IMPLANTEUS
SUSTAINABLE MEDITERRANEAN AGRICULTURE FOR HEALTH | GRADUATE SCHOOL

IMAS MASTER Academic Year 2025 - 2026

Proposal of M2 Internship

PROJECT TITLE AND SUMMARY:

Title: Extraction and valorization of globe artichoke biowastes

Summary: The global production of globe artichokes (*Cynara Scolymus L.*) amounts to 1.6 million tons per year. The EU contributes to 40% of this volume, with production concentrated in the Mediterranean countries. Agri-food industry produces millions of tons of waste/year, for instance, 80-85% of the total plant biomass of artichoke industrial processing are non-edible biowastes and therefore are discarded. However, globe artichoke biowastes (bracts, leaves, stems, roots) are highly rich in fatty acids, phenolic compounds, fibers, and fructooligosaccharides such as inulin [1] that can be extracted, transformed using various eco-responsible techniques, and valorized in many industrial sectors including detergents, cosmetics, pharmaceuticals, food additives, biomaterials and water treatment. Additionally, such molecules are often difficult and/or expensive to produce *de novo*. [2-3]

The aim of this project is to explore the valorization of domestically consumed artichoke biowastes using eco-friendly extraction (green solvents, unconventional techniques such as ultra-sounds assistance). A “biorefinery approach” will be adopted in order to separate two highly valued compounds: *(i)* phenolic compounds, and *(ii)* inulin. The collected fractions will be fully characterized by chromatography (HPTLC, HPLC, SEC) and spectrometry techniques (NMR, FTIR), and evaluated for their bioactivity. Then isolated inulin will be hydrophobized with natural hydrophobic terpene moieties.

This project is in line with the UN 2030 Agenda for Sustainable Development Goals (SDG12) as well as public policies and regulations such as France's Anti-Waste Law for a Circular Economy (AGEC) and aim to limit waste and preserve natural resources.

HOST UNIT: UPRI, Equipe Synthèse et Systèmes Colloïdaux Bioorganiques

Location :

Catholic University of Lyon « Biosciences, technologies, éthique », UR Confluence, Sciences & Humanités (EA1598),

and

UPRI, Equipe Synthèse et Systèmes Colloïdaux Bioorganiques.

The balance between the two locations will be discussed with the student and adjusted based on the results obtained; it is expected to be roughly two-thirds in Lyon and one-third in Avignon.

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MAIN ACTIVITIES:

- Eco-Extraction: conventional (green solvent) and ultra-sounds assisted non-conventional techniques.
- Separation of two main fractions of extractables: inulin and phenolic compounds.
- Characterization of different fractions by chromatography: HP-TLC and HPLC.
- Structural characterization: ^{1}H NMR, FTIR, SEC.
- Functionalization of inulin fractions with terpene moieties.

EXPECTED SKILLS:

- Analytical mindset, autonomy, and rigor.
- Good laboratory practices
- Structural analysis techniques (spectrophotometry, chromatography)
- Eco-extraction methods
- Knowledge of biological evaluation of natural products is a plus

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Duration: 6months
Dates: February 1st, 2026 until July 17, 2026
Level: Master 2
Internship profile: Research