



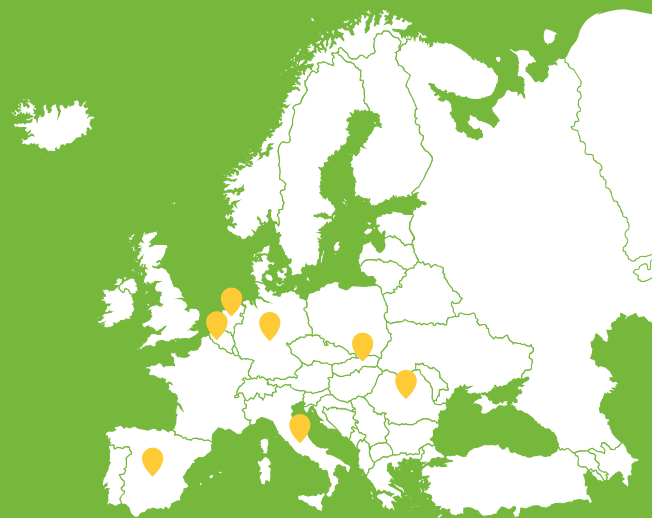
Enjoy reading  
the EXCornsEED  
newsletter!

## FOCUS ON RESEARCH ORGANIZATIONS

The sixth issue of the EXCornsEED newsletter deals with the research organizations involved in the project and their main activities performed in order to achieve the initiative's scope.

The newsletter, written in cooperation with the research organizations of the consortium, will highlight the main results achieved so far in the frame of their activities.

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# SAPIENZA – UNIVERSITÀ DI ROMA

Several technologies have been developed and tested by the project in its 30 months of implementation aimed at: partial digestion of purified proteins to obtain peptides endowed with possible biological activities of interest in the field of skin care; optimization of the extraction process of the protein from rapeseed meal for the food sector; fractionation of Corn Oil through the SPE technique with obtaining fractions enriched in Sterols and Carotenoids; synthesis of lipo-amino acids through the amidation reaction with lactones and anhydrides. All of those technologies have been scaled in laboratory at different levels and will be demonstrated in the next project months.

## ICECHIM

The activities performed during year 2020 lead to the achievement of WP3 objectives, for the corresponding timeframe period. The purified bioactive ingredients and concentrated / dry extracts were characterized. The results demonstrated an enhanced bioactivity and an improved functionality after purification for the target bioactive compounds / mixtures, respectively: (i) polyphenols / phenolic acid mixtures (as active ingredients for cosmetics) from rapeseed meal; (ii) fatty acids and non-saponifiable lipids from corn oil and (iii) proteins from thin stillage and rapeseed meal, as food supplements and source for production of (bioactive) peptides.

To improve sensory quality of rapeseed meal proteins hydrolysate, plastein formation was tested and proven to reduce the bitterness of the rapeseed meal protein hydrolysate. Optimization was done for plastein formation, to preserve the anti-hypertensive activity of the protein hydrolysate. Debittering was achieved also by deamidation, reaction which converts glutamine residues into umami promoting glutamate residues.

## CELABOR

The lab-scale protein extraction and purification process developed and designed by CELABOR starting from rapeseed meal produced by ENVIRAL was successfully upscaled to a 350 L extraction per batch, allowing the production of a relatively large quantity of highly pure proteins (84% to 91%). Thus, 2.6 kg of final pure proteins were extracted from 35 kg of rapeseed meal and delivered to partners, ENVIRAL, BIOZOON, CREA, and NUTRICIA, involved in the product characterization, validation, and formulation developments. CELABOR is currently planning the next pilot-scale production, based on the feedback of the partners and characterization results. Improvements of the operation units of the process are under investigation for maximizing the yield and maintaining the good protein purity.

Regarding the techno-economic analysis and considering the final aspect and targeted applications of the final protein isolates, various post-treatment processes are currently under evaluation, e.g., spray-drying, freeze-drying. Spray-drying is a way much cheaper drying technique compared to freeze drying, CELABOR is managing to optimize the spray-drying parameters at pilot-scale to produce high quality protein isolate with well-preserved functional and nutritional properties.

## FUNDACION TECNALIA RESEARCH & INNOVATION

TECNALIA, the leading private and independent RTO in Spain and one of the largest in Europe, is in charge of carrying out the environmental evaluation of EXCornSEED technologies. This is done applying the life cycle assessment (LCA) methodology under the standards ISO 14040/14044 and EN 16760. TECNALIA has carried out a preliminary LCA to compare the impact of the different processes developed so far by project partners for the extraction of proteins and bioactive compounds. The aim of this work was helping decision making on the selection of the technology to be upscaled on the pilot plant and identifying environmental "hotspots". Different impact categories were analysed such as global warming potential and photochemical oxidation potential among others. Upscaled LCA will be carried out in the next project periods allowing to compare EXCornSEED with traditional production ways of proteins and bio-active compounds.

## DANONE NUTRICIA

Nutricia Research evaluated the rapeseed protein that was isolated and chemically characterized by partners in the consortium for application in a plant-based young child formula. The composition of the rapeseed protein was matching most criteria to fit to the product application. Following this assessment, the technological properties of the ingredient were evaluated. This showed that the ingredient did not yet meet the requirements in terms of solubility, colour and process stability. Further improvements are needed to make use of the ingredient for this type of applications.

# CREA

CREA has worked in tight connection with partners CEL and SAP to analyze the chemical profile of the fractions obtained during corn oil and rapeseed meal processing. The fatty acid profile and the contents of tocopherols, tocotrienols, phytosterols, squalene, carotenoids and phenolic acids in corn oil fractions obtained through different procedures have been determined by GC-MS-FID, HPLC-DAD and LC-MS/MS. Results evidenced good levels of purification/concentration for carotenoids, phytosterols and phenolic acids. As regards rapeseed meal, fractions obtained by Celabor during process up-scaling, have been analysed for chemical composition. The total protein, lipid, ash, nonprotein nitrogen and total dietary fibre contents of RSM fractions and extraction residues and their mineral and phenolic acid profiles are being detailed up to the pilot-scale. Results will give useful indications for plant design and for next exploitation of products by end-users. Results obtained during WP1 (Chemical characterization of side streams) have been published in the following articles:

Di Lena, G.; Ondrejčková, P.; Pulgar, J.S.; Cyprichová, V.; Ježovič, T.; Lucarini, M.; Lombardi Boccia, G.; Ferrari Nicoli, S.; Gabrielli, P.; Aguzzi, A.; Casini, I.; Caproni, R. Towards a Valorization of Corn Bioethanol Side Streams: Chemical Characterization of Post Fermentation Corn Oil and Thin Stillage. *Molecules* 2020, 25, 3549. DOI: 10.3390/molecules25153549

Di Lena, G.; Sanchez del Pulgar, J.; Lombardi Boccia, G.; Casini, I.; Ferrari Nicoli, S. Corn Bioethanol Side Streams: A Potential Sustainable Source of Fat-Soluble Bioactive Molecules for High-Value Applications. *Foods* 2020, 9, 1788. DOI: 10.3390/foods9121788



## 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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