2023 Master internship at University of Cadiz

TITLE

Analytical tools in viticulture, agri-food and forensic chemistry

LAB & PEOPLE

- Name of the hosting lab: AGR291
- General activities of the lab:
    - Development and application of separation and spectroscopic methods of interest in wine, food and forensic chemistry
    - Automation of sample preparation and interpretation of analytical results
    - New methods for characterization and detection of food fraud
    - Advanced methods for determining food components of interest and materials used in their production and preservation
    - Use of waste and by-products from the agri-food industry
    - Evaluation of new techniques for the preparation of alcoholic beverages
    - Quality in analytical laboratories
    - Machine learning techniques in analytical sciences

- Website: agr291.uca.es
- Number of staff / PhD: 9/8
- Supervisor name and contact: Ceferino Carrera Fernández (ceferino.carrera@uca.es)

TOPIC OF THE INTERNSHIP

- Scientific context of the internship (max 20 lines)

    We offer internship positions related to the following research lines:

    - Functional Foods

The student will be involved in the research and development of extraction techniques for natural products and compounds exhibiting significant antioxidant activity found in fruits, plants, and mushrooms, with a particular emphasis on their application in functional foods.

The student will have the opportunity to explore various extraction techniques, including ultrasound-assisted extraction, microwave-assisted extraction, pressurized liquid extraction, and enzymatic extraction.

Additionally, the student will be responsible for devising methodologies to identify the specific compounds of interest using ultra-high performance liquid chromatography coupled with mass spectrometry (UHPLC-MS). Furthermore, they will analyze these compounds using ultra-high performance liquid chromatography coupled with diode array detection (UHPLC-DAD).

This analysis will provide further insights into the chemical composition of the functional foods and help assess their suitability for incorporating into products with enhanced health benefits.

By combining the extraction techniques and advanced analytical methods, the student will contribute to the development of functional foods that harness the antioxidant potential of natural products, paving the way for healthier and more nutritious dietary options.

Keywords

Analytical chemistry, food characterization, fruits, plants, mushrooms, extraction techniques, chromatographic analysis.

Bibliography

My full scientific production can be found at :
https://produccioncientifica.uca.es/investigadores/112275/publicaciones

My most recent 20 papers are the following ones :

2023

Application of Direct Thermal Desorption–Gas Chromatography–Mass Spectrometry for Determination of Volatile and Semi-Volatile Organosulfur Compounds in Onions: A Novel Analytical Approach.
Journal: Pharmaceuticals, 2023, 16 (5), Article ID: 715.
DOI: 10.3390/ph16050715

Optimization of a Microwave-Assisted Extraction Method for the Recovery of the Anthocyanins from Jabuticaba By-Products.
Journal: Agronomy, 2023, 13 (02), Article ID: 556.
DOI: 10.3390/agronomy13020556

Optimization of a New Ultrasound-Assisted Extraction Method of Caffeic Acid from the Aerial Parts of Coriandrum sativum by Using Experimental Design and Ultra-Performance Liquid Chromatography
Journal: Separations, 2023, 10 (02), Article ID:106.
DOI: 10.3390/separations10020106

2022

Optimization of a Microwave Assisted Extraction Method for Maximum Flavonols and Antioxidant Activity of Onion Extracts.
Journal: Antioxidants, 2022, 11 (12), Article ID: 2393.
DOI: 10.3390/antiox11122393

Ultrasound-Assisted Extraction of Betalains from *Opuntia* Fruit Pulp of Different Color Varieties.
Journal: Agronomy, 2022, 12 (11), Article ID: 02604.
DOI: 10.3390/agronomy12112604

Optimization of an Enzyme-Assisted Extraction Method for the Anthocyanins Present in Açai (*Euterpe oleracea* Mart.).
Journal: Agronomy, 2022, 12 (10), Article ID: 02327.
DOI: 10.3390/agronomy12102327

Ultrasound-Assisted Extraction of Total Phenolic Compounds and Antioxidant Activity in Mushrooms.
Journal: Agronomy, 2022, 12 (08), Article ID: 01812.
DOI: 10.3390/agronomy12081812

Extraction of Antioxidant Compounds from Onion Bulb (*Allium cepa* L.) Using Individual and Simultaneous Microwave-Assisted Extraction Methods.
Journal: Antioxidants, 2022, 11 (5), Article ID: 846.
DOI: 10.3390/antiox11050846

A comparison study between ultrasound–assisted and enzyme–assisted extraction of anthocyanins from blackcurrant (*Ribes nigrum* L.).
Journal: Food Chemistry: X, 2022, 13, 100192.
DOI: 10.1016/j.fochx.2021.100192

An ultrasound-based technique for the analytical extraction of phenolic compounds in red algae.
Journal Arabian Journal of Chemistry, 2022, 15, 103597.
DOI: 10.1016/j.arabjc.2021.103597

A microwave-based extraction method for the determination of sugar and polyols: Application to the characterization of regular and peaberry coffees.
Journal Arabian Journal of Chemistry, 2022, 15, 103660.
DOI: 10.1016/j.arabjc.2021.103660

2021

Uv-vis spectrophotometry and uplc–pda combined with multivariate calibration for kappaphycus alvarezii (Doty) doty ex silva standardization based on phenolic compounds.
Journal: Scientia Pharmaceutica, 2021, 89 (4), Article ID: 47.
DOI: 10.3390/scipharm89040047

Optimization of an ultrasound-assisted extraction method for the analysis of major anthocyanin content in erica australis flowers
Journal: Molecules, 2021, 26 (10), Article ID: 2884.
DOI: 10.3390/molecules26102884

Optimization by means of chemometric tools of an ultrasound-assisted method for the extraction of betacyanins from red dragon fruit (Hylocereus polyrhizus)
Journal: Agronomy, 2021, 11 (6), Article ID: 1053.
DOI: 10.3390/agronomy11061053

How different cooking methods affect the phenolic composition of sweet potato for human consumption (Ipomea batata (l.) lam).
Journal: Agronomy, 2021, 11 (8), Article ID: 1636.

DOI: 10.3390/agronomy 11081636

Flavonol composition and antioxidant activity of onions (Allium cepa l.) based on the development of new analytical ultrasound-assisted extraction methods
Journal: Antioxidants, 2021, 10 (2), Article ID: 273.
DOI: 10.3390/antiox10020273

Development of optimized ultrasound-assisted extraction methods for the recovery of total phenolic compounds and anthocyanins from onion bulbs
Journal: Antioxidants, 2021, 10 (9), Article ID: 1375.
DOI: 10.3390/antiox10091375

A novel ultrasound-assisted extraction method for the analysis of anthocyanins in potatoes (Solanum tuberosum l.)
Journal: Antioxidants, 2021, 10 (11), Article ID: 1755.
DOI: 10.3390/antiox10111755

Development of a rapid UHPLC-PDA method for the simultaneous quantification of flavonol contents in onions (Allium cepa L.)
Journal: Pharmaceuticals, 2021, 14 (4), Article ID: 310.
DOI: 10.3390/ ph14040310

A microwave-based technique to determine saccharides and polyols contents in Spirulina (Arthrospira platensis)
Journal: Arabian Journal of Chemistry, 2021, 14 (4), Article ID: 103094.
DOI: 10.1016/j.arabjc.2021.103094

- Tasks and duties entrusted to the student:

1. To prepare a research proposal based on the literature provided by the supervisor (1-2 weeks)
2. To run a training period in the lab (2-3 weeks) with the supervisor and the technicians
3. To develop the research proposal (2-6 months)
4. To prepare 3 reports :
    a. Initial report including the research proposal
    b. Intermediate report including information about the training period and the starting results from the training period
    c. Final report including
        i. All data obtained from the intership period
        ii. Critical evaluation of the data, including the data analysis
        iii. A draft of a manuscript to be evaluated by the supervisor. In case the results are excellent it will be proposed to be prepared for a scientific publication

- Skills to be acquired or developed:

- Experience in research duties
- Training in specific analytical procedures
- Training in data analysis

PROFILE OF THE DESIRED STUDENT

- Minimum level of study required: Running a master degree

- Field(s) of study: chemistry, food or environmental studies

- Scientific skills : basic experience in labs

- Language skills required : English

THE INTERNSHIP ASSIGNMENT:

Desired duration of the internship (in months): **3 months**

Desired Starting date of the mission: Any time between *February to March 2024 to be finished by July 2024*

Indicative weekly schedule: *25h / week*

Remuneration *? No*

Erasmus grant ?

Internship agreement: *an internship agreement will be signed.*

To SEA-EU students:

If you're interested please send your CV and letter of motivation to the scientist in charge, ceferino.carrera@uca.es before the date 31/09/2023.