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UnILiON BROKERAGE EVENT

10th December 2025, 10:00-13:00 CET

HORIZON EUROPE Cluster 6

Food, Bioeconomy, Natural Resources, Agriculture and Environment

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CLUSTER 6: FOOD, BIOECONOMY, NATURAL RESOURCES, AGRICULTURE AND ENVIRONMENT

Alfonso Ortega Garrido
University of Extremadura

UnILiON Brokerage Event under Horizon Europe Cluster 6 calls on Food, Bioeconomy, Natural Resources, Agriculture and Environment I 10th December 2025

UNIVERSITY OF EXTREMADURA (SPAIN)

It is the main public training and research institution in Extremadura (Spain) with **4 university campuses**. It has over **24,000 students** and **2,405 Researchers and Professors**.

According to **Shanghai's ranking**, it is **ranked 593th** amongst universities all over the world (Scimago Institutions Ranking, SIR 2022); and has been awarded

Campus of International Excellence since 2011

in association with two Portuguese universities

It's international well-position is shown in its **coordination of the European University Alliance EU GREEN**, participation in **international networks** such as UNILION, or its coordination and participation in projects within **Horizon Europe** or **Erasmus+**.

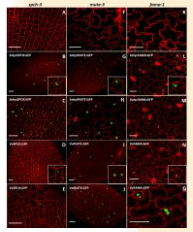
Department of Plant Biology, Ecology and Earth Sciences

Research Lines and Innovation Activities:

Assessment of the **phytoremediation potential of plant species** of agronomic interest in relation to **heavy metals**, **metalloids and other xenobiotic compounds**, as well as the identification of key plant components that enhance their remediation capacity.

Micropropagation for the maintenance of parental lines for **plant breeding purposes through organogenesis**, **somatic embryogenesis** and **shoot multiplication**.

Development of plant breeding programmes, **evaluation** of plant breeding **trials** for the **analysis** of **qualitative traits**, and the **search** for **sources** of **tolerance** to **biotic** and **abiotic stresses**.



Development of transgenic plant lines.

Topic of our interest:

HORIZON-CL6-2026-01-ZEROPOLLUTION-02: Bioremediation of Ukraine’s ecosystems contaminated by conflicts

Scope:

Recent wars are causing severe environmental degradation through extreme contamination of air, water, and soil, creating an urgent need to improve understanding of these conditions and to develop or adapt bioremediation strategies for ecosystem restoration.

Expected outcomes:

1. **Innovative biotechnology and Nature-based Solutions (NbS)**, such as **phytoremediation**, **must be developed** and made available to **key local stakeholders** (communities, land managers, administrators, and policymakers) **in Ukraine to advance biodiversity protection and zero-pollution ambitions**.
2. **The project should contribute to Ukraine's reconstruction, recovery, circularity, and environmental upgrading through the remediation** of severe conflict-induced ecosystem contamination and the subsequent **restoration of ecosystem services**.

Our contribution to this topic:

HORIZON-CL6-2026-01-ZEROPOLLUTION-02: Bioremediation of Ukraine's ecosystems contaminated by conflicts

Our research group has the **expertise to design strategies and conduct analyses to determine which crops would be most suitable for the remediation of the various affected soils prior to reforestation**, as well as to **assess the effects of the extraction, degradation, and/or accumulation of the different toxic compounds present in the environment on plant performance**. The following **activities are proposed**:

- **Field trials** in **mining areas within the region where the University of Extremadura** (UEx) is located, **affected** by **contamination with heavy metals**, **metalloids**, or **other harmful elements/compounds**, in order to **determine** which **plant species** would be **most suitable as phytoremediators**.
- **Evaluation of the physiological and biochemical effects of exposure to the different toxic compounds on plants**.

Topic of our interest:

HORIZON-CL6-2026-02-FARM2FORK-04: Accelerating the development of breeding tools for perennial crops, specifically fruits and nuts

Scope:

Woody perennial crops, such as fruit and nut species, are crucial for healthy diets, the global economy, biodiversity conservation, and climate change mitigation. However, **improving existing varieties of these crops in order to address challenges such as climate change, pests, and diseases is difficult because traditional breeding methods are slow and labour-intensive, owing to long generation times (juvenile phase) and genetic complexity**. The **aim** is to **enhance** the impact **and efficiency of perennial crop** breeding programmes through the **development of simple tools that can be effectively transferred to plant breeders**.

Expected outcomes:

1. **State-of-the-art**, **scalable and accessible tools and methods are available to accelerate the breeding of productive**, **qualitative**, **climate-smart and environment-friendly perennial crops**. This goal aims to enhance the competitiveness of the sector and foster biodiversity.

2. Researchers and breeders have access to innovative and **user-friendly breeding tools enabling faster improvement of sustainability traits**. These traits include pest and disease resistance, yield stability and quality, water use efficiency, and resistance to abiotic stresses.

Our contribution to this topic:

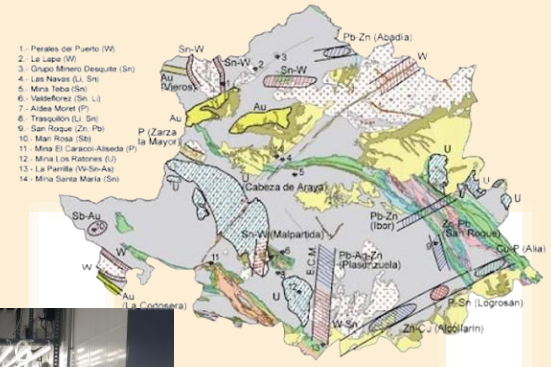
HORIZON-CL6-2026-02-FARM2FORK-04: Accelerating the development of breeding tools for perennial crops, specifically fruits and nuts

To **contribute** to the **development of innovative plant breeding tools and methodologies aimed at producing varieties with enhanced resilience to both abiotic and biotic stresses**:

- To apply **micropropagation** techniques for the **conservation** and **maintenance** of **elite parental lines**.
- To **identify** genetic **polymorphisms** in **key genes involved** in **plant physiological development** in order to enable the selection, within a species, of genotypes with superior environmental adaptation.

Our expertise

Our research group combines strong expertise in phytoremediation and plant breeding, with a **proven track record of high-impact publications and participation in competitively funded projects**. We have researched the **responses of agronomically relevant crops to abiotic** (**phytoremediation**) and **biotic stresses**, **identifying key molecular determinants** of **resilience** and **assessing** the **potential** of **elicitors** and **biostimulants** for **sustainable crop improvement**.



Esquema metalogenético. Provincia de Cáceres.

We perform experiments under both controlled conditions (**growth chambers** and **greenhouses**) and **open-field environments**, with **particular strength** in **phytoremediation through** the **testing** of **crops** on **soils contaminated with high levels** of **xenobiotic compounds**, **including heavy metals** and **metalloids**, **from abandoned mining areas** in **Extremadura**, where the University is located.

We **can evaluate different plant species through phenotypic**, **physiological**, **biochemical** and **molecular assessments** to **determine** their **responses to abiotic stress**, as well as **phenotype parental lines** and **hybrids** and **conduct molecular** and **bioinformatic analyses** to **identify intra-varietal polymorphisms** and **molecular markers**.

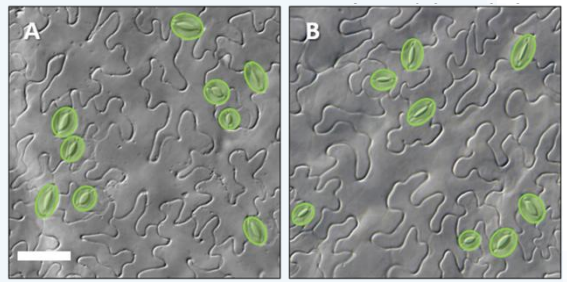
Our expertise - Publications

Topic	Title	Publication	Link
Phytoremediation	*Effects of antimony on redox activities and antioxidant defence systems in sunflower (Helianthus annuus L.) plants.*	Plos One	https://doi.org/10.1371/journal.pone.0183991
Phytoremediation	*Effect of antimony in soils of an Sb mine on the photosynthetic pigments and antioxidant system of Dittrichia viscosa leaves.*	Environ Geochem Health	https://doi.org/10.1007/s10653-020-00616-0
Phytoremediation	*Effects of Antimony on Reactive Oxygen and Nitrogen Species (ROS and RNS) and Antioxidant Mechanisms in Tomato Plants.*	Frontiers in Plant Science	https://doi.org/10.3389/fpls.2020.00674
Phytoremediation	*Response to Antimony Toxicity in Dittrichia viscosa Plants: ROS, NO, H_2S, and the Antioxidant System.*	Antioxidants	https://doi.org/10.3390/antiox10111698
Phytoremediation	*Effect of Thallium(I) on Growth, Nutrient Absorption, Photosynthetic Pigments, and Antioxidant Response of Dittrichia Plants.*	Antioxidants	https://doi.org/10.3390/antiox12030678
Phytoremediation	*Enzymes involved in antioxidant and detoxification processes present changes in the expression levels of their coding genes under the stress caused by the presence of antimony in tomato*	Plants	https://doi.org/10.3390/plants13050609
Breeding	*Overexpression of a SDD1-Like Gene From Wild Tomato Decreases Stomatal Density and Enhances Dehydration Avoidance in Arabidopsis and Cultivated Tomato*	Frontiers in Plant Science	https://doi.org/10.3389/fpls.2018.00940
Breeding	*YODA Kinase Controls a Novel Immune Pathway of Tomato Conferring Enhanced Disease Resistance to the Bacterium Pseudomonas syringae*	Frontiers in Plant Science	https://doi.org/10.3389/fpls.2020.584471
Breeding	*Physiological and Molecular Responses of Vitis vinifera cv. Tempranillo Affected by Esca Disease*	Antioxidants	https://doi.org/10.3390/antiox11091720
Breeding	*Current context of Cannabis sativa cultivation and parameters influencing its development*	Agriculture	https://doi.org/10.3390/agriculture15151635

Our expertise – Significant projects

EXCELENCIA & Proyectos projects by Ministerio de Economía y Competitividad, Government of Spain:

- *SCANNING: Stomata in models and crops: from genes and mechanisms that set their abundance to field phenotyping using non-invasive imaging* (AGL2015-65053-R).



Torres Quevedo Grand by Ministerio de Ciencia e Innovación, Government of Spain:

- *Development of pepper varieties more tolerant to abiotic factors (salinity) through the search and characterization of molecular elements that modulate stomatal abundance* (PTQ2019-010809).

Collaboration in activities in projects funded by the Regional Goverment, Junta de Extremadura:

- *Test-cann: Development of in situ tests for the early detection of synthesis enzymes and cannabinoids for the determination of chemotypes in Cannabis sativa crops.*

- *Cannabigen: Development of molecular techniques for the identification of strains and varieties of Cannabis sativa.*

- Methodological proposal for the diagnosis and phytoremediation of areas contaminated by PBZN in Extremadura following the abandonment of mining activities.

- Phytotechnology applied to combating oxidative stress and its effects on fruit species in a climate change context.

CONTACT DETAILS

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Research group: **Physiology and cellular and molecular biology of plants**

Research institute: **University Institute for Agricultural Resources Research (INURA)**