



EXCornsEED

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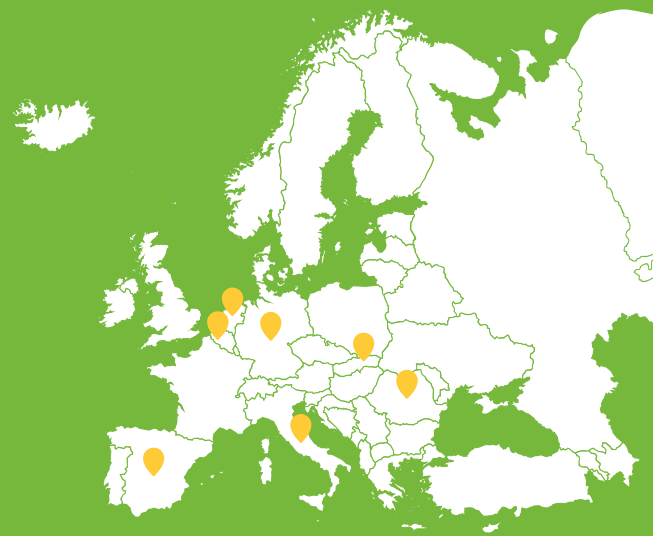
EXCORNSEED: UPDATES ON THE THIRD-YEAR PROJECT RESULTS

EXCornsEED celebrates its third year of implementation. The seventh edition of the newsletter gives a brief overview of our latest progress for the period June 2020 – June 2021.

As the project goes on, many activities have been implemented in order to achieve new technical results to exploit and valorise the side streams from bioethanol and vegetable oil production, namely corn oil and rapeseed meal.

The dissemination of the project results is also moving forward, with new scientific publications submitted and participation at online international conferences and the release of the new [promotional video](#).

Let's take a look at the key achievements of the 36 months activities of the EXCornsEED Project and for any further updates, please follow EXCornsEED page on [LinkedIn](#) and [Twitter](#)!



FROM THE PHYSICO-CHEMICAL CHARACTERIZATION PROCESS OF THE ACTIVE NATURAL COMPOUNDS TO THE FINAL FORMULATION

Sapienza has been involved in building on Celabor's results in the treatment of rapeseed meal (RSM) for designing a 1-ton pilot plant project to be built at the ENVIRAL site. Furthermore, the activities covered the chemical and physico-chemical characterization of the polypeptides by enzymatic hydrolysis from RSM proteins and the analysis of the biological properties, which led to the formulation and preparation of cosmetic products by Dr. Lauranne.

Sapienza is also working on the design and synthesis of lipo-amino acids in cooperation with P&G in order to obtain products with high detergent properties.

PILOT PLANT'S TECHNOLOGY UP-SCALE AND OPTIMIZATION STEPS

Third year of project implementation has **ENVIRAL** dedicated to close cooperation on technology up-scale and optimization steps with project partners. ENVIRAL ensured sufficient availability of evaluated feedstock and provided valuable feedback necessary for basic design a full-scale pilot plant. During this period ENVIRAL's role was to ensure feasibility, technical applicability on site and evaluate with project partners social and environmental impact of overall process. ENVIRAL had intensive discussions and cooperation with end-users and has participated on exploitation strategy of project. ENVIRAL has proudly supported articles writing and publication with CREA.

CELABOR worked in collaboration with Sapienza engineers in order to offer ENVIRAL a full design of the pilot plant. All steps of the process were discussed, and way of improvement were defined. In this purpose, CELABOR made a full pilot batch with 60L extraction tank from grinding of the RSM to final purification of the protein fraction by membrane filtration. At the end of the process, very pure proteins (up to 90% protein content) were produced and all the fractions of the process were given to CREA for full characterisation and sample comparison with previous batches. A new pilot batch has been scheduled in collaboration with Sapienza to gather all the missing data for the final design of the plant.

CREA LED THE PUBLICATION OF TWO SCIENTIFIC PAPERS ABOUT THE CHEMICAL PROFILE OF SIDE-STREAMS AND OBTAINED PRODUCTS WITH COMPLETE CONTENT ANALYSES OF TARGET MOLECULES

During this phase of upscaling/validation of rapeseed meal and corn oil valorization processes, CREA has worked in close collaboration with partners in order to provide the chemical profile of obtained products and their content in target molecules.

Chemical analyses on purified rapeseed meal fractions obtained at CELABOR laboratories during process upscaling, indicated a very high purification of proteins and polyphenols. Chromatographic analyses conducted on corn oil fractions indicated that a high concentration and purity of targeted bioactives (carotenoids, plant sterols and phenolic acids) was reached.

Results on chemical characterization of feedstocks have been published in the following papers:

- [Towards a Valorization of Corn Bioethanol Side Streams: Chemical Characterization of Post Fermentation Corn Oil and Thin Stillage;](#)
- [Corn Bioethanol Side Streams: A Potential Sustainable Source of Fat-Soluble Bioactive Molecules for High-Value Applications.](#)

DIFFERENT ENZYMATIC TREATMENTS FOR AN IMPROVED SOLUBILITY AND SENSORY QUALITY OF THE EXTRACTED PROTEINS

During the last year, ICECHIM activities were focused on improving the solubility and sensory quality of the proteins extracted from rapeseed meal by using different enzymatic treatments. The possibility to further improve the protein extraction technology to increase yields and product quality has been also investigated.

During protein extraction from rapeseed meal, there are also other valuable products which could be separated, like polyphenols, among which sinapic acid was found in higher concentrations. The team is currently exploring the possibility to use sinapic acid as a natural sunscreen in cosmetic products, and nanoformulation by grafting sinapic acid on chitosan to increase its bioavailability for other possible applications (e.g. bone regeneration¹).

¹Kalimuthu Balagangadharan, Ritu Trivedi, Mariappanadar Vairamani, Nagarajan Selvamurugan, Sinapic acid-loaded chitosan nanoparticles in polycaprolactone electrospun fibers for bone regeneration in vitro and in vivo, Carbohydrate Polymers, Volume 216, 2019, Pages 1-16, ISSN 0144-8617, <https://doi.org/10.1016/j.carbpol.2019.04.002>.

POTENTIAL CLIENTS AND END-USERS ENGAGED: FROM THE COSMETICS AND THE FOOD PRODUCERS SOME REAL TEST OF UTILIZATION!

The message that **Dr. Lauranne** has been delivering to its clients and potential clients is the possibility of using cosmetic ingredients from sustainable sources thanks to the efforts of the consortium inside the EXCornsEED project.

Dr. Lauranne could offer an overview of this new products philosophy inside their flagship stores, which have been open from June 2020 to November 2020 inside the railway stations of: Rome Termini, Milano Centrale, Venezia Mestre.

Additionally, they started to disseminate more details of this new approach also on a B2B scenario by participating to the **BIO International Convention** which usually takes place in USA, but has been held virtually this year, hosted by the Biotechnology Innovation Organization, which has been welcoming over 5500 scientific and industrial participants. This event took place from June 14th to June 18th, 2021.

In the same days, the sustainable ingredients topic has been introduced to clients and visitors of our virtual page inside the **Cosmoprof 2021 digital event** which took place from June 7th to June 18th 2021, attracting beauty professionals from all over the world.

Next planned event is the Life Sciences Baltics virtual convention, going to be held from 20th to 24th September 2021.

In the meantime, **BIOZOOM**, as crucial end user, carried out collaborative work with pilot protein production partners in consideration of evaluating the different protein samples. Food formulation and application opportunities, containing EXCornsEED proteins, have been determined and tested in terms of elderly nutrition. An evaluation of suitable methods and experimental design have been also considered. Results for sensory analysis as well as physical parameters such as: solubility, bulk density and moisture have been delivered.

The performance of EXCornsEED protein samples have been also examined as formulation ingredient within BIOZOOM's texturizing systems, such as thickeners and gelling agents.

GOAL AND SCOPE PHASE OF THE LIFE CYCLE ASSESSMENT

During this third year of the project, a comprehensive definition of the Life cycle Assessment Goal and Scope has been carried out by **TECNALIA** according to the European standard of reference EN 16760 Bio-based products - Life Cycle Assessment. This Goal and Scope phase defines essential aspects to be taken into account during the life cycle impact assessment of EXCornsEED technologies at different levels: the intermediate level (35kg/run); the scaled-up pilot plant which is being developed (1 ton/day); and a theoretical commercial plant of approximately 30-35 ton/day. Some of these key aspects that have been exhaustively defined are functional unit, system boundaries, definition of the initial data quality requirements, selection of impact categories and respective methods for impact quantification.

During this period TECNALIA has also performed some process' modelling for LCA, such as identification of available datasets and specific process modelling for those datasets not available on commercial LCI databases like ecoinvent. Next steps of the LCA will be to gather data for life cycle inventory of each of the defined scenarios and to do the life cycle impact assessment using dedicated software, so the environmental impact of different technologies and processes developed by industrial partners of the consortium can be evaluated helping decision-making and allowing to compare EXCornsEED processes with traditional production ways of proteins and bio-active compounds.

RESULTS ACHIEVED, RESULTS DISSEMINATED!

Innovation Engineering, as leader of the Dissemination & Communication task, is putting a lot of effort into the promotion of the EXCornsEED results and progresses. Every achievement reached by the consortium is properly promoted using the project channels, as its website and LinkedIn and Twitter accounts, which are continuously update with news and press releases.

More recently, Innovation Engineering, with the precious collaboration of the whole consortium, has realized the EXCornsEED **video**, which shortly explains the project, its impact and all the progresses achieved so far and it was disseminated through its own channels, each partners' networks and the **BBI** and the **BIC** official channels.

In the meantime, **CTA** is also working hard to present EXCornsEED results. CTA has joined the **International Congress of Circular Bioeconomy** (March 2021) and the **International Conference for Bioresource Technology** (May 2021), during which provided interesting updates on the latest progresses made within the project. Moreover, Marta Macías was **interviewed** to highlight the CTA contribution to the creation of a circular bioeconomy in Europe and its role in EXCornsEED.

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.

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