

## Technological challenges in oilseed crushing and refining<sup>☆</sup>

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World Health Day in April 2015 focused on food safety under the slogan “*From farm to plate, make food safe*” in order to draw global attention to the importance of food safety and its quality as a major challenge for the century.

For more than 150 years the world has been on an unwavering mission to sustainably nourish a global population. And now as the global population will grow from 7 billion today to more than 9 billion people by 2050, the consumer values shift and climate change is real, the food processing and agriculture systems must evolve, being this is one of the biggest challenges for the oilseed processing industry: keep the food supply while diminishing wastes and contributing to the GHG reduction (Carre, 2021a).

Innovation in all its forms – technology, digitalization and applications – provides the means to address some of the challenges of the global food system: whether it's achieving zero hunger, delivering on consumer preferences, creating safer workplaces, offering transparency in our food system, replacing fossil compounds or improving farming technology.

Innovation is not a matter of a single company, universities or technological platforms. That is why the dossier included here shows different approaches for technologies improvements that would help the oilseeds processing sector to evolve.

Safety of edible oils but also edible proteins is a major challenge in the century and one that must be tackled for the protection of human health but also to assure the protein and fat autonomy of the territories and this has an important role in the trade and countries economy (Broudiscou *et al.*, 2020). The challenge is how to get the oil fraction from the oilseeds but preserving the proteins quality in a more efficient way and eliminating the undesirable compounds with sustainable processing methods (Carre, 2021b).

An important challenge for the oil extraction process is the use (or not) of a solvent taking care of the economic, health and environmental issues. The well-known hexane extraction processing could be replaced by alternative and greener solvents or using specific surfactants, alternatives described in the articles included in the “dossier” (Chaabani *et al.*, 2019; Demarco and Gibon, 2020; Gharby *et al.*, 2020; Gagnon *et al.*, 2021).

But the scientific approach of the behavior of the oilseeds in the expellers (Bogaert *et al.*, 2020) and in general in the whole process of oilseeds processing is an important step forward to be able to understand and optimize the oilseeds processing, and then reducing the energy or solvent utilization keeping the proteins and oils quality intact.

The society is now looking much more on the naturality of the food and in this aspect the oils purification/refinery which allow to eliminate the undesirable compounds needs to find new ways to do it, by “inventing” the soft refinery either by enzymatic actions, bio sourced solvents or mechanical process (Bou Orm *et al.*, 2020).

The challenges also imply the need to develop a system for the recovery of the co-products, effluent and waste from the agribusiness sector, by converting them into chemical molecules used to create new materials and products. (Laguna *et al.*, 2020)

By creating a model in which the biodegradable organic carbon can be reused to produce materials is the challenge for our industry who then will be able to release on the market new chemical products derived from the recovery of products from the agricultural sectors for industrial and pharmaceutical applications, adding value to the oilseeds processing industry.

Finally, we should not forget the environment impact of the agriculture (like all industries) itself. Studies show that agriculture accounts for nearly 15% of global greenhouse gas emissions, while being at risk from rapid changes in climate. Agriculture can meet the rising demand for food, as farmers are resilient entrepreneurs who are increasingly doing more with less.

A partnership with farmers by investments in innovation and training will give farmers the tools they need to increase productivity and meet tomorrow's food demand: better technology, better seeds, more scale and mechanization without significantly expanding land use, and combining it with the technology innovation on the oilseed processing the challenge of tomorrow's food demand could be satisfy.

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