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Background:

INTRINSIC is a 5-year project (started in 2022) with industrial partners (Champlor, Riverina, FOSS, Danone, Cano-Ela) and Wageningen Research, that aims to improve the valorisation of rapeseed protein products from feed to food applications by the development of novel processing routes and matching products with specific food application requirements.

Oilseed residues are the single largest global source of protein losses in the supply chain. Achieving a total-use case for these materials has a huge potential impact. While technology exists to extract protein from many oilseed residues, adoption in existing, full-scale plants is limited by difficulties in separating components, the need for capital expenditures and high energy costs of extraction. Novel mild aqueous extraction technology is currently under development and seems initially promising, but requires substantial further research to deliver proteins with sufficient market value to sustain the business case. In general, oilseed crops suffer from a knowledge gap in the interaction between processing and protein food functionality.

Objective:

This research project aims to develop process technology that allows profitable production of oil and functional proteins from rapeseed and to implement this technology. Two separate routes are developed in this project: protein production from current side-streams from industry, and novel aqueous extraction of oil and protein. The assessment of the protein functional properties and linking these properties to food product applications is a crucial step in this project.

Methods:

The production of functional protein from current side streams from industry will be based on aqueous extraction using a pH swing method combined with ultrafiltration techniques. The products are a napin and a cruciferin enriched product that each have a specific functionality, leading to different applications in food products.

The aqueous processing of rapeseed to oil, protein and fibre products will be developed, based on a minimal processing concept, leading to more native and less pure ingredients that can be used in specific food products, such as meat replacers. The process is based on solubilization and mild centrifugal separation, followed by membrane filtration steps. In order to monitor product purity, a novel analytical tool is being developed based on NIR.

Results:

The project provides the oilseed traders and crushers with practical guidelines to upgrade their existing full-scale, solvent-based process to co-extract oil and functional protein using specific, targeted, process adjustment with low capital expenditures. The wider focus of producing oil AND functional protein is largely new to the large-scale crushers. Simultaneously, a novel mild and minimal process concept that supplies oil, functional protein, and fibre fractions using an aqueous process is developed. Production of minimally processed functional ingredients, rather than intensively purified ingredients, is not new but large-scale implementation goes slowly due to the knowledge gap in the interaction between processing and protein food-functionality.

Outlook:

In the coming period, protein samples will be produced from side streams from industry. These samples will be used for an extensive assessment of the functional properties in food products.