



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: Estrella Espada Bellido (estrella.espada@uca.es) / +34956016355

TOPIC OF THE INTERNSHIP

- Scientific context of the internship (max 20 lines)
- **Determination of metal content in food: Evaluation of health risks and benefits**

We offer an internship position related to the following research lines:

- Food quality of essential and toxic metals in fruits, vegetables and/or mushrooms.
- Spectroscopic analytical methods.

The internship will apply a typical learning through an analytical research scheme, engaging the student directly in the research activities. The work will involve the study of the concentrations of essential and toxic elements (Fe, Cu, Zn, P, Cr, As, Cd, Hg and/or Pb) in fruits, vegetables and/or mushrooms of gastronomic interest in various geographic locations in the south of Spain. The determinations will be performed using flame atomic absorption spectroscopy (FAAS), inductively coupled plasma optical emission spectroscopy (ICP-OES) and/or inductively coupled

plasma mass spectrometry (ICP-MS) depending on the range of concentrations of the samples. Firstly, the samples will be digested in a closed vessel with acids. The validation of the method will be carried out using appropriate certified reference materials. The results will be used to assess the risks and benefits of fruits, vegetables and/or mushrooms consumption; chemometric tools will be applied to evaluate the possible correlations between the samples.

Keywords

Analytical chemistry, food control, metal determination, spectroscopic analysis.

Bibliography

My full scientific production can be found at :

<https://produccioncientifica.uca.es/investigadores/112459/publicaciones>

My most recent 20 papers are the following ones :

2023

The effect of ripening on the capsaicinoids composition of Jeromin pepper (*Capsicum annuum* L.) at two different stages of plant maturity

Food Chemistry, Vol. 399

2022

Ultrasound-Assisted Extraction of Total Phenolic Compounds and Antioxidant Activity in Mushrooms

Agronomy, Vol. 12, Núm. 8

Toxic elements and trace elements in *Macrolepiota procera* mushrooms from southern Spain and northern Morocco

Journal of Food Composition and Analysis, Vol. 108

Optimization of a Microwave Assisted Extraction Method for Maximum Flavonols and Antioxidant Activity of Onion Extracts

Antioxidants, Vol. 11, Núm. 12

Extraction of Antioxidant Compounds from Onion Bulb (*Allium cepa* L.) Using Individual and Simultaneous Microwave-Assisted Extraction Methods

Antioxidants, Vol. 11, Núm. 5

Exposure to Essential and Toxic Elements via Consumption of Agaricaceae, Amanitaceae, Boletaceae, and Russulaceae Mushrooms from Southern Spain and Northern Morocco

Journal of Fungi, Vol. 8, Núm. 5

Essential Mineral Content (Fe, Mg, P, Mn, K, Ca, and Na) in Five Wild Edible Species of *Lactarius* Mushrooms from Southern Spain and Northern Morocco: Reference to Daily Intake

Journal of Fungi, Vol. 8, Núm. 12

An electrochemical alternative for evaluating the antioxidant capacity in walnut kernel extracts

Food Chemistry, Vol. 393

2021

Simultaneous determination by UHPLC-PDA of major capsaicinoids and capsinoids contents in peppers
Food Chemistry, Vol. 356

Metal concentrations in Lactarius mushroom species collected from Southern Spain and Northern Morocco: Evaluation of health risks and benefits
Journal of Food Composition and Analysis, Vol. 99

Flavonol composition and antioxidant activity of onions (*Allium cepa* L.) based on the development of new analytical ultrasound-assisted extraction methods
Antioxidants, Vol. 10, Núm. 2, pp. 1-22

Development of optimized ultrasound-assisted extraction methods for the recovery of total phenolic compounds and anthocyanins from onion bulbs
Antioxidants, Vol. 10, Núm. 11

Development of a rapid and accurate UHPLC-PDA-FL method for the quantification of phenolic compounds in grapes
Food Chemistry, Vol. 334

Development of a rapid UHPLC-PDA method for the simultaneous quantification of flavonol contents in onions (*Allium cepa* L.)
Pharmaceuticals, Vol. 14, Núm. 4

2020

Content of capsaicinoids and capsiate in "filius" pepper varieties as affected by ripening
Plants, Vol. 9, Núm. 9, pp. 1-16

Changes in capsiate content in four chili pepper genotypes (*capsicum* spp.) at different ripening stages
Agronomy, Vol. 10, Núm. 9

2019

Optimizing and comparing ultrasound- And microwave-assisted extraction methods applied to the extraction of antioxidant capsinoids in peppers
Agronomy, Vol. 9, Núm. 10

Optimization of ultrasound-assisted extraction of bioactive compounds from jabuticaba (*Myrciaria cauliflora*) fruit through a box-behnken experimental design
Food Science and Technology, Vol. 39, Núm. 4, pp. 1018-1029

Extraction of Antioxidants from Blackberry (*Rubus ulmifolius* L.): Comparison between ultrasound- And microwave-assisted extraction techniques
Agronomy, Vol. 9, Núm. 11

Discrimination of myrtle ecotypes from different geographic areas according to their morphological characteristics and anthocyanins composition
Plants, Vol. 8, Núm. 9

- 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 internship 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,
estrella.espada@uca.es before the date 31/09/2023.*