CO-OPERATIVE RESEARCH PROGRAMME FELLOWSHIPS AWARDED FOR 2023

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Proposed Studies	Research Fellow's Nationality	Home Institution	Destination Country	Host Laboratory	Duration of Fellowship (weeks)
Theme 1 : Managing Natural Capital for the Future					
Accelerating locally-developed freshwater management practices across global growing regions through innovation ecosystems This project investigates co-operatives' role in supporting the accelerated adoption of freshwater management practices across globally dispersed growing regions. Previous work indicates that co-operatives can coordinate the search for and implement innovative solutions for sustainable development by shifting innovation from an isolated to a collective effort. Farmers' accelerated adoption is essential to improving freshwater management practices and mitigating the anticipated effects of climate change. How key stakeholders can assist local producers towards adoption while maintaining viable businesses in global value chains is crucial. Comparative analysis of Chilean, Italian, and New Zealand kiwifruit regions visualises any existing direct and indirect linkages in the global innovation ecosystem that accelerate innovation across globally dispersed growing regions.	New Zealand	University of Auckland	United Kingdom	University of Glasgow	6
Cost-effective controls for mitigating agricultural soil N_2O emissions: Opportunities and uncertainties *(confidential)* The aim of this research is to investigate the cost-effective control strategies to mitigate agricultural soil nitrous oxide (N_2O) emission at least cost by addressing the spatiotemporal heterogeneity and uncertainties in N_2O estimation methods. Agricultural soil N_2O emissions contributed nearly 90% to the global anthropogenic emission increase since 1980. presenting significant potential for greenhouse gas mitigation in the agriculture sector. The mitigation targets can be achieved with least economic costs and divergent effort priorities among countries. Our study utilizes an AI-empowered prediction tool to elucidate the non-linear relationship between N_2O emission factors and environmental variables. By integrating process-based N_2O model-ensemble estimations, machine learning approaches, and the GAINS modelling tool developed by IIASA, we aim to identify and quantify cost-effective N_2O mitigation options, considering diverse efforts and priorities among countries.	China (Work country: USA)	Iowa State University	Austria	International Institute for Applied System Analysis-IIASA	16

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Developing a mountain peatland restoration manual: combining lessons from the UK and the USA The degradation of ecosystems undermines the well-being of 3.2 billion people and costs about 10% of the global gross domestic product. Ecosystem restoration is fundamental to reversing those losses and achieving global sustainability goals. Peatlands contain a disproportionate amount of earth's soil carbon, but this carbon is easily degraded. Mountain peatlands are numerous but experience many disturbances. However, there is little information available to practitioners to restore mountain peatlands because most peatland restoration projects have occurred in flat boreal regions and these techniques do not transfer to steep mountain peatlands. I aim to develop a mountain peatland restoration manual by using my experience and incorporating knowledge from other scientists across Europe and the UK. **Book**: Chimner R. and D. J. Cooper (2024), *Mountain peatland restoration: Assessment, goals, and approaches*, Ed. Michigan Technological University; doi.org/10.37099/mtu.dc.oabooks/9	USA	Michigan Technological University	United Kingdom	University of Highlands and Islands, Environmental Research Institute	26
Ecological rhizosphere management for enhanced nutrient efficiency, stress resilience and biodiversity in sustainable agro(ecosystems) Nutrient acquisition in plant communities is mediated by a complex interplay between species-specific processes in the rhizosphere governing the chemical speciation of sparingly available element forms in concert with element fluxes between intermingling meta-rhizospheres. Since 6000 BC, agriculturalists rely on these root-mediated processes, which form the basis for mixed-cultures and crop rotation practices to reduce reliance on one set of nutrients and sustain soil fertility. However, at the current time, mechanistic knowledge on the effects of these cropping systems on the whole spectrum of plant nutrients, including beneficial elements and the ecological consequences on the plants' stress resistance, is very scarce, but if proven, this would have major implications for the development of sustainable cropping systems in the face of climate change and finite fertilizer (phosphorus) resources. In the proposed project, this hypothesis will be rigorously tested by combining two greenhouse experiments with a field experiment to explore novel mixtures and rotation practices based on data on rhizosphere chemistry, interspecific root interactions, and molecular stress resilience processes. This includes a trait-based plant screening of selected cultivars/genotypes of six agricultural relevant legume species, cereal and bioenergy crops regarding their root morphology, the release of element	Germany	TU Bergakademie Freiberg	France	Institut Polytechnique, AGHYLE, UniLaSalle	26

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solubilising metabolites, and the plants' responses to different combinations of stress (drought, nutrient deficiency) in presence or absence of silicon. The most promising species will be tested in the greenhouse and the field to compare element-fluxes and stress resilience processes of mixed-cultures and cropping sequences with the monocultures. The comparison of growth parameters, yield, nutrient efficiency, and stress responses between monocultures and the different plant mixtures will form the basis for developing novel nutrient-efficient and stress-resilient cropping systems for food and bioenergy production in the face of climate change and finite nutrient resources. **Manuscript:** Wiche O. and O. Pourret (2023), "The role of root carboxylate release on rare earth element (hyper)accumulation in plants – a biogeochemical perspective on rhizosphere chemistry", *Plant Soil* 485, pp. 247–257; doi.org/10.1007/s11104-023-06177-2					
Environmental monitoring using honey bee colonies and a novel sampling tool A challenge of current agriculture is to balance the use of agrochemicals for increased productivity with the need to protect pollinator and environmental health. Monitoring for environmental contamination is therefore crucial to guide stakeholders and inform policy decisions towards increasing food security and environmental sustainability. The European honey bee, *Apis mellifera* has proven to be an effective bio-sampler as it brings contaminants to the hive where they can be detected. This proposal aims to develop an intercontinental collaboration for knowledge exchange and technology transfer on bee-mediated monitoring. It will support a Canadian fellow at the University of Almería, Spain to examine a new tool, the APIStrip, which allows for non-invasive sampling of contaminants in beehives. It will include training on how the tool is prepared and utilised, as well as planning its use in Canada. This proposal also includes a comparative analysis of existing data from Canada and Europe. The fellowship will encourage networking, and data sharing, with researchers of other OECD member countries involved in bee-mediated monitoring of pesticides and other pollutants.	Canada	Government of Canada	Spain	University of Almeria	8

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Proposed Studies	Research Fellow's Nationality	Home Institution	Destination Country	Host Laboratory	Duration of Fellowship (weeks)
How does scientific information and traditional ecological knowledge shape forest restoration policy and practice? Forest restoration is a growing global priority, yet many forest restoration programs are unsuccessful. One reason that they may be unsuccessful is inadequate application of existing restoration knowledge. This proposal aims to understand what knowledge is used in forest restoration in Spain, the US, India, and Mexico, and why that knowledge is used. I particularly focus on the application of scientific and traditional ecological knowledge, as past research indicates that these may be particularly important for successful restoration. The results of this research will help restoration scientists conduct research that better supports restoration policy and practice, while helping restoration practitioners improve the knowledge they use in their decision-making. **Manuscript**: Requena-i-Mora M., D. Brockington and **F. Fleischman** (2025), "Eco-paradox USA: The relationships between economic growth and environmental concern generally, and by different income groups", *Ecological Economics*, Vol. 235, 108648, Ed. Elsevier, ISSN 0921-8009; doi.org/10.1016/j.ecolecon.2025.108648	USA	University of Minnesota	Institut de Ciència i Tecnologia Ambientals at the Universitat Autònoma de Barcelona (ICTA-UAB)	Spain	26
Land tenure models for carbon positive land use: comparative case studies between Scotland and New Zealand This project aims to explore the implications of the growing carbon market on property regimes and land governance in Scotland and New Zealand, to share knowledge between research and policy in both countries, and to identify (and ideally co-develop) a framework of land tenure solutions to mitigate the environmental and social risks of land use change for carbon, whilst maximising opportunities. This project is fundamentally about mitigation and adaptation to a changing climate through land use and land governance change. It seeks to identify possible and optimal land tenure options for sustainable land use (e.g. food production that contributes positively to both reduce carbon and protect biodiversity).	United Kingdom	The James Hutton Institute	New Zealand	Centre for Sustainability, University of Otago	6

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Proposed Studies	Research Fellow's Nationality	Home Institution	Destination Country	Host Laboratory	Duration of Fellowship (weeks)
Near-Real time irrigation scheduling and crop biomass estimation through remote sensing images with high spatial and temporal resolution Precision irrigation faces important challenges in arid and semiarid areas where the lack of water resources for irrigation is a relevant determinant for agricultural production. The US Great Plains and the Southeast of Spain have similar problems on how to manage irrigated agricultural systems aimed at sustainability and raising profitability levels. Decision-making for timely irrigation scheduling and, at the same time, to predict the crop biomass/yield properly, using remote sensing-based multispectral imageries, are two high critical issues at many irrigated areas. To improve irrigation scheduling, a dense series of multispectral imagery, at a spatial resolution high enough and with timely delivered imagery, is required. Although many commercial sensors with the desired characteristics display increasing capabilities for precision irrigation, several improvements are needed. Thus, the main objectives of this proposal are: a) to develop for maize crop improved basal crop coefficient-vegetation index (Kcb-VI) and fraction of the crop intercepted photosynthetic active radiation-vegetation index (fPAR-VI) relationships; b) to generate for the same maize crop smooth-continuous curves over time for Kcb and fPAR derived from interpolation methods; c) to estimate the biomass for maize crop from remote sensing imageries and the combined effect of potential transpiration and fPAR; d) to evaluate this technology with respect to near-real field time irrigation scheduling and the actual crop characteristic(s).	Spain	Instituto Técnico Agronómico Provincial (ITAP, S.A.U.)	USA	Colorado State University	12

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Proposed Studies	Research Fellow's Nationality	Home Institution	Destination Country	Host Laboratory	Duration of Fellowship (weeks)
Theme 2: Managing Risks in a Connected World					
Analysing the economic impact of sustainable dietary diversification on consumer choices in the MED countries using nudging strategies Among the European countries, Spain and Italy rank amongst the countries with the highest prevalence of overweight and obesity in the European Union. What we choose to eat plays a large role in determining our risk of gaining too much weight. But our choices are shaped by the complex world in which we live-by the kinds of food our parents make available at home, by how far we live from the nearest supermarket or fast food restaurant, even by the ways that governments support farmers. In this context the exploration of effective weight loss strategies and improve eating habits is essential. Nudges are currently advancing approaches that represent a new and better method for changing the behaviours of people. This project explores diversification opportunities in sustainable diets along the food chain in Mediterranean countries and postulates the central hypothesis that diversification of sustainable diets jointly nudges strategies leads to more healthy and improves the food safety in terms of "obesogenic" food environment. The current research aims at describing a framework of food security, safety and diversification diets in Med countries in a broader sense by identifying underlying factors, focus also on psychological ones, to drive consumers to change their diet towards sustainable healthy diet by the improvement of food safety and food environment using nudging strategies. To achieve this aim, we will adopt different economic methodologies, including choice experiments to evaluate the willingness to pay for diversified sustainable food products. Hence, we will combine an economic experiment with different behavioural strategies (nudges and positive messages) by altering the food environment to assess the impact on consumer purchasing decision-making.	Italy (Work country: Spain)	Centro de Investigación y Tecnología Agroalimentaría de Aragón	Italy	University of Naples Federico II - UNINA, Department of Political Sciences Agricultural Science	26

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Proposed Studies	Research Fellow's Nationality	Home Institution	Destination Country	Host Laboratory	Duration of Fellowship (weeks)
Developing a potent kairomone for the European grapevine moth, *Lobesia botrana* *(Confidential)* The European grapevine moth, *Lobesia botrana*, poses a significant threat to grape crops, particularly *Vitis vinifera*. Infestations can result in severe economic losses for vineyards by damaging grape clusters and compromising wine production. Traditional methods of pest control often involve chemical pesticides, which can have environmental and health implications. As a result, there has been a pressing need for more sustainable and targeted solutions to manage this pest. In this fellowship, we have isolated and identified additional kairomones that improve the attraction of the previously known kairomones for both female and male European grapevine moths. Kairomones are chemical compounds emitted by one species that affect the behaviour of another, often used in communication between organisms. The identification of this kairomone holds great promise for the development of environmentally friendly pest control strategies. By leveraging the attractant properties of the kairomone, we envision creating targeted traps baited with lures or dispensers that can be strategically placed in vineyards. This approach aims to improve the monitoring and detection of this important pest, and it can be used in mass trapping or lur- and-kill of the European grapevine moth, ultimately reducing the need for chemical interventions.	New Zealand	Plant and Food Research	Sweden	Linnaeus University	26
Innovative approach to remove seafood pathogens along the seafood chain Seafood production is regularly overwhelmed by cross contamination caused by biofilms of pathogenic bacteria present on surfaces throughout the food chain. Due to the emergence of antimicrobial resistance, it is important to develop innovative techniques to combat biofilm in the food sector. Methods based on physical or biological treatment have emerged but could be more effective if combined with a natural bioactive disinfectant proteins such as ovotransferrin and phosphodiesterase. Ovotransferrin is naturally found in egg white that we already consume by the people and phosphodiesterase is naturally found in bovine spleen. Here, we will explore how these natural proteins coupled with biological and/or physical treatments can remove *Vibrio parahaemolyticus* and *Listeria* monocytogenes biofilms, both well-known pathogens threatening the seafood industry.	France	French Agency for Food Environmental and Occupational Health & Safety	Canada and Australia	Agriculture and Agri-Food Canada - Institute for Nanoscale Science, Canada & Technology,Flinders University Adelaide, Australia	25

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Proposed Studies	Research Fellow's Nationality	Home Institution	Destination Country	Host Laboratory	Duration of Fellowship (weeks)
Manuscripts: 1. Brauge T. et al. (2024), "Sources and contamination routes of seafood with human pathogenic Vibrio spp.: A Farm-to-Fork approach", *Comprehensive Reviews in Food Science and Food Safety*, Vol. 23, Issue 1, pp.1-25; doi.org/10.1111/1541-4337.13283 2. Mougin J, A. Joyce, T. Brauge et al. (2024), '"Benzalkonium chloride disinfectant residues stimulate biofilm formation and increase survival of *Vibrio* bacterial pathogens", *Frontiers in Microbiology*, Vol. 14, 1309032; doi: 10.3389/fmicb.2023.1309032					
Transcriptomic analysis of the *Vibrio vulnificus pv. piscis* exposed to fish mucus The fulminating pathogen *Vibrio vulnificus pv. piscis* is the causative agent for a range of diseases of marine animals including species of interest in aquaculture such as eels and shrimps. Our hypothesis is that upon being exposed to mucus of the marine animals, the pathogen differentially expresses genes involved in colonisation, persistence, survival, and thereby cause disease. A whole-genome transcriptome profiles of the pathogen in the presence or absence of the fish mucus or purified mucin will be compared and thereby the virulence genes expressed specifically and required for the infection of the marine animals will be identified. Selected virulence genes will be cloned and further characterised at the molecular levels to expand current understanding of the *V. vulnificus* pathogenesis and thereby provide novel strategies to control the pathogen.	Korea	Seoul National University	Spain	University of Valencia	14

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Proposed Studies	Research Fellow's Nationality	Home Institution	Destination Country	Host Laboratory	Duration of Fellowship (weeks)
Theme 3: Transformational Technologies and Innovation					
Adapting crops to changing environments using related species and innovative pre-breeding approaches Our agricultural systems and hence food security are currently facing major challenges due to the increasing world population, the numerous impacts of climate change on crop production, and the need for a more environmentally friendly agriculture. This is notably the case for oilseed rape (3rd largest oilseed crop worldwide), which is used for human consumption, biofuel production and animal feed. This crop presents an extremely narrow genetic diversity, making difficult to maintain its production in changing environments. One avenue to cope with these constraints, while meeting the agroecology objectives, is to efficiently characterise the untapped genetic diversity existing in its parental species, and available in ex situ collections. The main aim of this project is to investigate the genetic diversity presents in the parental species of oilseed rape, and subsequently to explore other variation sources (e.g., epigenetic), as well as to use up-to-date phenomic selection tools to finely characterise this valuable material. We will also take advantage of an innovant method boosting recombination, which was recently identified by the applicant's group, to thereafter efficiently introgress this diversity (including traits of interest) in oilseed rape and create performant pre-breeding populations. Altogether, this fellowship will build a multi-institutional and international collaborative network enabling to collectively address the global challenges of oilseed rape production.	France	INRAE (National Institute for Agriculture, Food and Environment)	Australia	CSIRO Agriculture and Food	26

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Advanced breeding tools for meeting sustainable production and resilience: from satellites to genes Agriculture sits at the nexus of almost all of humanities grand challenges, including food security, climate change, and global poverty. Specifically, plant breeding has historically had a fundamental role in shaping agricultural practices and can therefore have a large impact in the development of a more sustainable and resilient agriculture. The goal of this fellowship is to push the boundaries of plant breeding by deploying state of the art tools from satellites to genomics to breed for sustainable agricultural systems using cereals as an example. Specifically, we will provide new designs for large genomic evaluations of breeding programs as well as improved genomic prediction methods with additional layers of phenomics and environomics to breed for emerging ecosystem services traits.	Sweden (Work country: USA)	University of Wisconsin - Madison	Sweden	Swedish University of Agricultural Sciences	22
Dairy farms' optimal nutrient allocation to maximise profitability and minimise environmental impacts By applying transformational digital technologies, we seek optimising nutrient allocation on dairy farms towards maximum profitability at the minimum environmental impact in the face of a growing world population under food insecurity and climate change challenges. Improved data acquisition procedures, better computer systems, and superior algorithms efficiently applied to dairy production systems can become a pilar for building a resilient and sustainable food production system. We will develop a novel, user-friendly, farm-specific, online application to concurrently support multiyear crop planning, feed ingredient purchase, minimum nutrient emissions, and optimal diets formulation by applying the latest scientific knowledge. Demonstration analyses with Italian and Wisconsin dairy farms will be published in the Journal of *Dairy Science* and trade magazines. **Manuscript**: Gong Y., A. Bellingeri, F. Fumagalli, G. S. Sechi, A. Stanislao Atzori, F. Masoero, A. Gallo, **V. E. Cabrera** (2025), "A mixed integer linear programming framework for mitigating enteric methane emissions on dairy farms through optimized crop and diet planning", *Journal of Cleaner Production*, Ed. Elsevier, Vol. 511, 145636; doi.org/10.1016/j.jclepro.2025.145636	USA	University of Wisconsin-Madison	Italy	Catholic University of the Sacred Heart in Piacenza	26

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Innovative eco-friendly Bio-basEd processes to recover BioactivE compoundS from agri-food wasTe (BE BEST) Food processing generates high waste and byproducts, causing a negative environmental impact and significant disposal expenses. Many of these biomaterials, including citrus wastes, are a source of valuable compounds that could be used in various commercial sectors, including food industries. Several techniques have been used to recover polyphenols from food byproducts, but most are expensive and unsafe for human health and the environment. In recent times, several "green" novel extraction techniques have been used to optimise the extraction of bioactive compounds. Natural deep eutectic solvents (NaDES) have become an exciting candidate. Considering the extraction recovery of bioactive compounds, the type of solvent and the chemical form in which food bioactives are bound to the food matrix must be considered. This Project will investigate the possible and synergic application of combined hydrolytic enzymes (pectinase, cellulase, and protease) and NaDES for polyphenols recovery from orange fruit byproducts (peel). This will enhance the value of agri-food waste, fitting the challenge of the theme identified by the CRP research fellowship.	Italy	University of Milan	Spain	Universitat de Valencia, Dep. of preventive medicine and public health, food sciences, toxicology and forensic medicine	14
Smart farming technologies and transformation in the work of farmers and advisers: Implications for technology adoption and policy The impacts of Smart Farming Technologies (SFTs) on the nature of farming work and the work of agricultural advisory services has received less attention from the scientific community. This research aims to examine the trends and changes in farm and advisory work related to SFT implementation in the UK and Australia, countries which share similar challenges in smart farming. The research will involve qualitative social research with interviews and workshops with farmers, advisers, SFT providers and policy makers in both countries. Focusing on the farmers and advisers implementing SFTs, the research is an important addition and departure from studies examining "non-adopters", to draw from the real-world experience of farmers and advisers and the change to their work. Through this novel approach, the research will contribute to anticipating the knowledge, skills and technology governance arrangements required to underpin the capacity of farmers and the service sector to realize the benefits from SFTs and improve how work impacts are factored in to interventions and policies in supporting value and benefit from SFTs. The research seeks to contribute to training and education curricula; assist farmers and	Australia	University of Melbourne	United Kingdom	Countryside and Community Research Institute, University of Gloucestershire	6

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advisers anticipate work changes from SFT implementation and make recommendations for the intersecting policy arenas of agricultural innovation, agricultural education and agricultural employment. **Manuscripts:** 1. **Nettle R.** and J. Ingram (2025)**. "**Smart farming technologies and changes to farm work: New insights into on-farm experiences", *Technological Forecasting and Social Change*, Vol. 218; doi.org/10.1016/j.techfore.2025.124227 **2. Nettle R.,** J. Ingram and M. Ayre (2025), "Digiwork: How Agriculture 4.0 is changing work for farm advisers", *Frontiers in Sustainable Food Systems*; doi.org/10.3389/fsufs.2025.1542007					