1 PhD position at the University of Milan within the programme

Horizon Europe (HORIZON)

Marie Skłodowska-Curie Actions

Doctoral Networks (DN)

“Eco2Wine”

“Natural microbial interactions in winemaking-associated ecosystems as a tool to foster wine innovation”

(HORIZON-MSCA-2022-DN-01, Project — 101119480 — Eco2Wine)

OPEN CALL: 17 October 2023 - 12 January 2024

The Eco2Wine project is designed to produce a new generation of PhD graduates equipped to manage winemaking-associated ecosystems effectively. These graduates will play a crucial role in safeguarding biodiversity, minimizing unsustainable interventions in natural environments, and enhancing the sustainability of wine production, including the production of "natural wine." Winemaking-associated ecosystems involve complex interactions among species and their abiotic surroundings. Direct manipulation of these ecosystems has become a focal point in wine science to promote sustainable and eco-friendly practices in response to consumer demands for diverse wine styles. Understanding the microbiota, ecological interactions, and molecular mechanisms within these ecosystems is vital for mapping and leveraging their natural biodiversity. The training program covers four key areas: wine ecology, wine innovation, wine business, and wine science communication. The consortium, comprising 9 beneficiaries and 12 associated partners with complementary expertise, aims to facilitate knowledge transfer among PhD students, the scientific community, and relevant social and economic stakeholders. The project's impact is anticipated to be significant in advancing wine research, benefiting winemakers, and engaging various stakeholders in the wine industry.

Offer Description

In the ever-evolving world of wine, where tradition meets innovation, the scope of wine science extends far beyond growing grapes and making wine. It reaches deep into sustainability, the ever-expanding wine trade, and the sensory enjoyment of wine. Therefore, wine science is about much more than the wine in your glass. It is also about the environment, economics, health and society.

Picture the new frontier of wine science: In this scenario, we have decoded the DNA of microbes associated with grapevines and winemaking, yeasts have been tailor-made for the perfect wine, and

we produce wine according to evidence from cutting-edge science. Consumers enjoy top-quality, eco-friendly wines.

However, the challenges are as vast as the vineyards themselves. Climate change looms large, public concerns about chemical inputs are mounting, and the sustainability of our natural resources hangs in the balance. Economic pressures demand increased competitiveness and internationalisation, while society cries out for authenticity, environmental responsibility, quality, and safety. To conquer these challenges, the wine industry must invest in frontier knowledge and high-level expertise by nurturing existing talent and fostering a new generation of wine science specialists.

Enter Eco2Wine: An innovative PhD program designed to push the boundaries of wine knowledge and innovation. Our mission is clear: We're here to explore the hidden world of microbial ecosystems associated with winemaking. These natural microbial communities are the unsung heroes of winemaking, and we're on a quest to unlock their secrets. We're not just growing grapes; we're fostering ecosystems. Our multidisciplinary approach blends environmental science, biotechnology, viticulture, microbiology, economics, social science and public engagement to create a new generation of wine innovators.

Why focus on microbes? Because they hold the key to sustainable and eco-friendly winemaking. Our passion is understanding the intricate dance between fungi, yeasts, and bacteria in vineyards and cellars. These microbial communities are the heart beat of winemaking, and by deciphering their secrets, we're paving the way fora brighter, more sustainable future for the wine world.

Eco2Wine is a journey into the heart of wine science. The Eco2Wine network connects 21 organisations worldwide, all deeply engaged in the art and science of winemaking. Join us in this exciting wine science journey that will help to shape the future of wine.

Ten PhD positions available (36-month contract).

We are looking for 10 PhD students to join the following research projects:

DC01. Investigating the role of fungi and yeasts as grapevine biocontrol agents. Ileana Vigentini. Universita degli Studi di Milano (UMIL)

Project summary:

Viticulture, a prominent agricultural activity worldwide, exhibits annual growth. As the industry grows, so does the concern about its environmental impact. Consequently, there is a rising trend towards adopting sustainable practices in viticulture. This shift is driven by the recognition that the sector's ecological footprint needs to be minimized, and that reliance on traditional agricultural methods may not be viable in the long term.

One of the most significant challenges facing viticulture is the relentless proliferation of fungal pathogens. Approximately 8000 species of fungi and oomycetes are associated with plant diseases, posing a severe threat to grapevines and grape berries. Among these, Botrytis cinerea, the causal agent of bunch rot, is a notorious antagonist. The impact of these fungal pathogens extends far beyond the vineyards, endangering ecosystems, human health, food security, the global economy, and the biodiversity of host plants. Traditionally, chemical pesticides have been the go-to solution to combat these fungal diseases in agriculture. However, this approach is no longer sustainable. In response to growing environmental concerns, the European Commission introduced new regulations in June 2022, requiring a 50% reduction in the use of chemical pesticides by 2030. This mandate has left viticulture and other agricultural sectors seeking alternative strategies for disease management.

One promising alternative to chemical pesticides and synthetic fungicides is the use of microbial biocontrol agents (BCAs). These BCAs harness the power of beneficial microorganisms to inhibit plant pathogens and protect crops. In the context of viticulture, the strategic isolation of grape-associated microorganisms adapted to the vineyard ecosystem could be a game-changer.

In summary, this project aims to revolutionize disease management in viticulture by leveraging the potential of microbial biocontrol agents. By isolating and characterizing grape-associated microorganisms and studying their interactions, it strives to provide sustainable and eco-friendly solutions that align with the changing landscape of agricultural regulations and environmental awareness.

Objectives:

1) Mode of Action: Investigate and describe the potential mode of action of selected BCA candidates against Botrytis cinerea. This will involve conducting experiments both in controlled laboratory settings (in vitro) and in vineyards (in vivo); 2) Formulation Development: Develop practical formulations for the in-field application of these selected BCAs. The goal is to create efficient and user-friendly products that can be easily integrated into the existing viticulture practices; 3) Microbial Interactions: Study the interactions of these BCAs with grapevines, the grapevine microbiota, and other microbes involved in the fermentation process. Understanding how BCAs affect these microbial ecosystems is crucial for their successful implementation.

Expected Results:

1) Discovery of Beneficial Fungi and Yeasts: Identification of attractive fungi and yeasts, both as epiphytes and endophytes, capable of enhancing grape health and bolstering resistance against biotic stresses; 2) Elucidation of Genetic and Metabolic Pathways: In-depth understanding of the genetic and metabolic pathways underpinning the interactions in the interplay plant-BCS-pathogen, shedding light on the mechanisms driving these beneficial effects; 3) Development of Innovative Disease Mitigation Strategies: Establishment of innovative and effective strategies to fight grape diseases, harnessing the knowledge gained from the plant-microorganism interactions to enhance disease resistance and overall grapevine health.

Planned secondment(s):

GTU, collection of resistant plants (domesticated and wild) for microbial isolation and metagenomics analysis; NWAG, training on traditional Georgian wines; FRS, training on metagenomics; CSIC, training on data processing; VCR, to set up an optimized protocol for a stable infection in plants of single selected microorganisms and/or attractive microbial consortia/to develop innovative protocols to prevent or mitigate pathogen infections; UB, training on metabolomics analysis; UCA, set up of microbial formulate of attractive microorganisms to mitigate pathogen infections.

Enrolment in Doctoral degree(s): UMIL

DC02. Learning microbial interactions in wine from metabolomics. Hervé Alexandre. Université Dijon Bourgogne (UB)

DC03. Preferences regarding Natural and Biotechnological wines. Jon Hanf. Hochschule Geisenheim (HGU)

DC04. Microorganism consortia to cope with drought for a sustainable viticulture. David Maghradze. Georgian Technical University (GTU)

DC05. Ruling and technology for strains and consortia biodiversity preservation in oenology. Gianluigi Cardinali. Universita degli Studi di Perugia (UNIPG)

DC06. Phenotypic and genomic characterization of grape microbial communities. Uroš Petrovič and Neža Čadež. Univerza V Ljubljani (UL)

DC07. Understanding the mechanisms involved in non-metabolic interactions between wine microbial starters as well as with natural microbiota. Ramon Gonzalez.Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC)

DC08. Microbial interactions useful to reduce chemical inputs on grape and table-grape. Gustavo Cordero Bueso. Universidad de Cadiz (UCA)

DC09. Characterising the ecological and molecular interactions between wine-relevant yeast species and strains. Florian Bauer. Stellenbosch University (SU)

DC10. Closing the Gap – Microbiomics, Winemakers and the Public. Marina Joubert. Stellenbosch University (SU)

Website for additional job details

https://unirioja-my.sharepoint.com/:f:/g/personal/ragonzal_unirioja_es/EuAre7Ta…

Requirements

Research Field

Biological sciences» Biological engineering

Agricultural sciences» Enology

Agricultural sciences» Agronomics Field

Agricultural sciences» Soil science

Biological science » Biodiversity

Chemistry » Biochemistry

Chemistry » Analytical chemistry

Chemistry » Organic chemistry

Communication sciences » Science communication

Economics » Consumer economics

Economics » Agricultural economics

Technology » Biotechnology

Additional Information

Benefits

- Competitive salary and benefits package (36 month employment).
- A wide range of stimulating internal training events and scientific workshops
- Access to state-of-the-art research facilities and resources.
- Opportunity to work on groundbreaking projects with real-world impact.
- Collaboration with a diverse and dynamic team of experts.
- Professional development and growth opportunities.

DCs Recruitment

Each DC will receive a 36-month grant to cover her/his participation costs, living, travel and installation allowance, family allowance, as follows:

Doctoral Candidate	Recruiting Institution	Living Allowance[a]	Mobility Allowance	Family Allowance	Total maximum GROSS amount from REA (36 month)[c]
DC1	UMIL	3311,66	600	660	158637,6
DC2	UB	3957,60	600	660	181893,6
DC3	HGU	3342,20	600	660	159739,2
DC4	GTU	2114,80	600	660	115552,8
DC5	UNIPG	3311,66	600	660	158637,6
DC6	UL	2832,20	600	660	141379,2
DC7	CSIC	3104,20	600	660	151171,2
DC8	UCA	3104,20	600	660	151171,2
DC9 DC10	SU	1880,20	600	660	107107,2

[a] The amount is dependent on a country correction coefficient which takes into account the cost of living in the country of the recruiting institution.

[b] Amount corresponded to the DCs having or acquiring family obligations (i.e. persons linked to them by (i) marriage, or (ii) a relationship with equivalent status to a marriage recognized by the legislation of the country or region where this relationship was formalized; or (iii) dependent children who are being maintained by the them) during the action duration.

[c] These are the maximum GROSS amounts paid by the European Research Executive Agency (REA). Net salaries will depend on the national taxation applied by the recruiting institution's country and on possible extra-benefits granted by the employing institution. For more information to contact the National Contact Points (NCPs) of the country in which the DC is recruited.

The cost of the PhD educational activities, as well as all expenses related to travels performed to attend schools, workshops, and network-organized events, will be paid by the network through the HORIZON EUROPE MSCA-DOCTORAL NETWORK grant.

DCs will be provided with office space and all facilities for their research project.

Eligibility criteria

- Candidates must not be in possession of a doctoral degree at the date of expected recruitment.

- At the date of expected recruitment, candidates must not have resided in the country where the research training takes place for more than 12 months in the 3 years immediately prior to recruitment, and not have carried their main activity (work, studies, etc.) in that country. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account.
- Candidates must satisfy the eligibility requirements to enrol on a PhD degree, including acceptable English language skills and a Master's degree in one of the research fields listed above (see the detailed description in the URL below for the appropriate research fields for each PhD project)

Selection process

The selection process will follow the European Charter for researchers and the code of conduct. Eco2Wine partners are equal opportunity employers. None of them will apply restrictions on gender, age, ethnicity, national or social origin, religion or belief, sexual orientation, language, disability, political opinion, and social or economic conditions.

Candidates will be evaluated for eligibility, according to the call criteria indicated above. Eligible candidates will be evaluated by a committee, defined by the Recruitment board. Evaluation will be based on previous academic record, publications, and statement of motivation. Shortlisted candidates will be interviewed (preferably in person) by experts specific to each PhD project. The interview might involve the presentation of a master thesis. They might also be asked to complete a written exercise (brief literature review). The candidate's travel and accommodation expenses will be reimbursed by Eco2Wine. The final appointments of the DCs will be made by partner institutions according to local rules.

How to apply

Instructions on submission are provided on https://euraxess.ec.europa.eu/jobs/148836.

Applicants should submit the documentation via e-mail to dnenrol.eco2wine@icvv.es by 12 January 2023 at 11.59 pm (GMT). Please also use this address for any queries.

Applications failing to include the requested documentation, where the candidates do not meet the eligibility criteria, or which do not indicate the preferred projects will not be considered.