

## CO-OPERATIVE RESEARCH PROGRAMME FELLOWSHIPS AWARDED FOR 2017

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Proposed Studies	Research Fellow's Nationality	Home Institution	Destination Country	Host Laboratory	Duration of Fellowship (weeks)
<b>Theme 1 : Managing Natural Capital for the Future</b>					
<p><b>Control of soil-borne diseases in peanuts with sustainable practices</b></p> <p>The goal of this project is to develop microbial seed inoculants (beneficial microbes) to reduce root diseases in peanuts and so provide sustainable alternatives to the more common chemical disease control for enhancing yields. The study will provide new insight into how these beneficial microbes impact peanut microbial ecology under different field conditions, thereby delivering a scientific basis to guide the development of these strains as seed inoculants for a major agricultural crop.</p>	United States	USDA/NCAUR	Australia	University of Southern Queensland	8
<p><b><u><a href="#">Crop stress response calibrations for improved water use assessments under deficit irrigation</a></u></b></p> <p>This project will look at calibrating and validating a crop yield model to accurately measure root zone soil water contents to correctly infer plant available water, to calibrate the effects of water deficits on crop water use, and to make appropriate real time water management decisions, for crops using irrigation. Currently, a major weakness of crops models is that water use under moderate to severe irrigation deficits is poorly estimated, thereby contributing to uncertainty in what water allocations are required to optimise productivity when water is limited. This research study aims to redress this problem.</p>	United States	Agricultural Research Service (ARS)	Spain	Centro Regional de Estudios del Agua (CREA), Castilla-La Mancha University	15
<p><b><u><a href="#">Disentangling ecosystem functioning of a nursery area by wavelet analysis of long term ecological time series: integrative ecosystem assessment of the Guadalquivir estuary for Gulf of Cádiz fisheries sustainability</a></u></b></p> <p>The aim of this project is to understand the mechanisms and environmental forcing factors that determine the evolution and covariance of the main populations of the aquatic community of the Guadalquivir estuary — fish juveniles and their prey. The estuary is a nursery area of proven importance for fish species of considerable commercial interest in the Gulf of Cádiz, such as anchovy, sardine, prawn and seabass. Disentangling the nursery ecosystem functioning and its relation with the Gulf of Cádiz fisheries stock evolution will provide relevant scientific information and advice to enable the development of an effective Integrative Ecosystems Assessment plan for the region, and to inform future policy decisions related to agricultural and water management that will affect the estuary nursery's function of ensuring sustainable fisheries.</p>	Spain	Andalucía Research and Training Institute for Agricultural and Fisheries-IFAPA- Junta de Andalucía	United States	Yale University	20

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<p><a href="#"><u>Impact of drought on soil biogeochemical cycling: regulation of microbial growth efficiency by soil moisture and substrate supply</u></a></p> <p>This project aims to analyse whether pasture conversion from grass to perennial legume forages such as Birdsfoot trefoil can increase the microbial Carbon Use Efficiency (CUE). CUE determines the proportion of the organic carbon consumed by soil microbes that is used for biomass production rather than for respiration. Because the conversion of grass pastures into Birdsfoot trefoil pastures is currently being considered in Western USA because of the evidence of greater weight gains of cattle grazing Birdsfoot trefoil pastures, it is important to be able to predict what effect such a land use change may have on carbon sequestration. Understanding such regulators of soil respiration is critical to formulating predictions of carbon sequestration under different land-use or climate change scenarios.</p>	Spain	Institute for Natural Resources and Agrobiology (iRNAS-CSIC)	United States	Utah State University	8
<p><b>Learning from Satoyama and landscape-scale initiatives: Review, comparative analysis and innovation in policies for sustainable agriculture</b></p> <p>This project will use comparative policy learning (mixed-methods evaluation) to examine policy frameworks, institutions and instruments supporting Satoyama in Japan and consider their EU and UK relevance. Japan's Satoyama concept is of living cultural landscapes of high nature value and longstanding human management where nature and culture are joint products. This is close to the UK understanding of its own rural landscapes, where most landscapes result from close natural and human social interaction over millennia, but currently, the views that less management is good for nature and "rewilding" have gained traction. Consequently, the experience of sustaining Satoyama in Japan, which has parallels in recent EU and UK landscape-scale experiments, will be helpful in formulating innovative policies in this domain.</p>	United Kingdom	University of Gloucestershire	Japan	Laboratory of Landscape Architecture, Kyoto University	8

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<p><a href="#"><u>Long-term dynamics of weed biodiversity-crop interference under climate change</u></a></p> <p>The goal of this collaboration project is to advance the scientific understanding of the effect of climatic variation on long-term crop-weed biodiversity interaction and the trajectory of such effects under climatic change scenarios. The researchers anticipate that the results of this work will help farmers to conserve weed biodiversity in addition to mitigating the impact of climate change on their crops. The project will look at whether thresholds and functional relationships for crop yield loss due to weed interference are dynamic under a changing environment and which climatic factors are most likely to alter such relationship, and whether certain components of the weed community are likely to become more prevalent under future environments. It will also examine the potential for contrasting management approaches to mitigate the impact of climate change upon weed diversity-crop relations.</p>	Spain	Consejo Superior de Investigaciones Científicas (CSIC)	United States	United States Department of Agriculture (USDA/ARS)	11
<p><b>Progressing a sustainable agriculture standard for Australia: Lessons from the USA</b></p> <p>This research project will work on the development of a sustainable agricultural standard for Australia, focusing on sustainable food, fibre and ecosystem services from the farm gate to facilitate recognition and trade. There is a demand for clean, green products produced within sustainable agricultural systems, but currently the appropriate governance structures for recognition, validation and consequently trade are lacking. The USA has two instruments (the National Sustainable Agriculture Standard and the Framework to Evaluate the Sustainability of Agricultural Production Systems) which are potentially useful for developing a sustainable agricultural standard for Australia, which this project will analyse.</p>	Australia	Australian Centre for Agriculture and Law, University of New England	United States	Penn State University	8
<p><b>Qualitative effects of non-agricultural lands on the health of insects providing ecosystem services</b></p> <p>This research project will use near-infrared spectroscopy to measure the health of organisms collected from different types of non-agricultural types of land use, including natural and semi-natural vegetation. This information will be useful for non-agricultural land management strategies that will protect ecosystem services in complex landscapes. These landscapes safeguard such ecosystem services as pollination and pest suppression by natural enemies, thus ensuring food security. The findings will also help transfer knowledge about pest management and pollinator usage from scientists to decision makers, as well as helping inform the public about the linkages between biodiversity and ecosystem services</p>	Japan	Forestry and Forest Products Research Institute	Australia	Commonwealth Scientific and Industrial Research Organisation (CSIRO)	22

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<p><b>Review on nutritional strategies to develop low-pollution feeds for a sustainable aquaculture</b></p> <p>As the quality of feeds for aquaculture are improved, emphasis will need to be put on reducing the amount of waste and nutrient discharge to ensure the continued development of sustainable aquaculture. Because studies related to understanding the factors affecting nutrient utilisation, and consequentially waste and discharge, have increased in recent years, they present a huge and contrasting amount of scientific information. This research project aims to conduct a meta-analytic review and synthesis of this information to help towards low-pollution feeds being developed in the future.</p>	Venezuela	Universidad Católica de Temuco, Chile	Japan	Tokyo University of Marine Science and Technology	12
<p><b><u><a href="#">Spanish land conservation programmes as a mechanism to protect agriculture and biodiversity</a></u></b></p> <p>This project will examine two Spanish conservation policies, the land stewardship programme and a law enabling biodiversity offsetting, to see how they are both developing. The researchers will look at individual projects, the level of participation and how biodiversity and ecosystem services are being protected under the auspices of these two policies.</p>	United States	State University of New York at Buffalo	Spain	Universidad Pontificia Comillas, Madrid	19
<p><b><u><a href="#">Stable isotopes to predict forest nitrogen dynamics across New Zealand</a></u></b></p> <p>This project will look at how to predict how different forests might retain and respond to added nitrogen, with the ultimate goal of providing information for policy discussions about land use change and forestry intensification impacts on water quality. The forestry sector in New Zealand has set the ambitious goal of doubling productivity by 2022, but will need to increase forest nitrogen fertilisation to do this. There are environmental concerns about nitrogen leaching into water, as well as concerns about the economic inefficiencies of such action because of the lack of confidence in current methods for predicting the effect of nitrogen fertilisation on growth. The new methods this project will test should help address these issues.</p>	United States	Virginia Tech	New Zealand	Scion	22

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<p><b><a href="#">Sustainable pre-infection solutions for mitigating parasitic lice infestations in salmon aquaculture</a></b></p> <p>This research project aims to develop new sustainable and non-chemical measures to mitigate parasitic diseases in finfish aquaculture by using an integrated measurement and modelling approach. This approach will assess how the spatial layout of aquaculture sea-cages create localised hydrodynamic zones with low or high concentrations of parasitic sea lice to help optimise the design and layout of cages to mitigate lice-fish interactions. This will be important because of the importance of world aquaculture production (167 million tons in 2014, with an average annual growth rate of 5.8% (FAO 2016), and as it continues to grow, the prevalence and severity of infectious and parasitic diseases, as well as their economic costs, is expected to continue to increase.</p>	Australia	South Australian Research and Development Institute	Norway	SINTEF Fisheries and Aquaculture	6
<p><b>Towards the use of groundwater biodiversity as indicator for aquifers quality in agricultural watersheds: an ecological field approach</b></p> <p>This project will assess the environmental alterations to groundwater ecosystems from agricultural watersheds in the Coquimbo region of Chile, a region well known for problems of diffuse nitrogen and pesticide pollution caused by irrigated agriculture. The project will evaluate the groundwater biodiversity, the effects of nitrogen and pesticides water loads on groundwater biota, and the ecosystem services provided by biota and their alterations due to agricultural activities. The synthesis of the results should provide predictive models on groundwater biodiversity and habitat loss due to agriculture activities at local and regional scales which help develop long-term monitoring programmes of groundwater ecosystems in distinct agricultural watersheds.</p>	Romania	IMDEA Water, Spain	Chile	Centro de Estudios Avanzados en Zonas Aridas	8
<p><b>Vulnerability of agricultural production networks and global food value chains due to natural disasters in Korea and Austria: ICT roles</b></p> <p>This project is to learn how Korea uses ICT in agricultural global food chains to warn about climate extreme event risks, to initiate automated preventative and emergency actions and to alter the food value chain in the event of such a risk. The project will then assess if damage to spring 2016 harvest in Austria could have been avoided if such ICT tools had been in place, and then go on to assess the potential value of ICT tools in regional and global agricultural value chains. The research collaboration builds on the CRP-sponsored conference on <i>Vulnerability of Agricultural Production Networks and Global Food Value Chains due to Natural Disasters of June 2016</i>.</p>	Austria	TU Wien - Vienna University of Technology	Korea	Gyeongsang National University, Dep. for Bioindustrial Machinery Engineering	16

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<b>Theme 2: Managing Risks in a Connected World</b>					
<p><b>Antimicrobial resistance in Atlantic salmon (<i>Salmo salar L.</i>) from salmon aquaculture in Chile</b></p> <p>This project will analyse then antimicrobial resistance of bacteria in Chilean aquaculture salmon in order to determine the associated risk factors. The results could provide important knowledge not only for veterinary purposes, but also for human health. In Chile, the second largest producer of farmed salmon, there is clear evidence of the higher frequency of antimicrobial resistant bacteria, due to the past and recent use of veterinary medicines.</p>	Spain	Universidad Zaragoza	Chile	Universidad Austral de Chile	6
<p><b>Development of a DIVA vaccine and companion ELISA for capripoxviruses</b></p> <p>Capripoxviruses include sheeppox, goatpox and lumpy skin disease of cattle. This research project is timely as lumpy skin disease is spreading within eastern Europe since entering Turkey in 2013. The aim is to develop a negative marker vaccine and companion serological assay(s), enabling the Differentiation of Infected from Vaccinated Animals (DIVA). Tools such as these would allow vaccination to be used in disease control programmes by differentiating infected animals from those which have been vaccinated. These tools will provide policy makers with an alternative to widespread culling to control the spread of include sheeppox, goatpox and lumpy skin disease, for which no such vaccine or companion test is currently available.</p>	Australia	Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Canada	National Centre for Foreign Animal Disease	13
<p><b><u><a href="#">Fast identification and valorisation of young shoots of invasive <i>Solidago</i> species</a></u></b></p> <p>The aim of this project is to develop a fast, easy to perform and relatively cheap method to distinguish the native <i>Solidago</i> species from invasive ones (goldenrods) which originated from North America and are now exceptionally successful invaders in Europe. This development will enable policy makers and risk managers to define when and the level of any intervention for the removal of the invasive species, to avoid threats to biodiversity and economic losses in agriculture.</p>	Hungary	Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences	Germany	Justus-Liebig-University of Giessen Institute of Nutritional Science	9

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<p><b>Food waste in Japan and Europe - detailed grasp of the magnitude, and analyses on the formation of awareness</b></p> <p>This project will compare the situations regarding food waste in Japan and Europe, particularly Austria and the United Kingdom because of the availability of data in these countries. It will investigate methodologies used to estimate the amount of food waste and compare the results. It will then investigate the factors that affect citizens' attitudes to the wastage of food. The reduction of food waste is important both for environmental sustainability and global food security. Waste management research has traditionally looked into the safe disposal and utilisation of waste. Prevention and reduction of waste is a relatively new challenge tackled by engineers as well as social scientists and this project aims to become a basis for international collaboration. It will be able to provide practical information for policy making by identifying effective policies.</p>	Japan	Teikyo University	Austria	BOKU University, Vienna	20
<p><b>Indicators for evaluating sustainability of agricultural systems. Options at farm scale.</b></p> <p>The objective of this project is to improve the capacity of agricultural systems to build resilience to encourage sustainability. Current conditions of certain natural resources which characterise new aspects of biodiversity and systems will be diagnosed and bio-economic models for predicting and simulating natural resources will be developed. These models will then help producers adopt sustainable strategies for detecting and conserving the biological diversity and species variability of agriculture.</p>	Spain	University of Zaragoza	United States	Dyson School of Applied Economics and Management, Cornell University	8
<p><b><u><a href="#">Optimisation of serological assays for the assessment of potential hosts and reservoir species of Henipaviruses</a></u></b></p> <p>This project aims to determine an optimized diagnostic strategy for the detection of antibodies against Henda Virus (HeV) and Nipah Virus (NiV) in different species. It will compare and possibly combine serological assays developed in Australia with enzyme-linked immunosorbent assays (ELISA) developed in Germany to develop an optimized assay which will not only allow the detection of serologically positive animals, but also to differentiate between (HeV) vaccinated animals and animals which are infected with HeV, NiV or Henipa-like viruses (HNV). Henipaviruses are new and highly pathogenic viruses which have emerged in recent years, posing a significant threat to human health. They are related to viruses which cause measles in humans, Newcastle Disease in poultry and distemper in some animal species, and cause respiratory and neurodegenerative diseases in pigs, horses and humans.</p>	Germany	Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health	Australia	CSIRO Health and Biosecurity, Australian Animal Health Laboratory (AAHL)	6

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<p><b>Optimising science, technology and innovation for studying ocean acidification effects on commercial species (<i>Ostiones</i>)</b></p> <p>This project aims to obtain new scientific knowledge on the effects of ocean acidification on commercial shellfish species in the UK and Chile, because the understanding on the potential effects of ocean acidification on commercial species is limited. As the climate changes and atmospheric carbon dioxide increases, the chemistry of seawater changes because of the uptake by seawater of carbon dioxide; seawater becomes more acidic. Evidence indicates that future ocean acidification will affect marine organisms, with repercussions for ecosystems and services. The work of this project should help support the development of climate change adaptation strategies as well as the planning and preparedness of aquaculture activities in both countries – and beyond – to support food security.</p>	United Kingdom	CEFAS	Chile	Ceaza/EULA	12
<p><b><u><a href="#">Processionary moths and global change: an increased risk for agriculture and forestry</a></u></b></p> <p>Processionary moths are a group of moths that feed on trees and pests in forestry and agro-forestry, and that have major impacts on human and domesticated animal health in Europe and Australia. These impacts have an enormous economic cost (tens of MEUR and MAUD per year). The diversity of species of these moths has led to different manifestations of the problem in Europe and Australia. The researchers in this project propose to put together all the information developed so far to identify the best practices for identification, diagnostics and management of the syndromes and reactions associated with exposure to these moths. This information can then be used in the management of natural resources and the management of farm animals and companion animals (especially dogs). Global change – climate warming and human trade – has increased the importance of these species and so there need to be preventative measures for each situation, which this study hopes to be able to provide.</p>	Italy	University of Padova	Australia	The University of Queensland School of Biological Sciences	11



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<p><b>Resolving the two haploid genomes of <i>Puccinia graminis f. sp. tritici</i> to identify structural variation underlying pathogen virulence</b></p> <p>This project will look at the fungus <i>puccinia graminis f. sp. tritici</i> (Pgt) which is the causal agent of stem rust, one of the most devastating diseases affecting the production of wheat worldwide. Stem rust is largely controlled by breeding for resistance genes, which is often undermined by the rapid evolution of the pathogen to evade resistance. The research to be conducted is novel in that it will explicitly separate the two haploid genomes to identify the structural variation that allows evolution of new virulent strains. Current genomic resources for Pgt are based on only a single haplotype. The information gleaned will be critical to designing effective deployment strategies for wheat resistance genes to minimise the risk of new stem rust epidemics.</p>	Australia	CSIRO	United States	University of Minnesota	10
<b>Theme 3: Transformational Technologies and Innovation</b>					
<p><b>Accelerating plant breeding</b></p> <p>This project will focus on establishing a novel in vitro nursery concept to minimise the breeding cycle time in various plant species, using doubled haploid (DH) technology. This technology can reduce line production times from more than five generations to two. It is already used in breeding programmes for crop species such as maize, wheat, barley and canola, but the protocols for development of DH lines in other crop species are not available. The rate of genetic gains will be increased, which will help meet the projected increase global food demand.</p>	Germany	Iowa State University	Australia	La Trobe University, Melbourne	19
<p><b>Application of “phage therapy” to develop bio-control using virus against Harmful Algae Blooms</b></p> <p>This project will look at applying the techniques of phage therapy developed in the agricultural field to the control of harmful algae blooms (HABs). These HABs, which occur every year in various parts of the world, have resulted in great damage to the aquaculture industry, human health, coastal economies and wild fisheries. Phage therapy is the use of viruses that infect and replicate in specific bacteria without harming either the host or other beneficial bacteria, and has huge potential in bio-control of HABs in fisheries. The results of this project will not only have practical use in the bio-control of HABs in fisheries, but will also facilitate policy-making for the use of phage and viruses in the environment and preservation of aquaculture.</p>	Japan	The National Research and Development Agency, Japan Fisheries Research and Education Agency	Belgium	KU Leuven University	13

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<p><a href="#"><u>Embryo-maternal communication in the bovine oviduct: crucial for successful embryo development</u></a></p> <p>This project will study the oviduct environment cows in order to improve our understanding of the regulatory mechanisms that control fertilisation and embryo development to reduce infertility. The project seeks to study <i>in vivo</i> how the embryo interacts with the maternal oviductal epithelium, which will be challenging due to the small size of the embryo and the difficulty in identifying its exact location in the oviduct.</p>	Spain	Instituto Nacional de Investigación Agrarias y Alimentarias (INIA)	Ireland	Animal and Crop Sciences, School of Agriculture and Food Science, University College Dublin	20
<p><b>Impact of the agricultural fungicide phosphite on the phosphoproteome of the oilseed crop <i>Brassica napus</i></b></p> <p>This project will look at profiling the Brassica phosphate starvation response to learn how plants sense and respond to cellular phosphate levels and their biochemical adaptation that help plants acclimatise to suboptimal levels of phosphate. This research will facilitate the identification of useful genes for engineering phosphate efficient crops. This research is important for various reasons: the world's reserves of rock phosphate (the primary source of phosphate fertilisers) are depleting rapidly, so a solution needs to be found; crop phosphate uptake from fertilisers is very inefficient with only 20% of applied phosphate being assimilated, so if crops can be bred that assimilate phosphate much more efficiently, less fertiliser will be needed; runoff of excess phosphate from fertilised soils is a major factor in the eutrophication and hypoxia of lakes, rivers and marine estuaries, and will be reduced if appropriately engineered crops can be bred; the socio-economic benefit of such crops would be enormous worldwide as farmers would not need to use as much phosphate fertiliser.</p>	Spain	University Pablo de Olavide	Canada	Queen's University	18
<p><a href="#"><u>Increasing hardiness of cereal crops against fungal pathogens through the CRISPR/CAS gene editing system</u></a></p> <p>This project will lead to the development of improved barley and wheat varieties for pathogen-free food production with a decreased impact on the environment, using the newest genomic tools (CRISPR/CAS gene editing system) and resources (cloned resistance and virulence genes). These new lines of barley and wheat will lead to greater economic value of the food products and promote the sustainability of farms using them.</p>	Slovak Republic	IEB Olomouc	United States	Cereal Disease Laboratory, Department of Plant Pathology, University of Minnesota	8

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<p><b>Regulation of forage grass growth and winter survival in northern latitudes</b></p> <p>This project will seek to understand the regulation of growth and winter survival of locally adapted genotypes of forage grasses that are well-adapted to the Nordic climate, and to analyse the sequence diversity in key regulatory genes for growth and winter survival. These grasses have huge potential for biomass production and they also have a key role in the sustainable intensification of agriculture and in nutrient cycling, as they can be grown successfully in mixtures with forage legumes. The grasses that are currently intensively managed have many traits that are negatively correlated with each other; for example, extensive autumn growth correlates negatively with winter survival. Consequently, adaptation to longer growing periods will require deeper understanding of the physiological and genetic links between biomass accumulation and winter survival. The results will be useful for forage grass breeding programmes and for developing new management practices.</p>	Finland	University of Helsinki	Denmark	Aarhus University	18
<p><b>Understanding microRNA-mediated regulation of aquaporin expression to improve cryopreservation in bovine oocytes</b></p> <p>This project is hoping to develop a technique that will improve the cryopreservation of bovine eggs and embryos using advanced molecular genetic tools and techniques. Advanced selection, breeding and reproductive strategies facilitate the rapid improvement of critical production traits in domestic animals. Cryopreservation of animal eggs, sperm and embryos is one key element in this as it allows the widespread inexpensive dissemination of animals that possess optimal genetics for desirable traits. However, currently, cryopreservation is not reliable. This research will examine a new approach through which microRNAs can be manipulated to effect successful egg cell cryopreservation. If successful, this work should accelerate the implementation of novel genetic improvement strategies to overcome existing production constraints in cattle.</p>	Canada	University of Guelph	Spain	Universidad Autónoma de Barcelona	12