

Summer School of the project ARISTO

Pesticides and other soil organic pollutants: interactions with the soil microbiota and implications for soil health and climate change



Venue: Conference and Cultural Centre in the old Monastery Paou, Argalasti
Pelion Greece (<http://mpaou.uth.gr/en/>)

Time: 27 – 31 May 2024

Website ARISTO project: <http://aristo.bio.uth.gr/>

Contact: avoul@uth.gr



ARISTO is funded by the European Union Horizon 2020 Research and Innovation Program under Grant Agreement No. 956496, and in the frame of the MSCA-ITN-EID-H2020 call. This document reflects the opinion of the author the European Union cannot be held responsible for any use which may be made of the information contained in this document

A few words about the ARISTO summer school

Pesticides and other organic pollutants like plastics, veterinary medicines and pharmaceuticals are known to interact with the soil microbiota with the outcome of this interactions being either growth-linked biodegradation or ecotoxicity. Recent evidence suggest that microbial communities, which are known to be involved in several ecosystemic services (e.g. soil fertility, food production, biocontrol etc), become more vulnerable to external perturbations under a multitude of biotic and abiotic stressors including climate derived stress. In order to minimize the effects of abiotic stressors on the soil microbiota and the reciprocal and cascading effects on ecosystem functioning we have identified the major process involved in the response of the soil microbiota upon exposure to single or multiple stressors and how these responses magnify along the soil food web. Defining mechanisms of soil microbiota response would enable us to define pathways to harm the soil microbiota and soil health. ARISTO an EU ITN-EID project (Grant agreement No. 956496 , <http://aristo.bio.uth.gr/>) is organizing a summer school whose main scope is to provide insights into the complex interactions driving the response of environmental microbial communities to different stressors. Particular note will be given to biodegradation of pollutants and the life cycle and responses of N cycling microbial groups and arbuscular mycorrhizal fungi as key functional microbial groups in soil ecosystems. Finally novel risk assessment approaches for pesticides and terrestrial ecosystems will be presented including soil microbiome analysis and pesticide mixtures. Besides taught lectures the attendees will get training of exposure mathematic modeling for pesticides, an indispensable element of environmental risk assessment.

Venue: The Summer School will be hosted in the Conference and Culture Centre of the Monastery Paou, Argalasti Pelion (<http://mpaou.uth.gr/en/>) which belongs to the University of Thessaly.

Attendees: The Summer School will be attended by the 9 PhD students of the ARISTO project but it will be also open to PhD students beyond the ARISTO project network that are interested in microbial ecology, environmental risk assessment and pollutants biodegradation. **There is no fee for the students attending the summer school and there will be 5 to 7 places for attendees beyond the ARISTO students. The attendees will be offered accommodation in the Monastery (double rooms shared with en-suite facilities) and lunch. In the venue there is common room and kitchen where coffee could be prepared.**

How to apply for a place: Students interested in attending the Summer School should send a CV to the following email dkarpouzas@uth.gr with a subject title "Summer School ARISTO".

Deadline for applications: 15 April 2024

Presenters: A list of top-class experts will be presenting in the Summer School. Brief description of each of the presenters **is provided below**



Prof. Dr. Lorenz Adrian is currently the Head of the Department of Molecular Environmental Biotechnology at the Helmholtz-Centre for Environmental Research – UFZ in Leipzig. He also holds the position of Professor for Geobiotechnology at the Institute for Biotechnology, Technische Universität Berlin since 2017. With a diverse academic background, Adrian has held various significant roles, including Senior Scientist at UFZ Leipzig, specializing in Isotope Biogeochemistry and Functional Genomics. He has also served as an ERC group head. Adrian's

academic journey includes postdoctoral research stints at institutions such as Cornell University and Rensselaer Polytechnic Institute in the United States. He completed his Habilitation at the Institute for Biotechnology, TU Berlin, following doctoral research at TU Berlin and diploma studies in Biology and Applied Molecular Biochemistry at Universität Bonn and the University of Manchester, respectively. With a wealth of experience and expertise, Adrian continues to contribute significantly to the fields of environmental biotechnology and geobiotechnology.

Dr. Evangelos Topakas holds a distinguished degree in Chemistry from Aristotle University, Thessaloniki, Greece, and earned his Ph.D. in Industrial Biotechnology from the National Technical University of Athens (NTUA) in 2004. His academic journey includes impactful roles such as a Research Associate at the Institute for Cell and Molecular Biosciences, University of Newcastle upon Tyne, and the Biotechnology Laboratory at NTUA. In 2010, he served as a Visiting Assistant Professor at Chalmers University, followed by his appointment as a Lecturer in January 2012 and subsequent promotions to Assistant Professor in November 2014 and Associate Professor in July 2019. As of December 2023, he holds the prestigious



position of Professor in Industrial Biotechnology at the School of Chemical Engineering, Department of Synthesis and Development of Industrial Processes, NTUA. Since March 2015, Dr. Topakas has concurrently served as a Visiting Associate Professor in the Chemical Engineering Division of the Department of Civil, Environmental, and Natural Resources Engineering at Lulea University of Technology, Sweden. This dual role has expanded his collaborative efforts and enriched his experiences in Northern Europe.



Dr. Georgios Fragkoulis has a Ph.D. in Agricultural Chemistry (Università Cattolica del Sacro Cuore, Istituto di Chimica Agraria ed Ambientale, Piacenza, Italy) and a M.Sc. in Agricultural Engineering and Water Resources (Aristotle's University of Thessaloniki, Greece, Department of Hydraulics, Soil Science and Agricultural Engineering). He is a Scientific manager in AEIFORIA HELLAS Ltd, with more than 15 years of experience in environmental fate modelling and risk assessment for Plant Protection Products, as required for national and EU product registration and renewal.



Dr. Evangelia Papadopoulou is an Assistant Professor specializing in Environmental Microbiology at the Department of Environmental Sciences, University of Thessaly, Greece. Her research primarily focuses on investigating the environmental fate and behavior of agrochemicals, including pesticides and nitrification inhibitors, and their intricate interactions with soil microorganisms, particularly those involved in nitrogen cycling. With a strong dedication to scholarly inquiry, she has (co)authored 24 publications in peer-reviewed journals (citations: 670, h-index of 17) and has made significant contributions to numerous EU-funded projects, such as MSCA-IAPP-FP7, HORIZON-WIDERA-2021-ACCESS-03 (Twinning) as well as national initiatives including BIOREMEDIATOMICS and HFRI. Additionally, she has actively engaged in industrial collaborations, further demonstrating her commitment to advancing scientific knowledge and fostering practical solutions in the realm of environmental microbiology.

Dr. Melanie Bottoms is an experienced soil organism ecotoxicology specialist. She completed a PhD in Soil Science and the University of Reading – focused on the fate and toxicity of veterinary medicines in the soil environment. She has worked at Syngenta for 14 years in a range of disciplines covering higher tier field study design through to Global ecological risk assessment. My research interests are broad ranging, from soil macro-invertebrates to the soil microbiome and everything in between, however her work is always rooted in regulatory need. Much of her recent work has been focused on ensuring an ecologically relevant pesticide risk assessment that is protective, robust and reliable.



Dr. Christina Ferousi earned in 2009 a BSc in Biology from the National & Kapodistrian University of Athens, followed by an MSc in Biology with a Major in Microbiology from Radboud University (the Netherlands) in 2013. In 2017, she completed her PhD in Environmental Microbiology at Radboud University, focusing on the enzymology of the biogeochemical nitrogen cycle, particularly on the enzymatic machinery of anammox bacteria. From 2018 to 2020, she served as a Camille and Henry Dreyfus Foundation postdoctoral research fellow at Cornell University (USA), researching the bioinorganic chemistry of microbial aerobic ammonia oxidation in the Inorganic Electronic Structure and Reactivity Group within the Department of Chemistry and Chemical Biology. Currently, she is a postdoctoral researcher in the Industrial Biotechnology & Biocatalysis Group ([IndBioCat](#)) at the School of Chemical Engineering of the National Technical University of Athens (Greece). Her research is dedicated to developing efficient and scalable bioprocesses aimed at waste reduction, optimized resource utilization, and environmental pollution mitigation.

Dr. Tiago Natal Da Luz has a PhD in Biology (speciality of Ecology) from the University of Coimbra, Portugal, in collaboration with the Free University of Amsterdam, The Netherlands. He is currently a hired researcher at the University of Coimbra, a position that he has held since 2018 with the management of the environmental management company Cloverstrategy Lda. Since 2001, has conducted research work in the field of soil ecotoxicology, promoting the development and standardization of laboratory tests with soil invertebrates as a tool to evaluate the toxicity of industrial residues and chemicals (e.g. metals and plant protection products; PPPs) and to support the ecological risk assessment of contaminated sites (integrated in the TRIAD approach). At the same time, has provided services to companies that include environmental impact assessments (with a higher focus on the entomological component) and evaluation of the effect of PPPs at soil community level (through the assessment of biodiversity and functional parameters). Has participated in research projects (with funding from national and international entities) related to the improvement of industrial wastes to allow its use in agricultural soils as organic amendments (supporting circular economy), validation and development of mesocosms for ecological risk assessment in the application of PPPs in temperate and tropical soils, and toxicity assessment of emerging soil compounds (e.g. nanomaterials).



Dr. Christina Hazard is a group leader in the Soil Microbial Ecology Group (soilmicrobes.fr) in the Bioengineering Department at Ecole Centrale de Lyon (ECL), France. Since 2020, she has been a permanent member of staff and prior to this a postdoctoral fellow at ECL and at the University of Aberdeen, UK. She received her Ph.D. degree in Environmental Biology at the University College Dublin, Ireland and M.S. and B.S. at the State University of New York, USA. Her group focuses on examining the diversity, distribution, interactions and activities of microorganisms (fungi, prokaryotes and viruses) in soil. Using a range of experimental systems from field-scale to controlled laboratory microcosm incubations and analyzed using molecular ecology, 'omic technologies and soil process measurements, projects aim to understand microbial contributions to biogeochemical cycling. Current funded research projects include examining the interaction between arbuscular mycorrhizal fungi and nitrifying prokaryotes and impact on nitrous oxide emissions, and the impact of virus-host interactions on nitrogen and carbon cycles.

PROGRAM

Monday 27.5.2024

10:00 - 13.00 Arrival of Attendees

13.00-14.00 Lunch break

14.00-18.00 Short presentations of the PhD students

Tuesday 28.5.2024 Soil microbial degradation of organic pollutants

9.30-10.30 Anaerobic degradation of organic pollutants – Lorenz Andrian, UFZ – Leipzig, Germany

10.30-11.00 Coffee Break

11.00-12.00 Biodegradation of plastics: Microbes and enzymes involved - Evangelos Topakas

12.00-14.00 Lunch Break

14.00-17.00 Pesticide exposure mathematical modeling training – George Fragkoulis

Wednesday 29.5.2024 N microbial cycling

9.30-10.30 Biological Nitrification Inhibitors: A new concept in our arsenal for decelerating N cycling –

Evangelia Papadopoulou

10.30-11.00 Coffee Break

11.00-12.00 The Anammox process – Christina Ferousi

12.00-14.00 Lunch Break

14.00-17.00 Pesticide exposure mathematical modeling training – George Fragkoulis

RISTO

Thursday 30.5.2024 Arbuscular mycorrhizal fungi and stressors

9.30-10.30 – Using arbuscular mycorrhizal fungi as an indicator of pesticide toxicity – the ERAMYC project –

Tiago Natal-da-Luz, Cloverstrategy Lda and University of Coimbra, Portugal

10.30-11.00 Coffee break

11.00-12.00 – Arbuscular mycorrhizal fungi interactions in the nitrogen cycle: A strategy for the mitigation of

N pollution from agroecosystems? - Christina Hazard – Ecole Centrale de Lyon, France

12.00-14.00 Lunch Break

14.00-17.00 Beach volley tournament

Friday 31.5.2024 Risk assessment of pesticides in terrestrial ecosystems

9.30-10.30 Using microbiome analysis as a tool for assessing the toxicity of pesticides on soil microbes,

Melanie Bottoms - Syngenta

10.30-11.00 Coffee Break

11.00-12.00 Mixtures of chemicals - how to assess their impact, Anja Coors (remotely), ECT Oekotoxicologie

12.00-13.00 Concluding remarks

13.00 Closure of the Summer School

ARISTO



SCAN ME FOR LOCATION



ARISTO is funded by the European Union Horizon 2020 Research and Innovation Program under Grant Agreement No. 956496, and in the frame of the MSCA-ITN-EID-H2020 call. This document reflects the opinion of the author the European Union cannot be held responsible for any use which may be made of the information contained in this document