



# TRANSNATIONAL ACCESS (TNA) CATALOGUE

MICROBES-4-CLIMATE TNA programme provides access and related services to the global scientific and entrepreneurial community by enabling the free access to microbial resource research institutions

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# Table of contents

**What is TNA?**..... 2

**Why apply for a TNA?**..... 3

**Guide for a step-by-step TNA application**..... 4

**MICROBES-4-CLIMATE partners participating in the call**..... 9

**Research Infrastructures & Installations**..... 11

**TNA to Services & Facilities** ..... 15

    1. Supply of biological resources..... 17

    2. Preservation of biological resources..... 19

    3. Isolation of microbial resources from soil and plant samples..... 21

    4. Identification and characterisation of microbial resources..... 23

    5. Soil and plant characterisation technologies..... 27

    6. On-site access to facilities for microbial discovery..... 29

    7. On-site access to facilities for controlled plant cultivation and phenotyping..... 32

    8. Big Data & Machine Learning infrastructure and tools..... 37

    9. Remote consultancy..... 41

## What is TNA?

Transnational Access (TNA) serves as a critical gateway for researchers, enabling them to tap into advanced Research Infrastructures (RIs) spread in several countries. Within the MICROBES-4-CLIMATE (M4C) project, TNA is instrumental in providing researchers and users free access to state-of-the-art infrastructures, thereby offering the tools, services, and data needed to drive scientific innovation. By leveraging these resources, TNA fuels curiosity-driven interdisciplinary research and promotes groundbreaking discoveries within climate-related research on microbes-plants-soil-environment interactions.

The MICROBES-4-CLIMATE TNA programme is designed to overcome geographical barriers, promote global intersectoral collaboration and significantly accelerate the scientific progress. Through unparalleled support to the researchers, this programme facilitates the access to essential resources and expertise, certifying that high-impact research can be conducted efficiently and effectively.

## Key principles of the MICROBES-4-CLIMATE TNA Programme



### Free Access to high-quality Research Infrastructures (RIs)

Researchers are granted access to cutting-edge RIs that are equipped with state-of-art technologies and methodologies. These specialised infrastructures enable a multi- or cross-disciplinary approach to climate-related microbial research.



### Tailored Services for Researchers

The programme is committed to meeting the specific needs of researchers by providing customised services. This includes providing essential tools, resources, training and technical assistance to ensure that research is conducted at the highest standard, from initial conception through to its concluding analysis.



### Quality management and rigorous standards

A robust quality management framework underpins the TNA programme, with strict adherence to high standards. This guarantees that all the research activities are both effective and aligned with international best practices.



### Ethical guidelines and Intellectual Property Rights (IPR)

Ethical considerations are central to the M4C TNA programme. All research activities adhere strictly to ethical guidelines, ensuring that they are performed responsibly and with respect for IPR. This guarantees that the research outcomes are both ethically sound and legally protected.

## Why apply for a TNA?

The TNA programme provides researchers with free access to cutting-edge services, facilities, and technologies, removing financial and geographical barriers to high-quality research. It offers flexible access options, from in-person to remote access, allowing researchers to work in the most convenient way for them. TNA also promotes interdisciplinary and cross-border collaboration, by interconnecting researchers with global experts. Access to exclusive testing environments contributes to high-quality research and impact, turning TNA into an invaluable tool for scientific advancement.

### ***MICROBES-4-CLIMATE funds your access to:***

#### Facilities

- Access to laboratories (wet and dry), experimental facilities and expertise from specialised support staff
- Travel expenses are covered by the TNA programme
- In-person access



#### Services

- Access to top-level expertise and platforms, including isolation, identification and characterisation of microbial resources, technologies for soil and plant characterisation, computational infrastructure and tools, as well scientific and/or technical support
- In-person and/or remote access



#### Products

- Access to a diverse range of microorganisms and data with shipping fees being covered by the TNA programme
- Remote access



### OUR OFFER

The TNA offer includes **workflows of integrated services and joint/cross-RI services**, leveraging facilities, resources, data, expertise and know-how in the microbial resources, plant sciences, agriculture and food production, forestry, climate, environment, biodiversity and data science.



# Guide for a step-by-step TNA application



# Guide for a step-by-step TNA application

## Application criteria



1

### **Users should be active researchers**

- PhD students, postdocs and researchers affiliated with academic or research institutions, non-profit organisations, industries or companies and must have a legal affiliation with their home institutions during the access period.
- Users must have full support and validation from their home institution.
- Fast-track access will be facilitated for Ukrainian researchers from government-controlled territories.

2

### **Transnationality Requirement**

- Access requests must be for services located in a country different from that of the user's institution, unless access is provided by an intergovernmental organisation, such as CABI, a Joint Research Centre (JRC) or an European Research Infrastructure Consortium (ERIC).

# Guide for a step-by-step TNA application

## Application criteria

3

### Eligibility

- The TNA call is open to EU Member States and EU associated countries. Other countries, up to 20% of the total TNA service capacity, may also apply for access.
- Researchers or users associated with project beneficiaries, that are not directly involved in M4C, are eligible to apply for TNA access, however, priority will be given to external users.
- Projects should be written in English and submitted online through the TNA portal.
- Users may use TNA to complement ongoing projects, ensuring no double funding (a statement confirming this may be required).
- Users must complete the ethical questionnaire and assess the responses to predefined questions.
- Users are required to apply for at least 2 services, each from a different RI or M4C beneficiaries, and priority will be given for cross-disciplinary projects: TNA must include a clear relationship between microbes AND the environment (plants, soil, etc.), indicating the expected impact in understanding and/or addressing Climate Change.
- In-person access must be completed within the timeframe of the M4C project.

4

### Feasibility

- Users should consult with the facility/service managers, prior to the submission, to ensure the submission of feasible proposals.
- The facility/service managers are responsible for determining and confirming the feasibility of the proposals in terms of technical and logistical aspects, as well as their adherence to the TNA offer.

# Guide for a step-by-step TNA application

## Selection process

TNA proposals will undergo the following selection stages:

### 1<sup>st</sup> Stage

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- Submitted proposals will be checked for eligibility by the Access Officer and feasibility by the facility/service managers. Only proposals that meet the eligibility and feasibility criteria will proceed to the evaluation process.

### 2<sup>nd</sup> Stage

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- All eligible/feasible proposals will be evaluated by an independent Experts Board\*, through a peer review process. The experts cover multiple scientific fields in Microbes-4-Climate, and will take the scientific merit of the proposals into consideration following the principles of transparency, FAIRness and impartiality.

### 3<sup>rd</sup> Stage

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- Proposals will be ranked based on the scoring provided by the reviewers. Proposals have to pass a minimum threshold to be considered for transnational access. In case there are multiple applications for a facility/service with limited capacity, the proposal with higher scoring will be approved. In case there is equal scoring, a third reviewer may be asked to evaluate the proposal.

### 4<sup>th</sup> Stage

---

- The Project Steering Committee will approve the list of granted proposals by majority vote, based on the reviewers' assessment and budget availability.
- An evaluation report will be provided for each proposal submitted by an applicant.

Users and facility/service managers can negotiate the specific terms of access and provide a final report after the completion of the access.

\*All experts involved in the assessments will be identified and appointed based on their expertise and the topics covered by the applications. To ensure a fair evaluation, experts from the M4C RIs may participate in the evaluation – they must not exceed 50% of the total panel. Special attention will be given to their selection and appointments to avoid potential conflicts of interest.

# Guide for a step-by-step TNA application

## Implementation

**The selection of TNA proposals must meet the following conditions:**

- After the approval of the applications, users and facility/service managers can negotiate the specific terms of access.
- In-person access (visits) must be within the timeframe of the contract between the user and the service provider, and completed within the timeframe of the M4C project.
- Users and facility/service managers have to provide a final report after the completion of the access.

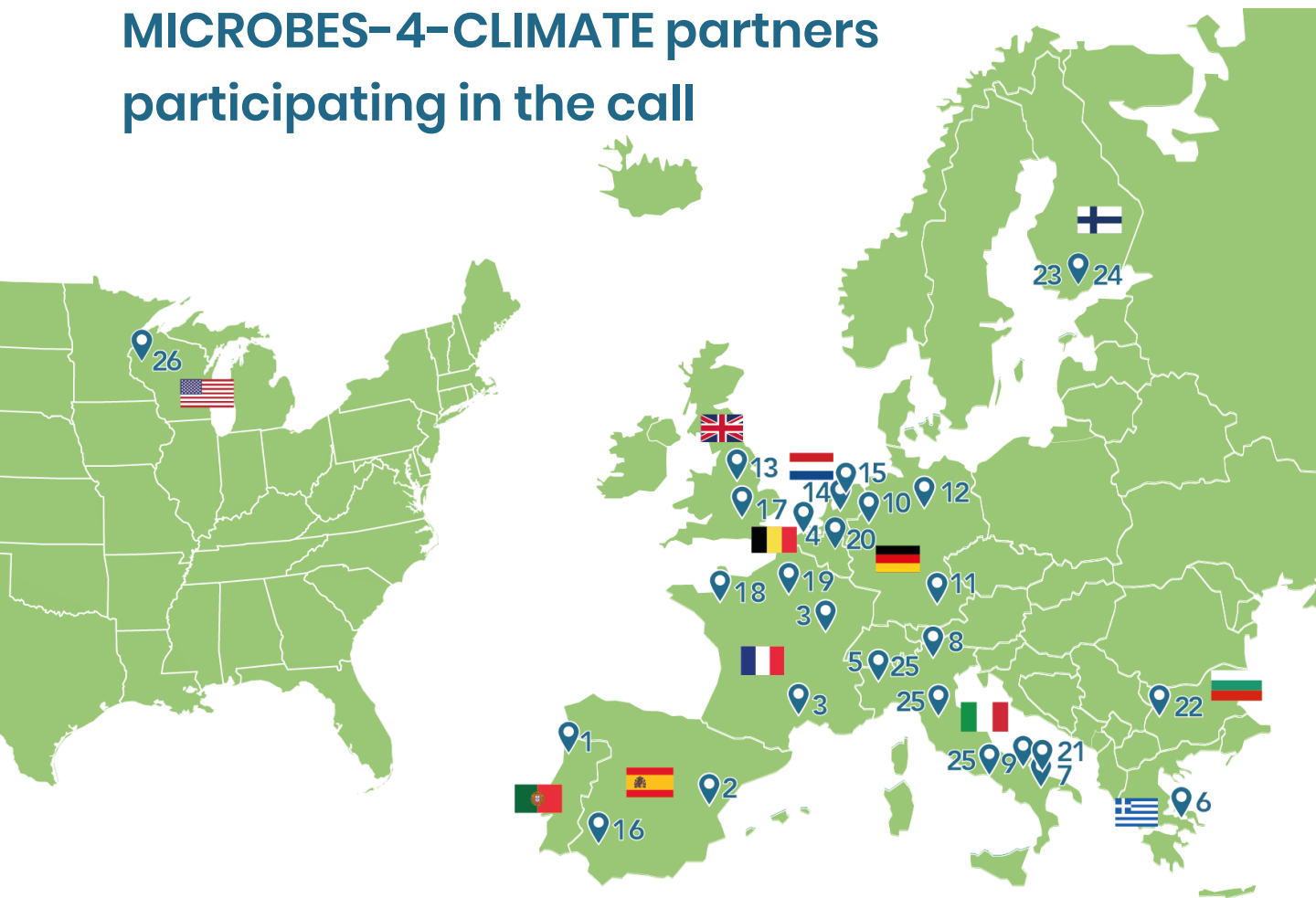




# MICROBES-4-CLIMATE partners participating in the call



## MICROBES-4-CLIMATE partners participating in the call



**BRAGA, PORTUGAL**  
UMINHO-MUM

**TURIN, ITALY**  
UNITO

**VALENCIA, SPAIN**  
UVEG-CECT

**ATHENS, GREECE**  
NKUA

**MONTPELLIER | DIJON, FRANCE**  
INRAE-CIRM | GenoSol

**TURIN, ITALY**  
CNR - IPSP

**GHENT, BELGIUM**  
UGENT-BCCM/LMG

16



**SEVILLE, SPAIN**  
LIFEWATCH ERIC

17



**LONDON, UK**  
CABI



**RENNES, FRANCE**  
UNIVERSITÉ DE RENNES

**HELSINKI, FINLAND**  
NATURAL RESOURCES  
INSTITUTE FINLAND -  
LUKE

**PARIS, FRANCE**  
CNRS

**HELSINKI, FINLAND**  
UNIVERSITY OF  
HELSINKI

18-25

**LIÈGE, BELGIUM**  
UNIVERSITÉ DE LIÈGE

**BARI, ITALY**  
CIHEAM-BARI

**FLORENCE, ITALY**  
CNR - IRET

**SOFIA, BULGARIA**  
ISSAPPNP

25



**TURIN | PORTICI | FLORENCE, ITALY**  
CNR (on behalf of MIRRI-ERIC, AnaEE-ERIC  
and EMPHASIS) stands for IPSP and IRET

26



**WISCONSIN, USA**  
PHYTOBIOMES ALLIANCE



**MATERA, ITALY**  
ALSIA

**NOTTINGHAM, UK**  
UNOTT

**TRENTO, ITALY**  
FEM

**WAGENINGEN, THE NETHERLANDS**  
WAGENINGEN  
UNIVERSITY – WU

**FOGGIA, ITALY**  
CREA

**UTRECHT, THE NETHERLANDS**  
UNIVERSITEIT  
UTRECHT – UU

**JÜLICH, GERMANY**  
FZJ

**PORTICI, ITALY**  
CNR - IPSP

**MUNICH, GERMANY**  
HMGU

**GATERSLEBEN, GERMANY**  
IPK

# Research Infrastructures & Installations

## Research infrastructures & Installations

### MIRRI-ERIC

The Microbial Resource Research Infrastructure – European Research Infrastructure Consortium (MIRRI-ERIC), is a pan-European initiative dedicated to preserve and valorise microbial resources. Established in 2022, it unites 39 Biological Resource Centres and research institutes from 8 European countries, allowing Bioscience and Bioindustry users access to high-quality bioresources, data and state-of-the-art facilities/equipments and top-level expertise. MIRRI's mission is to support research and innovation through the offer of legally compliant, accessible microbial resources, aligned with global and European strategic goals to address societal challenges and promote sustainability.



[MIRRI-ERIC Universidade do Minho](#)  
Campus de Gualtar,  
Complexo Pedagógico 3, Piso 0,  
4710-057 Braga, Portugal

### Installations



UVEG-CECT, Valencia



INRAE, Montpellier | Dijon



BCCM/LMG, Ghent



MUM - Micoteca da Un. do Minho

UMINHO-MUM, Braga



UNITO, Turin



CNR – IPSP, Turin



NKUA, Athens

### LifeWatch ERIC



#### [LifeWatch ERIC](#)

Plaza de España SN,  
SECTOR II-III,  
41071 Seville, Spain

LifeWatch ERIC, established in 2017, is a European Research Infrastructure Consortium that provides advanced e-Science facilities for biodiversity and ecosystem research. Its mission is to accelerate research through a Digital Twin platform, through the offer of access to biodiversity data, reproducible analytics, and co-designed tools for addressing societal challenges like Climate Change, food security, and sustainable development. LifeWatch ERIC empowers scientists, decision-makers, and citizens with cutting-edge resources, including Open Data, Big Data analysis, virtual labs, and training activities.

## Research infrastructures & Installations

### EMPHASIS

EMPHASIS is a European plant phenotyping infrastructure advancing research on plant-environment interactions to address challenges in crop development, food security, and climate change. It integrates phenotyping facilities across Europe to enhance understanding of plant traits and support crop breeding for higher yield, nutrient efficiency, and disease tolerance. EMPHASIS fosters cutting-edge technologies, seamless data management, and collaborative efforts to promote sustainable agriculture and innovative solutions for global challenges.



#### EMPHASIS

VIB Agro-Incubator  
Kerrebroek 66b,  
9850 Nevele, Belgium

### Installations



CREA, Roma



FEM, Trento



UNOTT,  
Nottingham



ALSIA, Matera



CNR – IPSP, Portici



FZJ, Jülich



IPK, Gatersleben



Universiteit  
Utrecht

UU, Utrecht

HelmholtzZentrum münchen  
Deutsches Forschungszentrum für Gesundheit und Umwelt

HMGU, Munich



WU, Wageningen



#### PHYTOBIOMES ALLIANCE

4620 Village Terrace Ct  
54701 Eu Claire, Wisconsin, USA

### PHYTOBIOMES ALLIANCE

The International Alliance for Phytobiomes Research (Phytobiomes Alliance) is an industry-academic collaborative initiative focused on building a phytobiome-based foundation for accelerating the sustainable production of food, feed, and fibre. We are an international non-profit alliance of industry, academic, and governmental partners. Our main goal is to facilitate and coordinate international efforts toward expanding phytobiomes research. One of our projects that is offered as a resource to the Microbes4Climate project is the U.S. Culture Collections Network (USCCN; usccn.org).

## Research infrastructures & Installations

### AnaEE – ERIC

AnaEE (Analysis and Experimentation on Ecosystems) enables understanding the complex impacts of global change drivers on terrestrial and aquatic ecosystems across Europe. It develops evidence-based adaptation and mitigation strategies to safeguard plant, soil, water, biodiversity, and ecosystem health, ensuring essential societal services like carbon sequestration, food security, and clean water. With versatile facilities simulating drivers like land-use change, pollution, and extreme weather, AnaEE provides a forward-looking approach through its integrative experimental, analytical, and modelling capabilities.



#### AnaEE - ERIC

AnaEE-ERIC - Central Hub,  
1 avenue de la Terrasse,  
91190 Gif-sur-Yvette, France

### Installations



Université de Rennes,  
Rennes



**CIHEAM  
BARI**  
CIHEAM-BARI,  
Bari



**UNIVERSITY OF HELSINKI**  
University of  
Helsinki, Helsinki



**CNRS,**  
Paris



Université de Liège,  
Liège



ISSAPPNP,  
Sofia



**Natural Resources**  
Institute Finland, Helsinki



CNR – IRET,  
Florence

### CAB International – CABI



#### CABI

Silwood Park, Buckhurst Rd,  
Ascot, Berkshire SL5 7PY,  
London, United Kingdom

CABI is a UN treaty level organisation, headquartered in the UK with offices in Switzerland, Kenya, Ghana, Pakistan, Malaysia, China, India, Trinidad & Tobago, United States and Zambia. The culture collection of 30,000 microbes is located in Egham UK. The collection is a unique resource of fungi and bacteria isolated from across the world. CABI also hosts the UK Crop Microbiome Cryobank, a 'first of its kind' resource of microbial communities isolated from soil and crop systems. Areas of research supported by the infrastructure include microbial culture and handling, cryopreservation using state-of-the-art techniques, plant/crop health, microbial identification and characterisation.



# TNA to Services & Facilities



## What type of services are offered through TNAs?

MICROBES-4-CLIMATE provides an extensive range of Transnational Access (TNA) services and facilities to support groundbreaking research in addressing climate change and its impact on biodiversity and ecosystems. These services include the **supply and preservation of biological resources**, by ensuring that high-quality, well-maintained microbial resources are accessible to researchers worldwide. The project further supports **the isolation, identification, and characterisation of microbial resources** from **soil and plant samples**, offering a comprehensive understanding of microbial diversity and its potential applications. To exploit the research outcomes, **on-site access to specialised facilities** is provided for **controlled plant cultivation and phenotyping**. Advanced soil and plant characterisation technologies are also made available, enabling detailed analysis of ecosystems and agricultural systems. The project harnesses cutting-edge **Big Data and Machine Learning infrastructure and tools** to facilitate data-driven approaches and innovative solutions. Additionally, **remote consultancy services** are offered to guide researchers in fully leveraging these resources, ensuring that M4C remains a key partner in the promotion of sustainable research and innovation.



Supply of biological resources



Preservation of biological resources



Isolation of microbial resources from soil and plant samples



Identification and characterisation of microbial resources



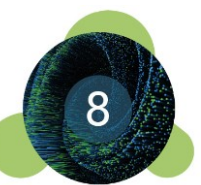
Soil and plant characterisation technologies



On-site access to facilities for microbial discovery



On-site access to facilities for controlled plant cultivation and phenotyping



Big Data & Machine Learning infrastructure and tools



Remote consultancy

**TNA to Services & Facilities**

# **1. Supply of biological resources**

# 1 Supply of biological resources

MICROBES-4-CLIMATE provides access to a **broad range of high-quality microorganisms**, their derivatives and associated data to support advanced research and innovation in microbial and environmental studies. The strains can be delivered **lyophilised (facilitating transport and preservation), as active cultures for immediate use in experimental applications, or as DNA extracts**, enabling molecular analyses and genomic research. DNA from soil samples are also available to support studies on soil microbiomes and environmental sustainability. By ensuring reliable access to these high-quality resources, the project facilitates groundbreaking research addressing climate challenges and promoting sustainable solutions.

All the services listed in this section are **accessed remotely**.

Table 1. List of available services for the supply of biological resources.

Service	Installation	RI*
<u>Supply of microbial resources (lyophilised strains)</u>	UMINHO-MUM	MIRRI-ERIC
<u>Supply of microbial resources (lyophilised strains)</u>	UVEG-CECT	MIRRI-ERIC
<u>Supply of microbial resources (lyophilised strains)</u>	NKUA	MIRRI-ERIC
<u>Supply of microbial resources (lyophilised strains)</u>	UNITO	MIRRI-ERIC
<u>Supply of microbial resources (active cultures)</u>	UMINHO-MUM	MIRRI-ERIC
<u>Supply of microbial resources (active cultures)</u>	UVEG-CECT	MIRRI-ERIC
<u>Supply of microbial resources (active cultures)</u>	NKUA	MIRRI-ERIC
<u>Supply of DNA extracts</u>	UMINHO-MUM	MIRRI-ERIC
<u>Supply of DNA extracts</u>	NKUA	MIRRI-ERIC
<u>Supply of DNA and soil conservation</u>	INRAE-GenoSol	MIRRI-ERIC

\*RI - Research Infrastructure.



TNA to Services & Facilities

## 2. Preservation of biological resources

## 2 Preservation of biological resources

The services for preservation of biological resources ensure the secure and long-term storage of valuable microbial and soil samples. These include **safe deposit options for microbial strains**, by offering tailored storage solutions such as safe deposit per strain for specified durations. **Public deposits** allow for open access to strains, supporting broader research and collaboration efforts. Additionally, **the cryopreservation of soil samples** ensures the integrity and viability of critical resources for future studies. All preservation services are carried out under strict quality standards, ensuring the viability and integrity of the resources over time. Detailed information on each preservation service is provided in the subsections from Table 2, outlining the scope and conditions of the resources available for deposit and conservation.

All the services listed in this section are **accessed remotely**.

Table 2. List of available services for the preservation of biological resources.

Service	Installation	RI*
<u>Safe deposit of fungi and bacteria</u>	UMINHO-MUM	MIRRI-ERIC
<u>Safe deposit of fungi and bacteria</u>	NKUA	MIRRI-ERIC
<u>Safe deposit of fungi and bacteria</u>	UNITO	MIRRI-ERIC
<u>Public deposit of fungi and bacteria</u>	UMINHO-MUM	MIRRI-ERIC
<u>Cryopreservation of soil samples</u>	CABI	CABI

\*RI - Research Infrastructure.



TNA to Services & Facilities

### 3. Isolation of microbial resources from soil and plant samples



3

## Isolation of microbial resources from soil and plant samples

Within this section, a comprehensive set of services are provided for the isolation of microbial resources from soil and plant samples. These include the isolation of fungal strains from diverse substrates, such as soil, plant materials, and diseased plant tissues, ensuring **the recovery of high-quality microbial strains. Advanced culturomics methodologies** are employed to isolate, purify, and dereplicate bacterial isolates, facilitating a deeper understanding of microbial diversity. Additionally, tailored sampling strategies are developed in collaboration with users to optimise microbial isolation processes. Specific culturomics approaches are applied to soil samples to both discriminate functional activities and explore microbial biodiversity, addressing critical research and application needs. These services provide cutting-edge tools to support microbial discovery and characterisation for a wide range of scientific and industrial purposes.

All the services listed in this section are **accessed remotely**.

**Table 3.** List of available services for the isolation of microbial resources from soil and plant samples.

Service	Installation	RI*
<u>Strain isolation from soil samples</u>	NKUA	MIRRI-ERIC
<u>Isolation of fungi from soil and plant materials, in presence of diseases</u>	UNITO	MIRRI-ERIC
<u>Isolation of fungal strains from different substrates including soil, plant, and diseased plant material</u>	UNITO	MIRRI-ERIC
<u>Culturomics: bacterial isolation, purification and dereplication of bacterial isolates</u>	BCCM/LMG	MIRRI-ERIC

\*RI - Research Infrastructure.

TNA to Services & Facilities

## 4. Identification and characterisation of microbial resources

4

# Identification and characterisation of microbial resources

Within this section, a comprehensive list of resources and services is available to support the identification and characterisation of microbial resources. Tailored to meet the needs of advanced microbiological research, these offerings facilitate the analysis of microbial diversity, functional attributes, and genomic features, using state-of-the-art techniques and methodologies. The catalogue includes services for microbial identification through genotypic and phenotypic approaches, advanced imaging, whole genome sequencing, and molecular characterisation of bacteria, fungi, yeast, and viruses. Additionally, it offers tools for assessing microbial functionality, such as antimicrobial activity, phytoprotection, and root colonization studies, as well as innovative techniques like metabarcoding and metagenomic analyses. Each resource and service is designed to adhere to high scientific standards, by ensuring accuracy, reproducibility, and reliability. Detailed descriptions and access procedures are provided in the subsections below.

All the services listed in this section are **accessed remotely**.

**Table 4.** List of available services for the identification and characterisation of microbial resources.

Service	Installation	RI*
<a href="#">Bacterial identification by 16S rRNA gene sequencing</a>	UVEG-CECT	MIRRI-ERIC
<a href="#">Bacterial identification by 16S rRNA gene sequencing</a>	BCCM/LMG	MIRRI-ERIC
<a href="#">Bacterial identification by 16S rRNA gene sequencing</a>	NKUA	MIRRI-ERIC
<a href="#">Bacterial identification by MALDI-TOF MS</a>	UVEG-CECT	MIRRI-ERIC
<a href="#">Filamentous fungi and yeast identification by MALDI-TOF MS</a>	UVEG-CECT	MIRRI-ERIC
<a href="#">Genotypic identification of microbial pure cultures</a>	UMINHO-MUM	MIRRI-ERIC
<a href="#">Phenotypic identification of filamentous fungi pure cultures</a>	UMINHO-MUM	MIRRI-ERIC

\*RI - Research Infrastructure.

## 4

## Identification and characterisation of microbial resources

(cont.) Table 4. List of available services for the identification and characterisation of microbial resources.

Service	Installation	RI*
<u>Gene sequencing and analysis</u>	UMINHO-MUM	MIRRI-ERIC
<u>Sample imaging by electron microscopy</u>	UMINHO-MUM	MIRRI-ERIC
<u>Sample imaging by fluorescence microscopy</u>	UMINHO-MUM	MIRRI-ERIC
<u>Molecular and morphological identification of filamentous fungi</u>	UVEG-CECT	MIRRI-ERIC
<u>Molecular identification of yeast</u>	UVEG-CECT	MIRRI-ERIC
<u>Clustering of bacterial isolates by MALDI-TOF MS protein profiles</u>	BCCM/LMG	MIRRI-ERIC
<u>Bacterial identification by MALDI-TOF MS / 16S rRNA gene sequencing</u>	BCCM/LMG	MIRRI-ERIC
<u>Genome sequencing of a bacterial strain</u>	BCCM/LMG	MIRRI-ERIC
<u>Genome sequence assembly of paired-end Illumina sequence reads of a bacterial strain</u>	BCCM/LMG	MIRRI-ERIC
<u>Bacterial identification based on assembled genome sequence data</u>	BCCM/LMG	MIRRI-ERIC
<u>Antimicrobial susceptibility testing (AST)</u>	BCCM/LMG	MIRRI-ERIC
<u>Strain identification using whole genome sequencing</u>	NKUA	MIRRI-ERIC
<u>Determination of antimicrobial activity of bacterial strains</u>	NKUA	MIRRI-ERIC
<u>Phytoprotection (biocontrol studies using microbial isolates)</u>	NKUA	MIRRI-ERIC
<u>Functional excretome analysis</u>	NKUA	MIRRI-ERIC
<u>OSMAC (one strain many compounds) analysis</u>	NKUA	MIRRI-ERIC

\*RI - Research Infrastructure.

**For eligibility inquiries**, contact the Access Officer ([accessofficer@microbes4climate.eu](mailto:accessofficer@microbes4climate.eu)). **For feasibility assessments and technical questions**, reach out to the respective facility/service manager.

4

## Identification and characterisation of microbial resources

(cont.) Table 4. List of available services for the identification and characterisation of microbial resources.

Service	Installation	RI*
<u>Molecular assessment of root colonization by arbuscular mycorrhizal (AM) fungi</u>	UNITO	MIRRI-ERIC
<u>Morphological assessment of root colonization by AM fungi</u>	UNITO	MIRRI-ERIC
<u>Identification of AM fungi on plant root sample or soil: taxon specific metabarcoding and preliminary bioinformatic analyses</u>	UNITO	MIRRI-ERIC
<u>AMF-based inocula quality control (traceability and effectiveness)</u>	UNITO	MIRRI-ERIC
<u>Identification of fungal pure cultures</u>	UNITO	MIRRI-ERIC
<u>Metabarcoding analysis for both fungi and bacteria</u>	UNITO	MIRRI-ERIC
<u>Metagenomic analysis</u>	UNITO	MIRRI-ERIC
<u>Fungal whole genome sequencing and annotation</u>	UNITO	MIRRI-ERIC
<u>Identification of viromes associated to plants and plant microbiome by high-throughput sequencing</u>	CNR-IPSP	MIRRI-ERIC
<u>Detection and identification of mycoviruses by high-throughput sequencing</u>	CNR-IPSP	MIRRI-ERIC
<u>Transmission electron microscopy (detection and identification of viruses in plants, fungi, and bacteria)</u>	CNR-IPSP	MIRRI-ERIC
<u>High-throughput sequencing based identification of metaviromes associated to soil</u>	CNR-IPSP	MIRRI-ERIC
<u>Phylogenetic analysis of plant and fungal viral sequences</u>	CNR-IPSP	MIRRI-ERIC
<u>High-throughput sequencing based identification of circular RNA genomes</u>	CNR-IPSP	MIRRI-ERIC
<u>Genomic characterisation of a single species set of yeast strains from soil and plant reservoirs</u>	INRAE-CIRM-Levures	MIRRI-ERIC

\*RI - Research Infrastructure.

**For eligibility inquiries**, contact the Access Officer ([accessofficer@microbes4climate.eu](mailto:accessofficer@microbes4climate.eu)). **For feasibility assessments and technical questions**, reach out to the respective facility/service manager.



TNA to Services & Facilities

## 5. Soil and plant characterisation technologies





5 Soil and plant characterisation technologies

Within this section, a suite of advanced tools and methodologies is offered for the detailed characterisation of soil and plant systems. These resources are designed to enable **high-precision analysis of structural, functional, and molecular traits, supporting cutting-edge research in soil and plant sciences**. The available services include analytical platforms, eDNA analysis, and specialised instrumentation for imaging and data integration. Techniques such as Magnetic Resonance Imaging (MRI) and multiscale X-ray Computed Tomography (XCT) provide innovative solutions for studying dynamic changes and structural features in plants and soils. Each technique and service is meticulously designed to deliver reliable and reproducible results.

Detailed descriptions and access procedures are provided in the subsections below.

Table 5. List of available services considering soil and plant characterisation technologies.

Service	Installation	RI*	Type of Access
<u>AnalitySys: analytical platform services</u>	CIHEAM-Bari	AnaEE-ERIC	In-person
<u>DATA PRO (Virosphere, WGS-Hub, CISPR\Cas)</u>	CIHEAM-Bari	AnaEE-ERIC	In-person
<u>eDNA of soil samples</u>	CNRS	CNRS	Remote
<u>DNA extraction and amplicon based strategy</u>	INRAE-GenoSol	MIRRI-ERIC	Remote
<u>Ecotron IDF ECOLABS Instrumentation</u>	CNRS	CNRS	In-person
<u>Ecotron IDF ANALYTICAL PLATFORM</u>	CNRS	CNRS	In-person
<u>Plant MRI: Magnetic Resonance Imaging to measure dynamic changes in structural and functional traits of plants</u>	Plant MRI	EMPHASIS	In-person
<u>HF-XCT: multiscale X-ray imaging installation dedicated to soil and plant science research</u>	HF-XCT	EMPHASIS	In-person
<u>DNA extraction and amplicon based strategy</u>	INRAE-GenoSol	MIRRI-ERIC	Remote

\*RI - Research Infrastructure.

TNA to Services & Facilities

## 6. On-site access to facilities for microbial discovery



## 6

## On-site access to facilities for microbial discovery

On-site access to state-of-the-art facilities dedicated to microbial discovery and analysis are further provided within M4C services. Researchers can access our partners' installations to isolate, assess, explore, identify, characterize and preserve a broad diversity of microbial groups. These comprehensive facilities are pivotal for advancing microbial research and biodiversity conservation. Detailed descriptions and access procedures are provided in the subsections below.

All the services listed in this section are **accessed physically**.

Table 6. List of available services for the on-site access to facilities for microbial discovery.

Service	Installation	RI*
<u>On-site access to facilities on establishment and assessment of AM mycorrhization</u>	UNITO	MIRRI-ERIC
<u>On-site access to facilities to discover and manage fungal biodiversity</u>	UNITO	MIRRI-ERIC
<u>On-site access to facilities to discover how to manage fungal isolation from different matrices</u>	UNITO	MIRRI-ERIC
<u>On-site access to facilities to discover how to isolate, identify and preserve different groups of fungi</u>	UNITO	MIRRI-ERIC
<u>On-site access to facilities for molecular and serological diagnosis of plant and fungal viruses</u>	CNR-IPSP	MIRRI-ERIC
<u>On-site access to facilities for molecular characterisation of plant and fungal viruses</u>	CNR-IPSP	MIRRI-ERIC
<u>On-site access to facilities for observation of viruses in plants, fungi and bacteria by transmission electron microscopy</u>	CNR-IPSP	MIRRI-ERIC
<u>Access to cryopreservation cold chain technology, cryobank crop and soil samples</u>	CABI	CABI

\*RI - Research Infrastructure.

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6

# On-site access to facilities for microbial discovery

(cont.) Table 6. List of available services for the on-site access to facilities for microbial discovery.

Service	Installation	RI*
<u>On-site access to facilities to preserve and characterize microbial resources</u>	UVEG-CECT	MIRRI-ERIC
<u>Isolation and purification of fungal strains</u>	UMINHO-MUM	MIRRI-ERIC
<u>Isolation of fungal strains from different substrates including soil, plant, and diseased plant material</u>	UNITO	MIRRI-ERIC
<u>Proteotypic identification of microbial pure cultures</u>	UMINHO-MUM	MIRRI-ERIC
<u>Clustering of microbial isolates by DNA typing</u>	UMINHO-MUM	MIRRI-ERIC

\*RI - Research Infrastructure.



TNA to Services & Facilities

## 7. On-site access to facilities for controlled plant cultivation and phenotyping



7

## On-site access to facilities for controlled plant cultivation and phenotyping

Within this section, an extensive list of resources is available for controlled plant cultivation and phenotyping, designed to enable researchers to study plant growth, development, and responses under various environmental conditions. These facilities support a wide range of experimental setups, from field-scale trials to highly controlled indoor environments. Services include open-air platforms, controlled environmental systems, and specialised experimental fields for field-scale research. There are also cutting-edge technologies for non-invasive phenotyping, soil-plant-microbe interactions, and environmental stressors like ozone exposure. Additionally, automated high-throughput systems enable precise measurement of plant traits, while advanced imaging technologies support detailed analysis of plant performance. Each resource offers unique capabilities tailored to different aspects of plant and ecosystem research. Details of the specific services and how they can be accessed are provided below.

All the services listed in this section are **accessed physically**.

**Table 7.** List of available services for on-site access to facilities for controlled plant cultivation and phenotyping.

Service	Installation	RI*
<u>MULTIEXP: Open-Air platform services</u>	CIHEAM-Bari	AnaEE-ERIC
<u>CSE: Controlled environmental system</u>	CIHEAM-Bari	AnaEE-ERIC
<u>Terrestrial Metatron: Renting mesocosms for new experiment</u>	SETE-CNRS	AnaEE-ERIC
<u>Ecotron IDF ECOLABS climate cells</u>	CNRS	CNRS
<u>Bozhurishte: experimental field Bozhurishte</u>	ISSAPPNP	AnaEE-ERIC
<u>Tsalapitsa: experimental field in Tsalapitsa village</u>	ISSAPPNP	AnaEE-ERIC
<u>AgriLeach: study soil, water and plant microbiomes and their interactions (field scale experiments, open air, natural weather conditions)</u>	LUKE - AgriLeach	AnaEE-ERIC

\*RI - Research Infrastructure.



## 7

## On-site access to facilities for controlled plant cultivation and phenotyping

Table 7. List of available services for on-site access to facilities for controlled plant cultivation and phenotyping.

Service	Installation	RI*
<u>BoFoReg: experiments related to microbiome in soils and plants, and their interactions</u>	LUKE- BoFoReg	AnaEE-ERIC
<u>Root laboratory (dasotrons)</u>	LUKE- Root laboratory	AnaEE-ERIC
<u>NorPeat: platform for experiments</u>	LUKE - NorPeat	AnaEE-ERIC
<u>NorPeat: sample availability and background information</u>	LUKE - NorPeat	AnaEE-ERIC
<u>Uliege TERRA-ECOTRON: vegetation growth rooms under fully controlled climatic conditions</u>	TERRA Gembloux Agro-Bio Tech	AnaEE-ERIC
<u>Hyytiälä SMEAR II: soil, water and plant sampling**</u>	University of Helsinki – Hyytiälä	AnaEE-ERIC
<u>Ozone exposure of mycorrhized plants for one growing season</u>	CNR-IRET	AnaEE-ERIC
<u>Ozone exposure of plants powered by biostimulants for one growing season</u>	CNR-IRET	AnaEE-ERIC
<u>Ozone exposure of phyllosphere</u>	CNR-IRET	AnaEE-ERIC
<u>BreedFace: plant growth under elevated CO<sub>2</sub> in the field and plant trait quantification</u>	BreedFace	EMPHASIS
<u>GrowScreen-Rhizo III: simultaneous and non-invasive phenotyping of root and shoot performance of crop plant species grown in soil-filled rhizotrons</u>	GrowScreen-Rhizo III	EMPHASIS
<u>SCANALYSER</u>	Scanalyser	EMPHASIS
<u>Fitness-SCREEN: automated high-throughput phenotyping system (above- and belowground plant traits)</u>	Fitness-SCREEN	EMPHASIS

\*RI - Research Infrastructure.; \*\*In-person/remote access.

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7

## On-site access to facilities for controlled plant cultivation and phenotyping

Table 7. List of available services for on-site access to facilities for controlled plant cultivation and phenotyping.

Service	Installation	RI*
<u>VOC-SCREEN: determination of the emission of volatile organic compounds (VOCs) and the plants' photosynthetic gas exchange</u>	VOC-Screen	EMPHASIS
<u>ExpoSCREEN: large walk-in chambers that simulate climatic conditions (incl. sun spectrum, gases, e.g. CO<sub>2</sub>, O<sub>3</sub>, NO<sub>x</sub>)</u>	ExpoScreen	EMPHASIS
<u>IPK-APPP-C: the conveyor belt-based high throughput plant (to sensor) phenotyping facility for large plants</u>	IKP-APPP-C	EMPHASIS
<u>IPK-PS-Cont: facility for fully environmentally controlled cultivation and phenotyping of plants in large containers</u>	IKP-PS-Cont	EMPHASIS
<u>IPK-PS-Rhizo: facility for fully environmentally controlled cultivation and phenotyping of plants with the Rhizotron system</u>	IKP-PS-Rhizo	EMPHASIS
<u>NPEC4 - G8: multiple genotypes we are analysing the growth performance of the plants with a multitude of imaging systems that move over these plants on a gantry</u>	NPEC4 - G8	EMPHASIS
<u>NPEC5 – Plantarray: fully automated, multi-sensor gravimetric-based platform that directly measures physiological traits</u>	NPEC5 - Plantarray	EMPHASIS
<u>NPEC5 – conveyor: a compartment of 10x12 meter with 560 trays for plant growth on conveyor belts</u>	NPEC5 - conveyor	EMPHASIS
<u>NPEC 2 - Plant Microbe Interactions - Root phenotyping</u>	NPEC2 - PMI	EMPHASIS

\*RI - Research Infrastructure.; \*\*In-person/remote access.

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7

## On-site access to facilities for controlled plant cultivation and phenotyping

Table 7. List of available services for on-site access to facilities for controlled plant cultivation and phenotyping.

Service	Installation	RI*
<u>SMIP: automated RGB and hyperspectral plant-to-sensor high-throughput phenotyping platform (non-invasive, controlled environmental conditions)</u>	SMIP**	EMPHASIS
<u>FieldPhen: high throughput field plant phenotyping for evaluation of yield-related characters by RGB sensing</u>	FieldPhen - CREA	EMPHASIS
<u>INFRA-VOL: growth chambers equipped with VOC paths for effectively deliver VOC to target organisms, and high-throughput analyses of volatilomes</u>	INFRA-VOL	EMPHASIS

\*RI - Research Infrastructure.; \*\*In-person/remote access.

TNA to Services & Facilities

## 8. Big Data & Machine Learning infrastructure and tools



8

## Big Data & Machine Learning infrastructure and tools

Within this section, a list of services to access cutting-edge **computational services, data management tools, and AI-driven solutions** designed to support complex bioinformatics and data science workflows is provided. These resources are specifically tailored to meet the needs of researchers working with **large-scale biological data**, enabling the efficient processing, analysis, and interpretation of diverse datasets. The catalogue includes virtual machine services for hosting computational tasks, along with dedicated support for bioinformatics workflows. It also offers tools for data FAIRification, by ensuring smooth data traceability, access, and integration across organisations. Additionally, AI and data science services are available to support the development and execution of custom workflows, as well as the creation of AI-based solutions for specific research needs. Detailed descriptions of the available services and further accesses are provided in the following subsections.

All the services listed in this section are **accessed remotely**.

Table 8. List of available services considering the big Data & Machine Learning infrastructure and tools.

Computational services	Installation / RI*
<a href="#">Service VM1: Hosting of computational service and data</a>	LifeWatch ERIC
<a href="#">Service VM2: Hosting of computational service and data</a>	LifeWatch ERIC
<a href="#">Service VM3: Hosting of computational service and data</a>	LifeWatch ERIC
<a href="#">Service VM4: Hosting of computational service and data</a>	LifeWatch ERIC
<a href="#">Service VM5: Hosting of computational service and data</a>	LifeWatch ERIC
<a href="#">Service VM6: Hosting of computational service and data</a>	LifeWatch ERIC

\*RI - Research Infrastructure.



## 8

## Big Data & Machine Learning infrastructure and tools

(cont.) Table 8. List of available services considering the big Data & Machine Learning infrastructure and tools.

Computational services	Installation / RI*
<u>Service VM7: Hosting of computational service and data</u>	LifeWatch ERIC
<u>Service VM8: Hosting of computational service and data</u>	LifeWatch ERIC
<u>Service VM9: Hosting of computational service and data</u>	LifeWatch ERIC
<u>Service VM10: Hosting of computational service and data</u>	LifeWatch ERIC

Data FAIRification services	Installation / RI*
<u>Connector development for organisation</u>	LifeWatch ERIC
<u>Old data upload for organisation</u>	LifeWatch ERIC
<u>Development of space for loading data from an organisation</u>	LifeWatch ERIC
<u>Data traceability module for an organisation</u>	LifeWatch ERIC
<u>User identification module for an organisation</u>	LifeWatch ERIC
<u>Data valuation module for one organisation</u>	LifeWatch ERIC
<u>Information access module for an organisation (API)</u>	LifeWatch ERIC

\*RI - Research Infrastructure.

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## 8

## Big Data & Machine Learning infrastructure and tools

(cont.) Table 8. List of available services considering the big Data & Machine Learning infrastructure and tools.

AI and Data science services	Installation / RI
<u>Neuronal training (Part 1)</u>	LifeWatch ERIC
<u>Neuronal training (Part 2)</u>	LifeWatch ERIC
<u>Service WF Cloud Titan 1 execution</u>	LifeWatch ERIC
<u>Service WF Cloud Titan 2 per workflow developed from scratch</u>	LifeWatch ERIC
<u>Service WF Cloud Titan 3 per workflow developed from existing components</u>	LifeWatch ERIC
<u>Support in the pre-processing of the data for its use in bioinformatic workflows</u>	LifeWatch ERIC
<u>Development of analytical module for an organisation's data</u>	LifeWatch ERIC
<u>Execution of an existing bioinformatic workflow</u>	LifeWatch ERIC
<u>Development and implementation of a bioinformatic solution</u>	LifeWatch ERIC
<u>Development and deployment of AI-based solution for a specific service</u>	LifeWatch ERIC
<u>Support in using bioinformatics metagenomics workflow and Long Read De Novo Assembly</u>	UNITO/MIRRI-ERIC

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**TNA to Services & Facilities**

## **9. Remote consultancy**



9

## Remote consultancy

Within this section, a list of specialised consultancy services is provided to support research and development across various biological and microbiological domains. These services provide expert guidance on a range of topics, including **microbial genomics**, **bioinformatics**, and **AI applications**, ensuring that researchers have access to the latest scientific insights and technologies. Consultancy options cover areas such as **microbial culture collections**, **regulatory matters**, and the establishment of **connections with industry networks, including those in the U.S.** Specific consultancy services are also available to facilitate training programmes and provide expertise aligned with MIRRI Clusters of Expertise. Detailed descriptions of each consultancy service and the expertise available are provided in the subsections below.

All the services listed in this section are **accessed remotely**.

**Table 9.** List of available services considering remote consultancy.

Service	Installation	RI*
<u>Consultancy on topics aligned with the MIRRI Clusters of Expertise</u>	UMINHO-MUM	MIRRI-ERIC
<u>AI consultancy for a specific service</u>	LifeWatch ERIC	LifeWatch ERIC
<u>Bioinformatics consultancy for one specific service</u>	LifeWatch ERIC	LifeWatch ERIC
<u>Consultancy on microbial genomics, regulatory matters, training programmes, and connection to the U.S. agricultural industry</u>	Phytobiomes Alliance	Phytobiomes Alliance
<u>Consultancy to facilitate connections with U.S. and global microbial culture collections</u>	U.S. Culture Collection Network	Phytobiomes Alliance

\*RI - Research Infrastructure.





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