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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title:
AGRI01 - Understanding of grapevine communication mediated by volatile organic compounds for the resistance against downy mildew - VOLAGRAPE

Funding Body:
University of Trento
Laimburg Research Centre

PhD Program Supervisor/s:
Prof. Michele Perazzolli; Dr. Michael Oberhuber; Dr. Peter Robatscher

Context / Synthetic description of the project and research outcome

Volatile organic compounds (VOCs) are key mediators of plant communication, but little is known about their involvement in the plant defence against pathogens. The objective of this project is to clarify plant-plant communications mediated by VOCs through a multidisciplinary approach, which includes metabolomic, transcriptomic and physiological studies.

A crop with high economic value (grapevine) and one of its most dangerous diseases (downy mildew) will be used as model. The expected results are: the identification of metabolic changes and inhibitory activities mediated by VOCs against the pathogen, the investigation of transcriptional regulations responsible for VOC-induced systemic resistance and the understanding of VOC-mediated communications between resistant and susceptible grapevines.

The outcome of this project will be a milestone in the development of natural products for grapevine protection against downy mildew and it will provide scientific publications and a successful training of the PhD student.

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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title:
AGRI02 - Enhancement of plant tolerance to cold stress by psychrotolerant bacteria and characterization of the involved mechanisms - COLDERANCE

Funding Body:
Fondazione Edmund Mach
University of Natural Resources and Life Sciences, Vienna (BOKU)

PhD Program Supervisor/s:
Prof. Michele Perazzolli; Prof. Rainer Schuhmacher

Context / Synthetic description of the project and research outcome

Future climate projections suggest increased risks of spring frost injuries and cold stress. Plants can activate defence reactions against cold stress and some psychrotolerant bacteria can enhance plant acclimation mechanisms. The objective of this project is to understand the physiological mechanisms activated by psychrotolerant bacteria in crops against cold stress.

Crops with high economic value (apple and tomato) and a collection of psychrotolerant bacteria will be characterised by metabolomic, transcriptomic and physiological approaches. The expected results are the identification of psychrotolerant bacteria for crop protection against cold stress, the understanding of metabolic changes and transcriptional regulations stimulated by psychrotolerant bacteria against cold stress.

The outcome of this project will be a milestone in the development of bacterial-based protectors against cold stress and they will provide scientific publications and a successful training of the PhD student.

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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title:
AGRI03 - Research and Development of new biological alternatives based on Plant Extracts, Microbials and soft chemistry for the control of the Grapevine pathogen Downy Mildew (*Plasmopara viticola*) as a base for the development of new IPM strategies in the crop

Funding Body:
Fondazione Edmund Mach (FEM)
Gowan

PhD Program Supervisor/s:
Gerardo Puopolo; Dario Sterzi, Gowan

Context / Synthetic description of the project and research outcome

Grapevine downy mildew caused by Plasmopara viticola in the major pathogen in viticulture worldwide and responsible for up to 60% of the application of synthetic fungicides. Occurrence of P. viticola populations resistant to synthetic fungicides and the progressive reduction of chemical active ingredients and copper input in viticulture represent major problems that viticulture are going to face in the next years The present PhD project designed by FEM/UNITN and Gowan, a USA company investing in the development of eco-friendly plant protection products, aims at providing new solutions for these problems. A part of the project will be dedicated to the study of P. viticola populations attacking grapevine plants grown in the Province of Trento. The assessment of the occurrence of P. viticola populations resistant to synthetic fungicides and how the management practices are correlated to this phenomenon will be the major outcome of this topic. In parallel, research activities will be carried out to select new eco-friendly plant protection products effective in controlling P. viticola on grapevine. The subsequent characterisation of their mode of actions will be at the basis for the design of integrated pest management strategies. A deep knowledge on the P. viticola populations present in the Province of Trento and the new management strategies developed in this project will lower the negative impact of grapevine downy mildew management on the environment and consumers health

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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title:
AGRI04 - Dissecting the genetic and physiological mechanisms of grapevine resilience to heat stress

Funding Body:
Fondazione Edmund Mach
Università degli studi di Padova

PhD Program Supervisor/s:
Laura Costantini, Luca Cappellin

Context / Synthetic description of the project and research outcome

Temperature is acknowledged as the single most significant climate variable, negatively impacting on grapevine productivity and wine quality. This project aims to dissect the physiological and genetic mechanisms of resilience to heat stress (HS), to provide knowledge for supporting plant breeding innovations or novel sustainable management strategies in viticulture. To this purpose, QTLs (quantitative trait loci) for thermotolerance, as evaluated through photosynthetic parameters, will be genetically mapped in a cross between parents with divergent response to HS. Moreover, the existence of a relationship between photosynthetic efficiency, antioxidants and other leaf metabolites, leaf emission of biogenic volatile organic compounds (potentially involved in protection), and warming sensitive traits, like phenology and berry ripening indices, will be investigated. Genetic results will be complemented by a deeper metabolic/ecophysiological/molecular characterization of selected individuals representative of different thermotolerance grades, which will help to raise new hypotheses regarding the functional regulation of grapevine resistance to HS.

The PhD student should have adequate analytical chemistry background, attitude for statistics, and willingness to acquire plant physiology and quantitative genetics skills to deal with the optimization of phenotyping, HPLC-MS, GC-MS, PTR-TOF analyses, the collection of all other phenotypic data, the QTL mapping and the identification/characterization of candidate genes under the supervision of experts in the different scientific areas.

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CALL 2020 – CYCLE 36

Title:
AGRI05 - QualiMap: Genetic mapping of fruit quality traits in pear

Funding Body:
Fondazione Edmund Mach
IRTA (Spain)

PhD Program Supervisor/s:
Fabrizio Costa; Jordi Giné Bordonaba

Context / Synthetic description of the project and research outcome

Pear fruit are appreciated by consumers for their intrinsic quality properties. These traits are genetically controlled by a high number of genomic loci, which today represent important targets in various breeding programs worldwide.
The main objective of the "QualiMap" project is the identification of the genetic regions involved in the control of important agronomic-qualitative characteristics essential for the definition of fruit quality and performance in the post-harvest phase. The project will use modern genotyping technologies for the realization of two genetic maps characterized by a common pedigree. The analysis of the segregation of the markers, together with the study of the variability of the different phenotypes considered during this study, will allow the identification of the genomic regions involved in the control of the heritability of these features (QTL). These genetic loci will initially be identified individually in each of the two genetic maps by means of a single bi-parental QTL mapping approach. After their identification, the effect of these QTLs will be further analysed through a combined approach through the Pedigree Based Analysis strategy, which will allow a more in-depth investigation of the genetic control of these qualitative properties. Finally, the availability of the pear tree genome will allow the in-silico identification of the genes included in these genetic regions, in order to hypothesize the physiological pathways undertaking the control of these important traits.
With this project we will identify the regions of the pear genome involved in the regulation of important fruit quality properties and post-harvest performance. The identification of the QTL and the analysis of the variome will allow the definition of the alleles associated with these properties. These alleles will be ultimately considered and validated as an important selection tool available to breeders to support and the genetic programs addressed to ameliorating the quality properties of this species.

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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title
AGRI06 - New strategies for Botrytis bunch rot control for a sustainable viticulture

Funding Body:
Fondazione Edmund Mach; CAVIRO (Wine Cooperative)

PhD Program Supervisor/s: Giulia Malacarne

Context

Worldwide viticulture makes use of massive amount of pesticides to control grapevine (*Vitis vinifera* L.) major diseases. Bunch rot, caused by the fungus *Botrytis cinerea* (Bc) is the most serious disease of grape clusters especially during rainy seasons and it leads to significant yield losses and reduced fruit quality.

Synthetic description of the project

Main aim of the project is to find safer alternatives for Bc control in grapevine with benefits both for human health and the environment.
Two main strategies will be hence pursued.

1. *Biochemical analysis and genetic manipulation of the cell wall metabolism.*
   Being the first barrier, the cell wall (CW) plays a major role in the host defence strategy against the infection. There is evidence both in Arabidopsis and in crop species that the degree of methyl-esterification of the CW pectin, which is regulated by Pectin Methyl-Esterase (PME) enzymes, is key in determining the fate of Bc infection. In the project, candidate *VvPME* genes will be functionally characterized by knock-out (using gene editing) or over-expression via genetic engineering. The most promising lines will be assessed for Bc resistance and characterized at molecular level by biochemical and gene expression analysis, to understand the role of these enzymes in the grapevine defence against Bc.
2. *Monitoring of field natural infection by molecular diagnostics to test alternative products and treatment optimization.*
   A method based on quantitative PCR will be set-up using bunch trashes collected in vineyards at different locations as a proxy for Bc natural infection and potential evolution during the season. Once set up, this diagnostic tool will help in assessing the efficacy of alternative Bc control products or in supporting more efficient treatments with already in use products (precision viticulture).

Expected results

i) Insights into the PME-mediated defence mechanism in grapevine;
ii) Bc resistant plants;
iii) a molecular method to precisely estimate Bc load in the field.

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CALL 2020 – CYCLE 36

Title:
AGRI-FOOD07 -Management of varietal thiols in wines using biotechnical tools" - "Biothiols"

Funding Body:
Fondazione Edmund Mach - Oenobrands

PhD Program Supervisor/s:
Tomas Roman; Tiziana Nardin

Context / Synthetic description of the project and research outcome

The bouquet of wine is determined by the set of compounds having the capacity to impact the aroma. These molecules come directly from the grapes (primary aromas), can be formed during the fermentation process (secondary) or are developed during the ageing process (tertiary). The family of varietal or polyfunctional thiols straddles the first two groups. They were initially hypothesized as a varietal character of the grape as they typify the aroma of Sauvignon Blanc wines and the sulfur molecules are present in the berries as non-aromatic precursors. Thiols are then partially released or formed during the fermentation process through the biochemistry of certain yeast strains, but the ratio of the volatile molecules in wines and the precursors in the musts rarely exceed 2-3% at industrial conditions. Not only but among grape lots there is not even a clear correlation between the concentration of precursors in must and the volatile thiols in the corresponding wines. Besides, with current knowledge the origin of about half of the content in the wine cannot yet be explained. On the contrary, studies have shown a correlation with certain must components intervening in normal yeast processes, or with secondary metabolites resulting from it. This allows to understand how the conditions of the matrix and the fermentation process can significantly influence the production of aromatic thiols by yeasts. Both fall within the technologically exploitable capacity in the cellar through physical, chemical and biotechnological processes.

The project initially aims to deepen the biochemistry of yeasts on the release of thiols, investigating certain secondary activities present in oenological enzymes and naturally active in yeast metabolism and the impact of yeast nutritional formulations. The limited studies carried out on red and rosé wines report thiol content in some varieties/wines such as to positively impact the aroma. These compounds present however a high reactivity towards some metals and phenolic compounds, present in red and rosé wines in higher concentrations compared to whites, and potentially limiting the final content of the aroma molecules. On the basis of the previous results, it is intended to evaluate the biotechnological management capacity in the winery, also through the use of enological techniques and vinification protocols to optimize their content in wine.

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CALL 2020 – CYCLE 36

Title:
AGRI-FOOD08 - Eno Functional Agro Pedology: Agro pedological determinants of fine chemical composition, quality and shelf life of Trentino's white wines. "PEDOWINES"

Funding Body: Fondazione Edmund Mach (FEM), CAVIT s.c.

PhD Program Supervisor/s:
Giorgio Nicolini, Roberto Larcher, Tiziana Nardin

Context / Synthetic description of the project and research outcome

In Trentino (N-E Italy; 10000 hectares of wine grapes) more than 70% of the vineyard is cultivated with white fruited varieties, also for the luck of one of its iconic products, Trento DOC sparkling wine. CAVIT s.c., co-founder of the Ph.D. project and one of the Italian biggest wine companies, produced a smart and detailed soil map (PICA, Integrated Vineyard Mapping Platform; https://www.youtube.com/watch?v=2KkSCLQBWZ4&feature=emb_rel_end) after a five-year research project carried out in collaboration with leading research centres in Trentino (Edmund Mach Foundation and Bruno Kessler Foundation). Using PICA, several vineyards will be selected on the basis of different pedologic and agronomic characteristics (soil depth, Available Water Content-AWC ...). Phenology as well as hydric, nutritional and vegeto-productive parameters will be recorded also by means of non-destructive measurements (e.g. NDVI index).
These vineyards will be the basis to investigate the relationships between pedologic/agronomic sources of variance and chemical compounds that significantly impact not only on sensory characterization and quality of still and classic method sparkling wines, but also on wine shelf-life, mainly related to the so-called Atypical Aging Off-Flavour (ATA) and different sulfur compounds (e.g. dimethylsulfide). ATA is an emerging problem of wines destined for long aging, as can be the case of Trento DOC classic method sparkling wine, in probable relationship also with inadequate agronomic choices to face the recent climatic changes.
The fine chemical composition of juice/wine will be studied using advanced analytical approaches (e.g. UHPLC-HESI-II, GC-MSMS…) available at FEM-CTT labs, mainly focusing on tryptophan, auxins both as free and bounded forms, skatole, 2-aminoacetophenone, glutathionyl- and cysteinyl-3-mercaptohexanol, S-methyl-methionine.
The field activities will occur in several Trentino vineyards in spring-summer, while equivalent time will be spent in the CTT chemical labs. European and extra-European stages are supported.
Results will be published on technical magazine and impacted scientific journals; moreover, they will be useful in technical consulting and directing the agronomic decisions of the industrial co-founder.

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CALL 2020 – CYCLE 36

Title:
FOOD09 - Traceability and authenticity of food using ^{1}H-NMR profiling

Funding Body:
Fondazione Edmund Mach
BRUKER BIOSPIN GmbH

PhD Program Supervisor/s:
Camin Federica, Bontempo Luana

Context / Synthetic description of the project and research outcome

There is increasing global demand to establish the authenticity and integrity of food products traceable along the entire production and supply chain.
^{1}H NMR (proton Nuclear Magnetic Resonance) profiling is an emerging and robust technique for the characterization of food quality, authenticity and origin. Bruker Biospin has developed ^{1}H NMR automated systems based on targeted (identification and quantification of specific compounds) and untargeted (acquisition of the whole spectrum i.e. profiling) analysis combined with multivariate statistical chemometrics. This approach has been used in the last years for detecting the authenticity and tracing the geographical origin of honey, wine and fruit juices (Honey-Profiling^{TM}, Wine-Profiling^{TM}, Juice-Profiling^{TM}).
The aim of this project is the development of new systems based on ^{1}H NMR profiling, usable to assess the authenticity of premium food products poorly investigated up to now, i.e. extra virgin olive oil and Aceto Balsamico di Modena. These systems to be effective and reliable require development of standard analytical and chemometric procedures, analysis of a large number of authentic samples to create appropriate databases, good quality NMR spectra and suitable processing and pattern recognition algorithms.
The expected outcome is training of the student on innovative and powerful analytical and chemometric techniques and on food adulteration and traceability topics as well as in generic and transferable skills that are necessary to ensure PhD student success in the academic, non-academic and industrial sectors. Other outcomes will be innovative results publishable in IF scientific journals and development of automated systems that can be commercialised and used by stakeholders.

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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title:
ENV10 - Development and application of a Flow-tracking Polar Organic Chemical Integrated Sampler for quantifying of pesticides fluxes in Alpine streams - FLOW-POCIS

Funding Body:
University of Trento, Associazione Produttori Ortofrutticoli del Trentino, Consorzio di Tutela Vini del Trentino

PhD Program Supervisor/s:
Guido Zolezzi, Roberto Larcher

Context / Synthetic description of the project and research outcome

The goal of this PhD research is to develop, test and apply a novel integrated sampler able to quantify time-averaged fluxes of pesticides in Alpine streams. POCIS (Polar Organic Chemical Integrated Samplers) have been increasingly used in the last two decades to monitor the presence of micropollutants in running waters, but they fail to provide reliable information on the pollutants' concentration, representing the main research goal of FLOW-POCIS. Together with chemical laboratory investigations to test the absorption rates of the samplers, existing POCI samplers will be integrated with flow meters suitable to measure water flow through the samplers, to estimate the time-averaged concentration of pesticides,
The PhD will be highly interdisciplinary and require expertise in river hydraulics, environmental chemistry, pesticides chemistry, thermodynamic of sorbent, and field equipment testing and development.
This PhD proposal originates from interaction of the supervising team and colleagues with the Trentino Environmental Protection Agency (APPA), which will ensure applicability of the developed technology and support its application. The project will consist of a first design and test phase in the laboratory (hydraulics lab at DICAM, Uni Trento), the development of analytical test and pesticide residues measurements (pesticides lab at FEM), followed by field testing and pilot applications in selected sites of recognized local relevance.
The ideal candidate is highly motivated and has a background in environmental engineering, chemistry or environmental sciences, and is willing to develop the missing knowledge and skills needed for this interdisciplinary research. Experience in the laboratory and field work would be appreciated. The interest shown by local fruit producers and winegrowers will facilitate exposure of the PhD student to a broad professional network from research to environmental monitoring**.**

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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title:
ENV11 - Impact of human activities on the hydrology and water resources of mountains areas of Adige and Tevere rivers basins

Funding Body:
UniTrento DICAM
CNR IRPI Perugia

PhD Program Supervisors:
Riccardo Rigon, Christian Massari

Context / Synthetic description of the project and research outcome

The candidate will be asked to extend the GEOframe system with tools to understand the anthropogenic impacts on the hydrological cycle on Adige and Tevere basins via the integration of hydrological modelling and satellite/ground based observations. They will start from an already existing solid base (operational at the ARPAB and implemented in various catchment around the world) and tries to answer the following research questions: how much human activities is impacting mountainous region and which will be the main challenges in the future ? How water resources should be allocated to respond to the future needs ?How to best manage water resources among the competing interests ?The Ph.D. candidate will take care of the implementation of a suite of modelling solutions for the Adige and the Tevere river basin with specific focus on some subcatchments.
In general the research activities will aim to fuse information from any available source and especially remote sensing of snow, soil moisture, surface temperature, vegetation with model components of new type developed inside the GEOframe platform. The project is part of a wide spectrum of collaborative research activities between UniTrento, IRPI-PG and EURAC.

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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title:
ENV12 - Assessment of atmospheric flows and turbulence over sloping terrain and their impacts on agricultural operations and crop protection - MOUNTAGRIMET

Funding Body: UniTN - Co.Di.Pr.a

PhD Program Supervisor: Prof. Dino Zardi

Context / Synthetic description of the project and research outcome

The project fill focus on thermally driven flows over complex terrain – in particular up-slope flows produced by surface heating during daytime and down-slope flows originating from surface cooling during nighttime – and their impact on crops, especially over valley sidewalls.

The project will combine an observational approach (including the analysis of data from previous field measurements as well as data collected at targeted campaigns to be specifically arranged within the project), and modelling efforts, by means of both similarity analysis and numerical simulations.

The candidate will investigate the development in time and space (especially vertical profiles) of physical quantities (such as temperature, wind strength and direction, air pressure, water vapour content, heat fluxes, radiation, precipitation, etc.) controlling soil-vegetation-atmosphere dynamics. The focus will be not only on mean values, but also on turbulent fluctuations and their connections with transport processes and soil-vegetation-atmosphere exchanges.

Accordingly, the project will combines the analysis of data from measurements by means of both conventional weather stations and advanced instruments (sonic anemometers, fast response water vapor and CO2 analysers, lidar, tethered balloon, etc.) adopting the state of the art techniques, specifically developed for complex terrain situations. Also new algorithms for the analysis of data, especially for turbulence quantities, will be tested and applied.

Results will contribute to propose and testing improved closures of subgrid phenomena and parameterisations of surface processes in numerical weather prediction models.

The project output will be applicable to a series of phenomena relevant to agriculture and crop protection, such as monitoring and management of surface-plant-atmosphere exchanges (e.g. evapotranspiration), modelling of airborne transport of parasites, management and optimisation of spraying of antiparasitic treatments, forecasting cold air drainage and frost risks.

The project will benefit from cooperation with and support from CoDiPra in keeping connections with farmers and their organisations during the project.

The project will also benefit from existing measurement instruments and expertise in field observations, data analysis and numerical modelling available at the Atmospheric Physics Group of the Department of Civil, Environmental and Mechanical Engineering, as well as from connections with international partners and cooperation projects and initiatives in the field, in particular the programme Transport and Mixing over Complex Terrain (TEAMx).

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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title:
ENV13 - River Ecomorphodynamic modelling

Funding Body:
DICAM – Dipartimento di Eccellenza

PhD Program Supervisor/s:
Annunziato Siviglia, Walter Bertoldi

Context / Synthetic description of the project and research outcome

River managers are challenged by the need to ensure flood protection, water resources availability, and ecosystem health in a changing environment. Understanding and predicting the interaction between riparian vegetation and river morphology is crucial to assess river evolutionary trajectories under different climate, flow regulation, and river restoration scenarios. In this context, the goal of the project is twofold. First, to improve the quantitative description of the most relevant geomorphological processes to include them in numerical models. Second, to increase our understanding of such processes on the overall morphodynamics of rivers. The project specifically aims at (i) investigating how erosion and deposition processes, in combination with water level oscillations, affect the above- and below-ground riparian vegetation biomass; (ii) disentangling the role of uprooting and burial mechanisms during flood events; and (iii) understanding the mutual effect between vegetation and sediment sorting. This project will focus strongly on mathematical and numerical models. The research will involve setting up and running numerical simulations and mathematical modelling of ecological processes.

The successful candidate will have a strong engineering background, skills in coding (e.g. C++, FORTRAN, Python, MATLAB) and a desire to work at a modelling level at the interface between hydraulics and ecology. Fluent spoken and written English, as well as good communication skills are required.

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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title:
ENV14 - Changes in the Mediterranean climate with global warming: Impacts on water resources

Funding Body:
DICAM – Dipartimento di Eccellenza

PhD Program Supervisor/s:
Simona Bordoni

Context / Synthetic description of the project and research outcome

The aim of this project is to improve our understanding of mechanisms regulating the Mediterranean hydrological cycle and its response to warming, through analyses of observational products, ERA5 and MERRA2 reanalyses, targeted model simulations and simulations in the CMIP5 and the soon-to-be-available CMIP6 archives. The analyses will be guided and interpreted through the lenses of the large-scale budgets of moisture and energy, whose terms will be decomposed in mean, transient and stationary eddy contributions. This approach will allow us to: 1) Assess the relative role of each term in the maintenance of the observed hydrological cycle in reanalyses; 2) Explore to what extent GCM simulations of present-day climate are able to correctly represent the observed climatology; 3) Evaluate changes with warming, to relate them to changes in mean, stationary and transient eddy circulation patterns, humidity and /or stability changes. Targeted experiments will be aimed at assessing if future changes are primarily driven by increases in global mean sea surface temperatures (SST), by spatial “patterns” of SST changes, such as those related to changes in meridional SST gradients or basin-wide changes, or a combination of both.

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PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title:
ENV15 - Movement behavior impacts and population consequences of an intensive white-tailed deer sterilization program in New York City

Funding Body:
Fondazione Edmund Mach
White Buffalo Inc.

PhD Program Supervisor/s:
Francesca Cagnacci

Context / Synthetic description of the project and research outcome

Overabundant white-tailed deer (Odocoileus virginianus) in suburban communities create conflicts, including increased deer-vehicle collisions (DVC), a rise in tick-borne diseases, and concerns about forest degradation. Non-lethal management techniques are appealing in areas where traditional management methods are not feasible or practical. Fertility control has been shown to limit reproduction in deer, however behavioral impacts should be considered. There is a concern that fertility control programs which result in a high percentage of females exhibiting multiple estrous cycles (e.g., vasectomy, tubal ligation, PZP vaccine) may increase DVC risks due to extended breeding behavior. Risks of extended breeding behavior also include the potential reduced physical condition of individuals. Despite the widespread interest in these methods and the need for additional management tools, little is known about their behavioral impact.
This project will compare seasonal movement and activity of white-tailed deer at two study sites in suburban areas of the northeast USA (Staten Island, New York and a nearby control site) to document the effect of a high percentage vasectomy treatment (i.e., inducing multi-estrous cycles in females) in one population (Staten Island). The hypothesis that the treatment will not create extended breeding related movements and increased energetic expenditure will be tested.
The output of this research will provide scientific support to the application of a humane method to manage wildlife-human conflicts and favour, thus favouring the use of this and similar approaches.

PhD in AGRIFOOD AND ENVIRONMENTAL SCIENCES

CALL 2020 – CYCLE 36

Title: ENV-16 Hydro-morphodynamics and water-related ecosystem services in near-natural river corridors and wetlands

Funding Body: University of Trento

PhD Program Supervisor/s: Guido Zolezzi (C3A), Davide Geneletti (DICAM)

Context / Synthetic description of the project and research outcome

River corridors and wetlands provide high-value ecosystem services because of their role in the landscape at the land–water interface; they act as filters, conveyors of water, sediments and organic matter, and provide key habitat diversity for wildlife, but also water and sediments suitable for different human uses. Knowledge of their natural dynamics and functioning is essential for their sustainable management, though in Europe, very few river corridors and wetlands still retain near-natural functioning where those dynamics can be observed, because of heavy anthropic pressures.

Such near-natural conditions occur especially in regions characterized by limited data availability, rapid socio-economical transformations, and difficult enforcement of environmental regulatory frameworks. In Europe, these combinations are frequent in the Western Balkans / South-East regions. where a still outstanding natural value is often paralleled by a high risk of uncontrolled and often non-reversible environmental degradation. The heavy regulation of river channels, floodplains and wetlands that occurred in many countries worldwide has fundamental implications for ecosystem services provision, leading to loss of human well-being, biodiversity, negative long-term impacts on economies, communities, and business.

In general terms, this PhD research (i) will address the eco-hydro-morphological functioning of near-natural river corridors (e.g. Gurnell et al., 2016, Schiemer et al., 2020) and wetlands and (ii) will develop a replicable, integrated approach for the biophysical, socio-cultural and economic assessment of related ecosystem services (Weibel et al. 2018; Grêt-Regamey et al., 2015). The investigation will have a specific focus on South-East Europe, namely in Albania, which will offer the primary case studies for the investigation, including the Vjosa river basin and other wetlands in the country. Other case studies may be considered in analogous climatic, biogeographic settings to support generalization of the research outcomes. The project requires strong motivation to conduct inter-disciplinary research in the context of international cooperation, with extensive fieldwork to collect biophysical data, as well as to interact with local institutions, stakeholders and communities.