

University Academic Curriculum Vitae

Personal information Name: Federica Piergiacomo

**Education
since leaving
school**

- **2020-2023**

- **PhD in Food Engineering and Biotechnology**

Free University of Bolzano-Faculty of Science and Technology

Address: Piazza Università 1, 3900, Bolzano, Italia, 39100 Bolzano (Italia)

City: Bolzano

Country: Italy

Website: <https://www.unibz.it/it/>

Project title: "Agri-food residues within the circular economy framework: Microbiological assessment of their potential reuse and the associated emerging contaminants under the One-Health vision"

Supervisor: Lorenzo Brusetti

Section: Agricultural Microbiology

Assessment of the impact of the addition of synthetic and compostable microplastic debris and antibiotics to microbial communities in microcosms made of "input" agricultural products (sediments/manure/compost) coming from two different and opposite areas (a cold Alpine and a warm Mediterranean one), through the use of several techniques such as PCR, Real-Time Polymerase Chain Reaction (RT-PCR) and also confocal fluorescence microscopy, genome sequencing and bioinformatic and metabolomic analysis on microcosms samples with a particular interest in the:

1. Taxonomic composition and functional gene diversity of the microbiome, as well as the biofilm formation of mixed microcosms compared to controls and the type of plastic/antibiotic used over time;
2. Qualitative and quantitative changes within bacterial antibiotic resistance genes in mixed microcosms towards control samples and plastic type/antibiotic over time;
3. Abundance of ARGs;
4. The metabolic response to antibiotic/plastic exposure.

Period abroad at Universitet I Oslo (UiO):

Metagenomic sequencing analysis and post processing with a bioinformatic approach and a focus on antibiotic resistance.

Period abroad at Norce Norwegian Research Centre:

Laboratory activities related to antibiotic resistance and microplastic pollution.

- **12/2024**

- **IELTS (General) Certificate**

British Council

- **06/06/2022-10/06/2022**

- **Workshop entitled "Metabarcoding in Microbial Ecology"**

Physalia courses

Email: info@physalia-courses.org

Understanding of the concept, potential and limitation of microbial metabarcoding techniques. Learning how to process raw sequencing reads to obtain meaningful information. Obtaining experience on how to statistically evaluate and visualize data. Being able to make informed decisions on best practices for own data.

- **05/2020-07/2020**

- **Cambridge English Level 1 Certificate in ESOL International (First)**

Cambridge Assessment English

- **2016- 2019**

Master's degree in Agricultural Science and Technology (110/110 cum laude)

University of Foggia, Department of Agricultural, Food and Environmental Sciences, Foggia (Italy).

Address: Via Napoli, 25, 71122, Foggia

City: Foggia

Country: Italy

Website: <https://www.agraria.unifg.it/it>

Thesis title: "Application of molecular methods for the evaluation of microbial ecology and functionality of nitrogen-cycling microbial populations in the agriculture and environment".

Section: Environmental Microbiology.

Knowledge in food and environmental microbiology, molecular biology and in the field of production of plant-source raw materials and soilless systems, biomass handling for agricultural use and groundwaters systems.

Use of molecular biology methods for the ecological-functional evaluation of the nitrogen cycle microorganisms in agriculture and environment: ARISA, end-point PCR, quantitative real-time PCR, NGS sequencing analysis, data analysis with molecular biology software.

Drafting of the thesis in English.

- **2017-2018**

PEF24

University of Foggia, Department of Agricultural, Food and Environmental Sciences, Foggia (Italy)

PEF24 in the Anthro-Psycho-Pedagogical disciplines and for the Didactic Methodologies.

- **2014– 2015**

Project of the European Union (Erasmus Plus)

Uniwersytet Przyrodniczy w Poznaniu-Poznan University of life sciences, Poznan (Poland)

Website: www.skylark.up.poznan.pl/en/

Attendance of English courses and acquisition of theoretical and practical laboratory skills in: Bioprocess Engineering, Bioprocess technology, Immunochemical methods in research and food analysis and Computerized control systems in food technology.

- **2013-2016**

Bachelor's Degree in Food Science and Technology (106/110)

University of Foggia, Department of Agricultural, Food and Environmental Sciences, Foggia (Italy). Address: Via Napoli, 25, 71122, Foggia

City: Foggia

Country: Italy

Website: <https://www.agraria.unifg.it/it>

Thesis title: "Management, control and application of microbial crop cultivation in continuous reactors".

Section: Industrial Microbiology.

Knowledge in food and industrial microbiology analysis, industrial biotechnology and bioengineering. Management of continuous biological reactors and related inoculum, determination of "start up" parameters and monitoring of the efficiency of the anaerobic digestion process and of biological nitrogen removal, through chemical and molecular analyses.

Learning and execution of conventional microbiological and molecular biology techniques for the chemical-physical/ molecular characterization of wastewater, industrial sludge and biomass samples: measurement of total solids and volatile total solids, DNA extraction, end point PCR, spectrophotometric measurement of ammoniacal nitrogen, nitrites and nitrates.

Data analysis

- **2011-2015**

Training course for Volunteers of Italian Red Cross

European First Aid Patent

Present appointment

- **Research Assistant**
- **15/02/2025– Today**
- **Level: International**
- **Libera Università di Bolzano-Faculty of Agricultural, Environmental and Food Sciences, address: Piazza Università 1, 3900, Bolzano, Italy, 39100 Bolzano (Italia)**

Development of bioinformatic methods for genomic and proteomic analyses applicable to molecular data from food and biological matrices, and establishment of protocols for gene quantification through real-time PCR.

Professional experience

From / to	Job title	Name of academic Institution	Academic level	responsibilities
15/02/2025-14/02/2026	Near misses – Brusetti 2024 + Plant wastes bio recycling in novel foods enriched in biologically active peptides - PROACTIVE + Fondo sviluppo nuovi progetti Raffaella di Cagno”	Free University of Bolzano-Bozen, Faculty of Agricultural, Environmental and Food Sciences, Bolzano (Italy)	Researcher	Development of bioinformatic methods for genomic and proteomic analyses applicable to molecular data from food and biological matrices, and establishment of protocols for gene quantification through real-time PCR.
1/11/2023 – 14/04/2025	(ROCK-ME) Risposta dei Rock Glaciers al riscaldamento globale	Free University of Bolzano-Bozen, Faculty of Agricultural, Environmental and Food Sciences, Bolzano (Italy)	Researcher	Bioinformatic analyses of antibiotic and metal resistomes, metabolic pathways reconstruction and statistical analysis to integrate data with chemical, biotic, and environmental factors
03/2020 – 05/2020	Study of biomolecular data and use of bioinformatic methods for the evaluation of anaerobic digestors microbial communities	University of Foggia, Department of Agricultural, Food and Environmental Sciences, Foggia (Italy)	Researcher	Statistical analysis of biomolecular data, microbial communities of anaerobic digestors using several statistical softwares.
12/12/2019 – 12/01/2020	Study of biomolecular data on faecal indicators	University of Foggia, Department of Agricultural,	Researcher	Application of molecular methods (in particular

	and groundwater microbial communities	Food and Environmental Sciences, Foggia (Italy)		ARISA) for the detection of pollutant microbial communities in groundwater, Data analysis
01/08/2019 – 14/11/2019	Sustainable water management and wetland restoration strategies in northern China, SuWaRest) (TN8203)	Free University of Bolzano-Bozen, Faculty of Science and Technology, Bolzano (Italy)	Researcher	Drafting of a complete scientific paper in English, based on the available data and a draft of the manuscript, to be presented for an international peer-reviewed journal; Drafting of a short communication in English to be submitted to an international journal dealing with environmental microbiology. Data analysis.
1/10/2018 – 31/10/2018	Study of Arisa methods to define the impact of pollution on microbial communities of the aquifers	University of Foggia, Department of Agricultural, Food and Environmental Sciences, Foggia (Italy)	Researcher	Application of molecular methods (in particular ARISA) and statistical analysis of the related data to define the impact of pollution on the microbial communities of groundwater wells.

Participation in exhibitions (where applicable)

RotaryEnfasi2019 competition

Project: **EUREKA! Energy Unit (where) Recovering (is the) Key Asset**

team leader: dr. De santo Francesca, dr. Paolo Morisco.

other team members: dr. Piergiacomo Federica, Colucci Donato, D'Amore Saverio, De Matteis Giovanni Pasquale, Macchiarola Ines.

Tutor: Prof. Monteleone Massimo (University of Foggia)

- Amount admitted for financing € 11,000.00

Experience in academic teaching

**Postgraduate supervision (PhD level)-Teaching assistant:
03/2021 – Today**

Carried out laboratory exercises regarding environmental microbiology, molecular biology and bioinformatics (32 hours) within the course of "General and agricultural microbiology" AGRI-08/A (AGR/16) among the bachelor course in Agricultural Science and Agricultural Technology at the Free University of Bolzano, Italy.

Postgraduate supervision-Bachelor Thesis in Agricultural, Food and Mountain Environmental Sciences:

Thesis title: "Microplastics increase the bacterial ciprofloxacin resistance in mountain freshwater sediments". Academic Year: 2023/2024.

Aim: comprehensively investigate the dynamics and the ecological consequences of microbial communities in relation to emerging contaminants through a study case in Alpine rock glacier and its derived freshwater.

Postgraduate supervision- Path for Transversal Skills and Orientation (PCTO) for students of:

- I.I.S.S. "Gandhi" (Merano, Italy)
- Scientific Highschool "E.Torricelli" (Bolzano, Italy)
- I.I.S.S. G. Galilei (Bolzano, Italy)

2023 – Today

Teacher for the PNRR 3.1 project 'New Skills and New Languages – The Microbiota Associated with Microplastics in Urban Environments' (CUP C54D23001680006). Taught two editions of a 12-hour course (24 hours total) at I.I.S.S. G. Galilei. Academic period: January–April 2025

Memberships

Member of the Italian Society of Environmental, Agricultural and Food Microbiology (SIMTREA)

Research and scholarships

Date granted	Award Holder(s)	Funding Body	Title	Amount received
15/02/2025-14/02/2026	Federica Piergiacomo	University of Bolzano-Bozen, Faculty of Agricultural, Environmental and Food Sciences, Bolzano (Italy)	Near misses – Brusetti 2024 + Plant wastes bio recycling in novel foods enriched in biologically active peptides - PROACTIVE + Fondo sviluppo nuovi progetti Raffaella di Cagno"	€ 24.000
1/11/2023-14/02/2025	Federica Piergiacomo	Free University of Bolzano-Bozen, Faculty of	(ROCK-ME) Risposta dei Rock Glaciers al riscaldamento	€ 22.200

		Agricultural, Environmental and Food Sciences, Bolzano (Italy)	globale	
03/2020-05/2020	Federica Piergiacomo	University of Foggia, Department of Agricultural, Food and Environmental Sciences, Foggia (Italy)	Study of biomolecular data and use of bioinformatic methods for the evaluation of anaerobic digestors microbial communities	€ 2.500
12/12/2019 – 12/01/2020	Federica Piergiacomo	University of Foggia, Department of Agricultural, Food and Environmental Sciences, Foggia (Italy)	Study of biomolecular data on faecal indicators and groundwater microbial communities	€ 700
01/08/2019 – 14/11/2019	Federica Piergiacomo	Free University of Bolzano-Bozen, Faculty of Science and Technology, Bolzano (Italy)	Sustainable water management and wetland restoration strategies in northern China, SuWaRest) (TN8203)	€ 4.100,00
1/10/2018-31/10/2018	Federica Piergiacomo	University of Foggia, Department of Agricultural, Food and Environmental Sciences, Foggia (Italy)	Study of Arisa methods to define the impact of pollution on microbial communities of the aquifers	€ 500

Publications

- Mosca Angelucci, D.*, **Piergiacomo, F.***, Donati, E., Pagani, L., Minuti, E., Brusetti, L., Tomei, M. C. 2025. Combined effects of ciprofloxacin and microplastics on alpine spring water microbiota: evidence from glacier-fed microcosm experiments. *Frontiers in Microbiology*, 16, 1654589. <https://doi.org/10.3389/fmicb.2025.1654589>. IF:4.5

*These authors have contributed equally to this work and share first authorship

- Auriemma, S., Chowdhury, A. A., Sorze, A., Valentini, F., **Piergiacomo, F.**, Dorigato, A., Brusetti, L. 2025. Wood-derived topsoil cover positively influences the diversity and activity of tomato plant rhizobacteria. *Resources, Environment and Sustainability*, 100241. <https://doi.org/10.1016/j.resenv.2025.100241>. IF:7.8

- Beneduce, L., **Piergiacomo, F.**, Sikorska-Zimny, K. 2024. Different Nutritional Regimes in a Tomato Soilless System Affect the Bacterial Communities with Consequences on the Crop Quality. *Agriculture*, 14(12), 2254. <https://doi.org/10.3390/agriculture14122254>. IF:3.3
- Clagnan, E., Petrini, S., Pioli, S., **Piergiacomo, F.**, Chowdhury, A. A., Brusetti, L., Foladori, P. 2024. Conventional activated sludge vs. photo-sequencing batch reactor for enhanced nitrogen removal in municipal wastewater: Microalgal-bacterial consortium and pathogenic load insights. *Bioresource Technology*, 401, 130735. <https://doi.org/10.1016/j.biortech.2024.130735>. IF:9.7
- Beneduce, L., **Piergiacomo, F.**, Limoni, P. P., Zuffianò, L. E., Polemio, M. 2024. Microbial, chemical, and isotopic monitoring integrated approach to assess potential leachate contamination of groundwater in a karstic aquifer (Apulia, Italy). *Environmental Monitoring and Assessment*, 196(3), 312. <https://doi.org/10.1007/s10661-024-12477-6>. IF: 3.1
- **Piergiacomo, F.**, Brusetti, L., Pagani, L. 2022. Understanding the Interplay between Antimicrobial Resistance, Microplastics and Xenobiotic Contaminants: A Leap towards One Health? *International Journal of Environmental Research and Public Health*, 20(1), 42. <https://doi.org/10.3390/ijerph20010042>. IF:4.614
- Bellucci, M., Borruso, L., **Piergiacomo, F.**, Brusetti, L., Beneduce, L. 2022. The effect of substituting energy crop with agricultural waste on the dynamics of bacterial communities in a two-stage anaerobic digester. *Chemosphere*, 294, 133776. <https://doi.org/10.1016/j.chemosphere.2022.133776>. IF: 8.943
- **Piergiacomo, F.**, Borruso, L., Esposito, A., Zerbe, S., Brusetti, L. 2022. The Geochemical Drivers of Bacterial Community Diversity in the Watershed Sediments of the Heihe River (Northern China). *Water*, 14(12), 1948. <https://doi.org/10.3390/w14121948>. IF: 3.530
- **Piergiacomo, F.**, Borruso, L., Ciccazzo, S., Rizzi, S., Zerbe, S., Brusetti, L. 2020. Environmental Distribution of AR Class 1 Integrons in Upper Adige River Catchment (Northern Italy). *International journal of environmental research and public health*, 17(7), 2336. <https://doi.org/10.3390/ijerph17072336>. IF:4.614
- Bellucci, M., Marazzi, F., Naddeo, L., **Piergiacomo, F.**, Beneduce, L., Ficara, E., Mezzanotte, V. 2019. Disinfection and nutrient removal in laboratory-scale photobioreactors for wastewater tertiary treatment. *Journal of Chemical technology and Biotechnology*. <https://doi.org/10.1002/jctb.6010>. IF: 3.709

Further data

-Abstracts presented to national/international scientific conferences- oral communications:

- **Piergiacomo, F.**, Lejzerowicz, F., Tran, T., Chowdury A.A, Beneduce, L., Wikmark, O.G., Pagani, L., Eiler, A., Brusetti, L. 2023. Do microplastics offer a suitable surface for antibiotic resistance spread into the open environment? AGRIFOODPLAST2023-International conference on micro and nano plastics in the agri-food chain. Piacenza (IT). September 10-12, 2023.
- **Piergiacomo F.**, Lejzerowicz, F., Tran, T., Chowdury, A.A, Beneduce, L., Wikmark, O.G., Pagani L., Eiler, A., Brusetti, L. 2023. Do microplastics offer a suitable surface for antibiotic resistance spread into the open environment? 9th Symposium on Antimicrobial Resistance in Animals and the Environment. Tours (FR). 3-5 July 2023.
- **Piergiacomo, F.**, Bellucci, M., Borruso, L., Brusetti, L., Beneduce, L. 2021. Effect of a partial substitution of energy crop with agricultural

waste on the dynamics of bacterial communities in a two-stage anaerobic digester. 8th International Conference on Sustainable Solid Waste Management. Thessaloniki (GR). June 23-25, 2021.

- **Piergiacomo, F.**, Bellucci, M., Gatta, G., Beneduce, L. 2021. Addition of soluble bio-based substances select for Archaeal communities with higher performances in thermophilic Anaerobic digestion processes. 8th International Conference on Sustainable Solid Waste Management. Thessaloniki (GR). June 23-25, 2021.
- **Piergiacomo F.**, Beneduce L., Limoni P.P., Zuffianò L.E., Polemio M. 2019. Health risk assessment of polluted aquifer in agricultural area hosting a landfill site. 2nd International scientific and training conference: Multidimensionality of the health. Faculty of Natural and Technical Sciences PWSZ Skierniewice Poland. December 06-07, 2019.

-Abstracts presented to national/international scientific conferences- poster presentations:

- **Piergiacomo F.**, Lejzerowicz F., Tran T., Chowdury A.A, Beneduce L., Wikmark O.G., Pagani L., Eiler A., Brusetti L. 2023. Do microplastics offer a suitable surface for antibiotic resistance spread into the open environment? AGRIFOODPLAST2023-International conference on micro and nano plastics in the agri-food chain. Piacenza (IT). September 10-12, 2023
- **Piergiacomo F.**, Pagani L., Beneduce L., Russo P., Alkilani S. R., Brusetti L. 2021. Preliminary antimicrobial and multidrug resistance spread assessment in a municipal wastewater treatment plant and soil from the south of Italy. 6th International Conference on Microbial Diversity 2021 "Advances in Microbial Diversity MD2021", Virtual event 14-15 December 2021. ISBN 9788894301021 pag. 137.
- **Piergiacomo F.** 2021. The role of microplastics on ecosystem functioning: a focus on antibiotic resistance spread in input for agricultural purposes. First Virtual Workshop on the Developments in the Italian PhD Research on Food Science, Technology and Biotechnology, Palermo 14-15 September 2020. ISBN 978-88-5509-315-6 pag. 112.
- **Piergiacomo F.**, Beneduce L., Limoni P.P., Zuffianò L.E., Polemio M. 2019. Microbial molecular indicators as a tool to assess source of contamination of groundwater in an agricultural area potentially threatened by landfill contamination. Microbial Diversity Conference 2019, Catania 15-17 September 2019. ISBN 978-88-943010-1-4 pag. 258-259.
- Beneduce L., **Piergiacomo F.**, Sikorska-Zimny K. 2019. Effect of different supply of nitrogen and minerals in soilless tomato crop system on the microbial community of the root system and the product quality. Microbial Diversity Conference 2019, Catania 15-17 September 2019. ISBN 978-88-943010-1-4 pag. 368-369.
- **Piergiacomo F.**, Sikorska-Zimny K., Beneduce L. 2018. Improvement of functional quality of cherry tomatoes after biochar application on soilless tomato crop and consequent shift of microbial communities of the rhizosphere - 1st International scientific and training conference: Multidimensionality of the health. Faculty of Natural and Technical Sciences PWSZ Skierniewice Poland. October 12-13, 2018.
- Bellucci M., Marazzi F., Naddeo L.S., Beneduce L., **Piergiacomo F.**, Ficara E., Mezzanotte V. 2018. Disinfection In Lab-Scale Photobioreactors for Wastewater Tertiary Treatment. 7th European Bioremediation Conference & 11th ISEB Conference, Chania, Greece, June 25 – 28, 2018.
- Bellucci M., Borruso L., **Piergiacomo F.**, Brusetti L., Beneduce L. 2016. Can Ammonia Oxidizing Microorganisms Survive In A Full Scale Two-Stage Anaerobic Digester Fed With Agro-Industrial Wastes? Proceedings of the 10th International Society for Environmental Biotechnology Conference Barcelona, 1-3 June 2016.

-Scientific reviewing activities for peer-reviewed journals: "PloS one", "Microorganisms", "Sustainability", "Frontiers in Environmental Science",

“Frontiers in Microbiology”.

Statement of interest

As a Research Assistant with a master’s degree in Agricultural Sciences and Technology and a PhD in Food Engineering and Biotechnology, I am strongly motivated to investigate ecological microbial communities through both quantitative and qualitative approaches, integrating molecular microbiology, bioinformatics, and environmental data. My research experience spans several areas of environmental microbiology and biotechnology in complex natural and anthropogenic ecosystems, as demonstrated by my scientific publications.

I have recently worked on a dedicated post-doc contract focused on rock glacier microbial communities, where I investigated the resistome (antibiotics and heavy metals), the mobilome, and the metabolic pathways of these extreme ecosystems. For this purpose, I developed and released *ARMonaut*, an open-source bioinformatic pipeline on GitHub for the characterization of antibiotic resistance, metal resistance, and associated pathways in metagenomic datasets. This work strengthened my expertise in metagenomics, genome annotation, pathway reconstruction, and data integration within a One Health framework. My broader research lines include:

1. Characterization of bacterial community structure, diversity, functionality, and resistance traits in **food, biological matrices and rock glacier samples** from the South Tyrolean Alpine region using a combined microbiological and bioinformatic approach.
2. Analysis of microbial communities in **irrigation waters, sediments, compost, manure, and microplastic-associated biofilms**, focusing on multi-resistance traits (antibiotics and heavy metals) across different climatic areas.
3. Study of microbial communities involved in the **bioremediation of polluted waters** in North China and characterization of their resistance behaviours.
4. Microbial indicators of **metal and fecal contamination** in groundwater ecosystems.
5. Ecological and functional assessment of **nitrogen-cycle microorganisms** in agricultural and natural environments.
6. Characterization of microbial consortia from **wastewater, industrial sludge, and biomass** involved in anaerobic digestion and biological nitrogen removal in continuous bioreactor systems.

Throughout my academic and collaborative research experiences, I have gained solid skills in basic microbiology (isolation and plate count, membrane filtration, clone libraries, pure-culture isolation), and in molecular biology techniques, including DNA extraction from a wide range of matrices (cells, soil, water, sediments, sludge, biofilms), DNA quantification, qualitative and quantitative PCR, agarose gel electrophoresis, DNA purification, restriction digestion, ARISA, and metabolic profiling with Biolog EcoPlates.

In parallel, I have developed considerable expertise in bioinformatic analyses, particularly in preprocessing fastQ files (quality control, filtering, error correction), sequence assembly, genomic and plasmid annotation, prediction of antibiotic and metal resistance genes, microbial community profiling (taxonomic and functional), resistome and mobilome characterization, and metabolic pathway reconstruction. I am experienced with several computational tools and databases, including R, Jupyter Notebook, Singularity, Docker, QIIME2, MEGA, Chromas, PeakScan, Past, GraphPad, Pfam, dbCAN, MAR, GTDB-Tk, UNITE, SILVA, BLAST, CARD, GenBank, BacMet2, UniProt, and the KEGG Pathway database.

Given the objectives of the advertised position, I believe my expertise is highly aligned. Moreover, I have direct experience with environmental sampling in Alpine and remote areas, and I am confident in managing the entire experimental workflow, from field sampling to laboratory processing, data analysis, and coordination with project partners.

Building on my recent research, I aim to contribute to the University of Bolzano by advancing the understanding of microbial ecology in forest peatlands and by producing high-quality scientific outputs that strengthen the research profile of the department.

**Language
competence**

Mother tongue(s): Italian

Foreign Languages	Understanding	Speaking	Writing
English*	B2	B2	B2
Deutsch	A1	A1	A1

Levels: A1 and A2: Basic user - B1 and B2: Independent user - C1 and C2: Proficient user

[Common European Framework of Reference for Languages](#)

*Cambridge English Level 1 Certificate in ESOL International (First) and IELTS (General) Certificate of British Council enclosed.

**Driving
license**

B

Date

Signature