.) need an alternative to milk proteins. Tests on prototypes confirmed the value of EXCornsEED rapeseed protein isolate from both nutritional and techno-functional points of view.

Biozoon GmbH (Germany) has tested EXCornsEED rapeseed protein isolate for the formulations of several food products, from texture-modified (TM) products for elderly people with mastication and swallowing difficulties, to drinks and 3D-printed products. All tests were successful. In particular, sensory and chemical-nutritional evaluations of TM-products conducted in collaboration with CREA-Food and Nutrition Research Centre (Italy), highlighted the nutritionally adequacy of products for seniors.

Dr Lauranne has formulated, tested and validated cosmetic products containing rapeseed polyphenols and peptides. Results highlighted the acceptability and efficacy of the products, in terms of hydrating, antioxidant, anti-aging, anti-irritating and anti-inflammatory potentials, as well as protection from blue light, in keeping in line with the latest market trends.

As the market of food and cosmetics in Europe is increasingly driven by consumers' preferences for sustainable, high-quality, healthy, plant-based products, the new bio-based products developed, based on purified rapeseed meal ingredients, encounter current and future development trajectories of high-value market sectors. All three applications here shortly described are promising and innovative because of the healthiness, functional properties and sustainable origin of the ingredients.

Biozoon GmbH (Germany) has tested EXCornsEED rapeseed protein isolate for the formulations of several food products, from texture-modified (TM) products for elderly people with mastication and swallowing difficulties, to drinks and 3D-printed products. All tests were successful. In particular, sensory and chemical-nutritional evaluations of TM-products conducted in collaboration with CREA-Food and Nutrition Research Centre (Italy), highlighted the nutritionally adequacy of products for seniors.

Dr Lauranne has formulated, tested and validated cosmetic products containing rapeseed polyphenols and peptides. Results highlighted the acceptability and efficacy of the products, in terms of hydrating, antioxidant, anti-aging, anti-irritating and anti-inflammatory potentials, as well as protection from blue light, in keeping in line with the latest market trends.

As the market of food and cosmetics in Europe is increasingly driven by consumers'

preferences for sustainable, high-quality, healthy, plant-based products, the new bio-based products developed, based on purified rapeseed meal ingredients, encounter current and future development trajectories of high-value market sectors. All three applications here shortly described are promising and innovative because of the healthiness, functional properties and sustainable origin of the ingredients.

DEVELOPMENT OF YOUNG CHILD FORMULAS BASED RAPESEED MEAL PROTEIN ISOLATE

Danone Nutricia Research has developed Young child formula liquid prototypes using the rapeseed protein isolates produced by the EXcornsEED consortium. Initial lab scale results have shown good processability of the protein isolates and promising sensorial properties. Being first of its kind source of rapeseed protein, we envision many benefits using this kind of protein source not only from a technical and nutritional perspective but as well from a sustainability and economical point of view. In short, this protein source and the way it is produced has a great potential in the future of plant based food systems.

EXCORNSEED CONCLUDES WITH SUCCESSFUL FINAL EVENT IN ROME

The Sapienza University hosted the final plenary meeting of the EXCornsEED project jointly organised by the coordinator and the partner Technological Corporation of Andalusia (CTA), which took place on February 13 and 14, 2023 in Rome (Italy).

The meeting focused on the progress achieved in the last months of activities and each partner presented the results obtained in their work packages at the end of the project that has been in development for the past almost 5 years.

The event began with an introduction of the CBE-JU Project Officer Ana Ruiz Sierra and a keynote speech from the project coordinator Prof. Dr. Giancarlo Fabrizi (University La Sapienza, Rome), who provided an overview of the project, presenting the challenges the team faced and the breakthroughs they achieved.

A special attention was given to the latest scientific and technical development. In the session dedicated to biorefineries' side streams, Dr. Gabriella Di Lena (CREA, Italy) introduced to the audience the biofuel biorefineries side streams studied in the project and their valorization potentials.

In the session dedicated to the technologies and processes developed, were illustrated small-scale methods for the valorization of post-fermentation corn oil and rapeseed meal (Dr. Antonia Iazzetti, University La Sapienza, Rome), the nanoformulation of compounds recovered from rapeseed meal (Dr. Florin Oancea, ICECHIM, Romania) and the methodological development of side streams valorisation from lab to intermediate semi-pilot-scale conducted at Celabor laboratories (Dr. Camille Malterre and Dr. Mahmoud Hamzaoui, CELABOR, Belgium). Dr. Petra Ondrejíčková, from ENVIRAL a.s. (Slovakia) the biofuel industry initiator of the project proposal and part of the EXCornsEED Consortium, has presented the scale-up process realised with success at its premises.

In the session dedicated to sustainability assessment, Dr. Maria Nieto Fajardo (Consultant, CTA, Spain) and Fernando Cirez (TECNALIA, Spain) have provided an overview of sustainability and techno-economic assessment analyses conducted in the frame of the project.

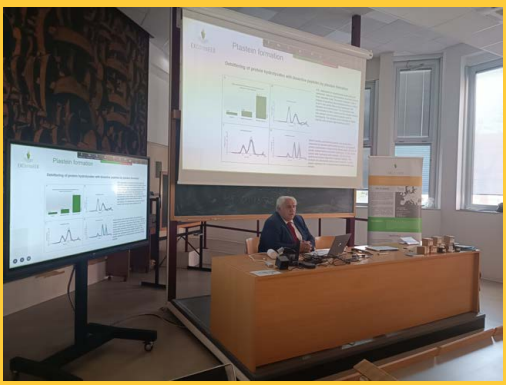
The highlight of the event was the unveiling of the project's final product: represented by the cosmetic company Dr Lauranne (Dr. Gaetano Galeppi, Italy) and by the food companies, Danone Nutricia Research (Roland Gouzy, The Netherlands) and BIOZOON Food Innovations GMBH (Dr. Ann-Kristin Schwarze, Germany).

The meeting was the chance not only to discuss the progresses achieved within the consortium, but also to exchange ideas with all the results of the project and the researchers involved.

The audience was thrilled by the results and gave the consortium a standing ovation. The project was seen as a significant advancement in the field of the bioeconomy, with particular focus on the development and validation of an integrated process of innovative and highly sustainable extraction/purification/concentration technologies to be applied to bio-refineries side streams, and many attendees were excited to see the new bio-refineries in the future.

In a closing phase, in synergy with the sister project BIOBESTICED, Dr. Anna Franciosini (from Ciaotech, PNO Group) presented the results of the other project and how the technology intelligence can exploit and create new opportunities and collaborations in the framework of different projects.

In doing so, the final event of Project EXCornsEED was a resounding success, and its legacy will continue to benefit society for years to come.



SO NOW WHAT? THE FUTURE OF THE EXCORNSEED TECHNOLOGY

The alternative protein industry has made rapid progress in recent years and our consortium was one piece of jigsaw representing key role in production of valuable compounds from biorefinery co- products.

The protein rich rapeseed meal processing by EXCornsEED technology towards production of alternative rapeseed proteins and bioactive compounds provides sustainable nutrition and game-changing application in food sector, cosmetics and homecare application as alternative proteins have a promising chance to become a reliable, low-impact source of nutrition for billions of people.

The EXCornsEED technology approaches the next phase of its evolution, undergoing the optimization of process conditions to provide marketing samples for potential early adopters and end-users. Also, these optimizations steps will provide useful data for subsequent assessment of business cases together with already conducted LCA and TEA analyses. After stabilizing the process and obtaining representative biologically active natural products the commercialisation will take place. So stay tuned.

Also, sustainability assessment was conducted in the frame of the project through a Life Cycle Assessment (LCA), technical assessment (TEA) and a review of regulation and standards. Preliminary results have supported the identification of future work to be done in order to reach the market and have delved into different operational approaches and strategic considerations regarding the financing of further technology upgrade.

SOME WORDS FROM THE COORDINATOR

Dear readers,

After 5 years of really hard work, the project came to an end.

I believe most of you are already aware of the technology, the results achieved, and the exceptional outcome of the project. The work performed by the consortium has been positively acknowledged and recognized by many of you through your kind feedback.

We are very proud of the results achieved. Not only we have managed to engineer, upscale, pilot and prove a technology, we have also positively fulfilled the not lesser tough administrative requirements of the EU-Commission, among others, 44 Deliverables have been achieved.

The financial support of the BBI-JU and the EU Commission, which made the project a reality, is highly appreciated.

I am proud of the work performed by each and every of you, dear partners.

As coordinator, I really appreciate your engagement and commitment to the project, especially at tough times.

But then it happened: "When the going gets tough, the tough gets going".

Best consortium for the best technology!

Kind regards,

KEEP INFORMED

If you want to learn more about the EXCornsEED project or get in touch with one of the EXCornsEED partners, please visit the EXCornsEED website or follow the project on Twitter and LinkedIn.

www.excornseed.eu

@EXCornsEED

info@excornseed.eu

www.linkedin.com/company/excornseed/

If you like our content subscribe to our newsletter and like, follow and share our social media accounts and posts to get the most recent news on events and results.

PARTNERS

Sapienza Università di Roma
www.uniroma1.it

Biozoon GmbH
www.biozoon.de

Celabor
www.celabor.be

CREA
Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria
www.crea.gov.it

Fundación Corporación Tecnológica de Andalucía
www.corporacionteconologica.com

Nutricia Research B.V.
www.nutriciaresearch.com

Dr. Lauranne
www.drlauranne.eu

ENVIRAL a.s.
www.enviral.sk

HighChem
www.highchem.com

National Institute for Research and Development in Chemistry and Petrochemistry ICECHIM
www.icechim.ro

INNOVATION ENGINEERING
www.innovationengineering.eu

P&G
www.us.pg.com

Fundacion Tecnalia Research & Innovation
www.tecnalia.com

This project has received funding from the Bio Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement n°792054.