LUCIA FORESTO, 3rd year PhD student

PhD sector: Fermentation Chemistry and Biotechnology
Specific PhD program: Innovative Technologies and Sustainable Use of Mediterranean Sea Fishery and Biological Resources (FishMed-PhD)
Main topic: Multi-omics Applications for Studying the Role of Microbiota in Systems

Description

Microbial biotechnologist and molecular ecologist with a multidisciplinary background in microbiology, computational biology, marine ecology, molecular biology, genetics and zoology. Experienced in metagenomic and shotgun sequencing processing and data analysis. Performing microbiome ecosystems analysis using R and Bash languages. Comprehensive experience from field to data: management of sampling campaigns, isolation and characterization of microbial strains, NGS sequencing, bioinformatic analysis. Advanced skills in multi-omics technologies and applied data science, specialized in the functional characterization of complex environmental and host-associated microbiomes and the development of biotechnological solutions based on microorganisms.

Thematic expertise

- Host-associated microbiomes (human, animal, plant)
- Environmental microbiomes
- Antibiotic resistance genes and viruses
- Marine microbial ecology
- Food microbiomes and fermentation
- Microbial biogeography and environmental gradients
- Plant Growth-Promoting Bacteria (PGPB)
- Bacterial cell cultures and yeasts

SKILLS

Project & Research Management
- Multi-factorial experimental design
- Coordination of field campaigns and sampling
- Management of complex multi-omics datasets
- Participation in EU projects
- Sequencing facilities coordination

Molecular Biology & NGS Techniques Complete Workflow
- Sterile sample processing prior to DNA extraction
- DNA extraction from complex matrices (faeces, soil, plants, water, biofilm)
- PCR, quality control (e.g. Qubit)
- NGS library preparation (Illumina MiSeq and NextSeq)
- Amplicon sequencing (16S rRNA, ITS) and shotgun metagenomics

Data Science & Bioinformatics
- Languages: R, Bash
- Analysis: taxonomic assignment, microbiome composition analysis, diversity metrics, phylogenetic diversity, distance metrics, PERMANOVA, envfit, network analysis
- Data visualization tools (e.g. Cytoscape)
- Methods: PCoA, NMDS, CCA/RDA, Bray-Curtis, UniFrac
- Multi-omics integration (metadata, metabolomics)

Microbial Biotechnology
- Isolation, purification and characterisation of microbial strains
- Screening of functional enzymes and metabolites
- Bioreactor and fermentation management
- Optimization of microbial growth and industrial processes (growth kinetics, scale-up)
- Biobank design and management (cryogenic storage, traceability)

Teaching & Research
- Laboratory tutor in Fermentation Biotechnology (2025)
- Co-supervision of theses (5 students, 2023-2025)
- Publications in international journals (4 articles, 2023-2025)
- Conference presentations (2 poster sessions, 2023-2025)
- Dissemination events, educational workshops and seminars