



PhD Opportunity: Join the M2ProLIV Project

PhD Title: Study of the key parameters and mechanisms governing the oxidative stability of food emulsions formulated with protein fractions from oilseed co-products.

Context: This PhD opportunity is part of the ANR M2ProLIV project "Towards mildly-processed and multifunctional protein-based ingredients of vegetable co-products rich in healthy lipids", launched in 2024. The project aims to develop multifunctional protein extracts from secondary streams of oilseed pressing industries (e.g., hemp, walnut) and microalgae lipid production, where residual cakes remain underutilized. The research contributes to the broader goal of plant-based diet transition, promoting sustainable food systems and reducing the environmental impact of animal protein production. The originality and challenges of this project lie in the choice to valorize co-products from sources rich in polyunsaturated fatty acids, which are therefore potentially highly prone to oxidation. The initial oxidation state of the available oilseed cakes, as well as oxidative degradation during the various processes implemented by the M2ProLIV project partners to obtain protein fractions, will represent significant risks. To mitigate these risks, our working hypothesis is that these co-products could benefit from the natural antioxidants present in these raw materials, which may exert their beneficial effects throughout the technological process of ingredient production, up to the final food matrices.

PhD Objectives:

Evaluate the physical and oxidative stability of protein-based ingredients in model oil-in-water emulsion systems.

Investigate the impact of protein ingredient quality on physical and oxidative stability, with a focus on lipid oxidation.

Assess the stability of food products (e.g., plant-based drinks, vegan mayonnaise, or low-moisture foods) formulated with selected protein-based ingredients to identify the most effective.

Explore the connections between food structure, ingredient composition, and oxidative stability to better understand the mechanisms at play.

Key Responsibilities:

Design and conduct experiments to characterize plant protein fractions.

Analyze the impact of protein ingredients on food matrix stability, especially regarding the lipid oxidation.

Use advanced analytical techniques (e.g., spectroscopy, microscopy) to assess oxidation and structural changes.

Collaborate with academic and industrial partners.

Present findings at scientific conferences and publish in peer-reviewed journals.

Participate actively in project meetings and workshops.

Desired Qualifications:

Master's degree or engineering diploma in food science, chemistry, or physical chemistry.

Interest in multi-scale research using coupled techniques.

Knowledge of dispersed systems or emulsion-based food systems is a plus.

Strong organizational and experimental planning skills.

Proficiency in scientific English (oral and written).

Rigor, autonomy, and teamwork capabilities.

Work Environment:

You will be based at CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement) in Montpellier, France, within the Qualisud research unit. CIRAD is an academic institute in agronomic research, addressing sustainable development challenges through collaborative and interdisciplinary approaches.

Application Details:

Motivated candidates are invited to submit their applications by **April 30th, 2025**. The anticipated start date is **October 1st, 2025**.

Applications should include, either in English or French: A detailed CV. A cover letter outlining research interests and relevant experience.

Send applications to: Erwann Durand (erwann.durand@cirad.fr) and Pierre Villeneuve (pierre.villeneuve@cirad.fr). **Please indicate** "PhD2025_" followed by your name" in the subject line of the email.

Learn More:

<https://www.m2proliv.org>

<https://www.linkedin.com/company/m2proliv-anr-france-2030>

<https://umr-qualisud.cirad.fr/1-umr-qualisud>